Final EIA Report 12/12/20/2526

PROPOSED RENEWABLE ENERGY GENERATION FACILITY ON PORTION 5 OF THE FARM GROOTKUIL 409 KQ, THABAZIMBI LOCAL MUNICIPALITY, WATERBERG DISTRICT MUNICIPALITY, LIMPOPO PROVINCE

Short name: Platinum Solar Park

October 2014

Commissioned by: Firefly Investments 224 (Pty) Ltd
Document version 2.0 – Final

AGES
Purpose with Passion

Proudly Supporting
TOUCHING AFRICA

Final EIA Report: **12/12/20/2526**

Prepared by

AGES

Purpose with Passion

Proposed renewable energy generation facility on Portion 5 of the Farm Grootkuil 409 KQ, Thabazimbi Local Municipality, Waterberg District Municipality, Limpopo province
Short name: Platinum Solar Park

October 2014

PROJECT APPLICANT

Company name:	**Firefly Investments 224 (Pty) Ltd (Reg. n. 2011/010966/07)**
Contact Person:	Ms Izel van Rooy (PlanWize)
Physical Address:	4th Floor Aloe Grove, Houghton Estate Office Park, 2 Osborn Road, Houghton 2198 - South Africa
Postal Address:	P.O. Box 225, Highlands North 2037, South Africa
Telephone Number:	+27 (0) 14 772 1758
Fax Number:	+27 (0) 14 772 1758
S.A. Mobile Number	+27 (0) 82 449 7626
E-mail:	info@fireflyinvestments224.com

ENVIRONMENTAL ASSESSMENT PRACTITIONER

Company Name:	AGES Limpopo (Pty) Ltd (Reg: 2006/020831/07)
Contact Persons:	Mr. Johan Botha / Ms. Engela Grobler
Physical Address:	120 Marshall Street, Polokwane, 0699, South Africa
Postal Address:	P.O. Box 2526, Polokwane, 0700, South Africa
Telephone Number:	+27 (83) 557 6494 / +27 0(15) 291 1577Tel
Fax Number:	+27 (15) 291 1577
E-mail:	**jbotha@ages-group.com/egrobler@ages-group.com**

AGES (Pty) Ltd

J.H. Botha (Senior Environmental Scientist – M.Sc. Environmental Management (*Pri Sci Nat)*
E Grobler (Environmental Scientist – M.Sc. Environmental Management (Univ of Stellenbosch)

REPORT DISTRIBUTION LIST

Name	Institution
Izel van Rooy	Firefly Investments 224 (Pty) Ltd
Tebogo Mapinga	Department of Environment Affairs (DEA) (2 copies)
Limpopo Office - Polokwane Mr. Ben Sengani	Department of Water Affairs
Mr. Mahlokoana	Limpopo Department of Agriculture, Forestry & Fisheries
Ms. Mashudu Marubini	National Department of Agriculture, Forestry & Fisheries
Ms. H Bezuidenhout Mr. John Geeringh Mr. Xander Neethling	Eskom
Ms. Masungi Tshuketana	Limpopo Department of Economic Development, Tourism and Environmental Affairs (LEDET)
Mr. P van Rensburg	Thabazimbi Local Municipality
	Registered Interested and Affected Parties

DOCUMENT HISTORY

Report no	Date	Version	Status
12/12/20/2526	July 2014	1.0	Draft
12/12/20/2526	October 2014	2.0	Final

PROJECT MAIN FEATURES

Project main features - according to the EIA guidelines
Summary of information included in the report

General site information

Site location	
Farm	**GROOTKUIL 409 KQ**
Portion	**5**
Surveyor-general 21 digit site	T0KQ00000000040900005
Local Municipality	Thabazimbi
District Municipality	Waterberg
Province	Limpopo

Property details	
Extent	563.9564 hectares
Land Owner	RUSTENBURG PLATINUM MINES LTD
Diagram deed number	T9142/924
Title deed number	T4817/2006
Registration date	20060116
Current land use	grazing

Site data	
Development area / footprint	190 hectares
Latitude	24° 57' 25" S
Longitude	27° 13' 10" E
Altitude	992 m to 1008 m a.m.s.l.
Ground slope	flat

Adjacent farm portions	
Farm	**GROOTKUIL 409 KQ**
Portion	**11**
Surveyor-general 21 digit site	T0KQ00000000041100011
Land Owner	RUSTENBURG PLATINUM MINES LTD
Diagram deed number	N/A
Title deed number	not registered yet
Registration date	not registered yet
Extent	±1.0 hectares
Current land use	N/A
Motivation of affection	new 132 kV power line
Farm	**WILDEBEESTLAAGTE 411 KQ**
Portion	**Remainder**
Surveyor-general 21 digit site	T0KQ00000000041100000
Land Owner	DORSLAND ONTWIKKELINGS PTY LTD
Diagram deed number	DB172/15
Title deed number	T33347/2000
Registration date	20000330
Extent	26.5828 hectares
Current land use	Spitskop HV substation
Motivation of affection	connection to the Eskom substation

Farm	**SPITSKOP 410 KQ**
Portion	**Remainder Portion**
Surveyor-general 21 digit site	T0KQ00000000041000001
Land Owner	Republic of South Africa (?)
Diagram deed number	T56447/2000
Title deed number	N/A
Registration date	N/A
Extent	800.0000 hectares
Current land use	grazing
Motivation of affection	N/A (adjacent farm portion)
Farm	**WILDEBEESTLAAGTE 411 KQ**
Portion	**10**
Surveyor-general 21 digit site	T0KQ00000000041100010
Land Owner	Phufane Game Lodge Close Corporation
Diagram deed number	T26985/994
Title deed number	T141994/2007
Registration date	20071017
Current land use	Game farm and hunting lodge
Motivation of affection	N/A (adjacent farm portion)
Farm	**GROOTKUIL 409 KQ**
Portion	**4**
Surveyor-general 21 digit site	T0KQ00000000040900004
Land Owner	RUSTENBURG PLATINUM MINES LTD
Diagram deed number	T9141/924
Title deed number	T143484/2003
Registration date	20031030
Extent	586.0435 hectares
Current land use	grazing
Motivation of affection	proposed access road
Farm	**LEEUWKOPJE 415 KQ**
Portion	**3 (Remaining Extent)**
Surveyor-general 21 digit site	T0KQ00000000041500003
Land Owner	NORTHAM INV PTY LTD
Diagram deed number	T93/1925
Title deed number	T30154/1973
Registration date	19730912
Extent	294.7947 hectares
Current land use	grazing
Motivation of affection	proposed access road
Farm	**ZWARTKLIP 405 KQ**
Portion	**2 (Remaining Extent)**
Surveyor-general 21 digit site	T0KQ00000000040500002
Land Owner	RUSTENBURG PLATINUM MINES LTD
Diagram deed number	G252/928
Title deed number	T1683711950
Registration date	19500828
Extent	1023.9159 hectares
Current land use	Union North Mine, Zwartklip town
Motivation of affection	N/A (adjacent farm portion)

PV power plant design specifications and connection to the Eskom grid

Project data	
Project name	**PLATINUM SOLAR PARK**
Technology	**Photovoltaic power plant**
Number of Phases	**1**
Maximum generating capacity at the delivery point	**up to 75 MW**
Type of PV modules	Thin-film or Mono/Polycrystalline
Type of mounting system	fixed or horizontal single-axis trackers (SAT)
Average annual energy production (up to)(*)	up to 160 GWh/year with fixed mounting system up to 190 GWh/year with trackers
Load factor (*)	0.223 with fixed mounting system 0.251 with trackers
Full net equivalent hours (EOH) (*)	1950 h/year (Wh/Wp/y) with fixed mounting systems 2200 h/year (Wh/Wp/y) with trackers
(*) calculated by PVSYST, simulation professional tool	

Technical specifications (*)	
Maximum generation capacity	**up to 75 MW**
Installed power capacity - AC side	**up to 77 MW**
Installed power capacity - DC side	**up to 86.25 MWp**
Number of PV modules	up to 638,900 thin film modules of 135 Wp up to 287,500 mono/polycrystalline modules of 300 Wp
Number of structures (PV arrays)	up to 24,570 fixed structures up to 15,1301-axis horizontal trackers (SAT)
Minimum structure height above ground level	0.8 m
Maximum structure height above ground level	3.1 m

Other information	
Fenced area	up to 190 ha
Footprint	up to 180 ha
PV power plant lifetime	25 - 30 years
Construction camp (temporary)	10 ha
Construction timeframe	approximately 15 months

Connection to the Eskom grid (**)	
Connection solution: description	The Platinum Solar Park will be connected to the Eskom Spitskop substation, located on the Remainder Portion of the Farm Wildebeestlaagte 411 KQ, adjacent to the project site. The new power line will be approximately 400 m long. As *alternative connection solution*, the Platinum Solar Park may be connected to one of the Eskom's 88 kV or 132 kV power lines running along the eastern and the southern boundary of the site (loop-in loop-out connection).
Point of connection	Eskom Spitskop substation
Point of connection (farm, portion)	Remainder Portion of Wildebeestlaagte 411 KQ
Delivery point: voltage level	88 kV or 132 kV
New power line - overall length	390 m
New HV substation inside the property - footprint	4,000 m^2
(**) already included in the current EIA application	

Water requirements	
Water consumption	See on paragraph 4.2.5 - water requirements

Site maps and GIS information

Status quo information - site	***ESRI shapefiles***
Site	Portion 5 of Grootkuil 409 KQ
Building and other structures	Possible Historical Period Structures
Agricultural field	Old fields
Natural and endangered vegetation areas	Vegetation and Sensitivity map
Cultural historical sites and elements	Possible Historical Period Structures
Contours with height references	2m contours
Slope analysis	2m contours
High potential agricultural areas	Not applicable

Status quo information surrounding areas	***ESRI shapefiles***
Cadastrals	Cadastrals
Rivers, streams and water courses	Brak Spruit, Phufane Spruit, Wetlands
Critical Biodiversity Areas and Ecological Support Areas	Not applicable

Development proposal maps	***ESRI shapefiles***
Position of solar facilities	PV arrays
Permanent laydown area footprint	Fenced area (footprint)
Construction period laydown footprint	Construction camp
Internal roads	Internal roads
River, stream, water crossing	Wetland area, access road
Substation and transformers	On-site HV substation
Connection routes	New high-voltage power line
Buildings	MV stations, On-site HV substation, control building, warehouses

Regional maps and GIS information

Description	***ESRI shapefiles***
Cadastrals	Cadastrals
Roads, types and category	Eskom road, D869
Railway lines and stations	Railway
Industrial areas	Union North Mine (Farm ZWARTKLIP 405 KQ)
Harbours and airports	not applicable
Electricity transmission and distribution lines	Eskom power lines Planned MASSA NGWEDI 400 kV power lines
Transmission and distribution substations	Eskom Spitskop substation
Critical Biodiversity Areas and Ecological Support Areas	Not applicable

Annexures

Layout and technical drawings of the PV Power Plants and of the connection infrastructure	Annexure A
Photos of the project site	Annexure B
Public Participation Process	Annexure C
Ecological Impact Assessment	Annexure D
Avifauna Impact Assessment	Annexure E
Agricultural Potential Assessment	Annexure F
Wetland Delineation Study	Annexure G
Heritage Impact Assessment	Annexure H1
Palaeontological Desktop Study	Annexure H2
Geo-technical Report	Annexure I
Visual Impact Assessment	Annexure J
Socio-economic Impact Assessment	Annexure K
Services Report	Annexure L
Draft Environmental Management Programme	Annexure M
Rehabilitation and Re-Vegetation Plan	Annexure M1
Alien Invasive Management Plan	Annexure M2
Rescue and Protection Plan	Annexure M3
Erosion Management Plan	Annexure M4
Open Space Management Plan	Annexure M5
Monitoring Guide	Annexure M6

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ANNEXURES

Annexure A Layout and technical drawings of the PV Power Plant and of the connection infrastructure:

- Vegetation Map
- Sensitivity Map
- PLSP_00.1_r1 Locality Map - Development Area and access road
- PLSP_00.2_r1 Development Area (preferred and alternative) and Sensitivity Map
- PLSP_01_r2 Layout plan - PV power plant up to 75 MW
- PLSP_02_r0 Mounting system - Alternative Option 1 (fixed mounting systems)
- PLSP_03_r0 Mounting system - Alternative Option 2 (SAT)
- PLSP_04_r0 Medium-voltage stations
- PLSP_06_r1 Control building and medium-voltage receiving station
- PLSP_07_r1 On-site High-voltage substation
- PLSP_08_r0 Warehouse
- PLSP_09_r0 High-voltage overhead power line - steel monopole structure

Annexure B Photos of the project site

Annexure C Public Participation Process

Annexure D Ecological Impact Assessment

Annexure E Avifauna Impact Assessment

Annexure F Agricultural Potential Assessment

Annexure G Wetland Delineation Study

Annexure H1 Heritage Impact Assessment

Annexure H2 Palaeontological Desktop Study

Annexure I Geo-technical Report

Annexure J Visual Impact Assessment

Annexure K Socio-economic Impact Assessment

Annexure L Services Report

Annexure M Draft Environmental Management Programme

Annexure M1 Rehabilitation and Revegetation Plan

Annexure M2 Alien Invasive Management Plan

Annexure M3 Rescue and Protection Plan

Annexure M4 Erosion Management Plan

Annexure M5 Open Space Management Plan

Annexure M6 Monitoring Guide

ABBREVIATIONS AND ACRONYMS

AGES	Africa Geo-Environmental and Engineering Consultants (Pty) Ltd
BID	Background Information Document
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CSP	Concentrating Solar Power
DAFF	Department of Agriculture, Fisheries and Forestry
DEA	Department of Environmental Affairs
DEAT	Department of Environmental Affairs and Tourism
DoE	Department of Energy
DWA	Department of Water Affairs
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIR	Environment Impact Assessment Report
EMP	Environmental Management Plan
ESS	Environmental Scoping Study
FIT	Feed in Tariffs
Firefly Investments 224	Firefly Investments 224 (Pty) Ltd (applicant)
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
LEDET	Limpopo Department of Economic Development, Tourism and Environmental Affairs
LEMA	Limpopo Environmental Management Act, 2004
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
Project site	Portion 5 of the Farm Grootkuil 409 K.Q.
Property	Portion 5 of the Farm Grootkuil 409 K.Q.
PV	Photovoltaic
REFIT	Renewable Energy Feed-in Tariffs
REIPPPP	Renewable IPP Procurement Programme
RFP	Request for Qualification and Proposals for New Generation Capacity under the Renewable IPP Procurement Programme
SAHRA	South African Heritage Resources Agency
SANRAL	South African National Roads Agency Limited
SANS	South African National Standard
UPS	Uninterruptible Power Supply

1. INTRODUCTION

Firefly Investments 224 (Proprietary) Limited (Reg. No. 2011/010966/07) is proposing the development of a renewable solar energy facility in a key strategic location in terms of the connection to the Eskom grid and in terms of favourable solar irradiation.

The proposed site is **Portion 5 of the Farm Grootkuil 409 KQ (563.95 ha), located in the Thabazimbi Local Municipality, Waterberg District Municipality, Limpopo Province,** 4 km West of Northam and 45 km South of Thabazimbi.

The selected area is located on a property which is part of the mining rights area of Rustenburg Platinum Mines (Pty) Ltd (Anglo American Platinum Limited) and is currently being used for grazing purposes. **The proposed solar park will help the Eskom grid to meet the high energy demand related to the mining activities conducted in the area (Union North Mine on the Farm Zwartklip 405 KQ). Furthermore, being a renewable energy plant which doesn't generate CO_2 emissions - it will help to compensate for the CO_2 emissions arising from these mining activities.**

The name of the project is **PLATINUM SOLAR PARK** and it envisages a **photovoltaic (PV) power plant having a maximum generating capacity of 75 MW**.

The **development area (fenced area)** of the proposed development will be up to **190 ha**, while the **footprint** will be approximately **180 ha**, within the fenced area. The remaining 10 ha include Eskom power lines crossing the planned development area.

Access to the project site will be from **Road D869**, North of the proposed development, via a new access road 8 m wide and approximately **1.3 km long**, which will run parallel to four existing Eskom 132 kV power lines. The first section (920 m) of the proposed access road will run over the eastern side of **Portion 3 (Remaining Extent) of the Farm LEEUWKOPJE 415 KQ,** starting where the present level crossing over the railway line is situated. The second section (1200 m) of the proposed access road will run over the western side of **Portion 4 of the Farm GROOTKUIL 409 KQ**, owned by the same landowner of the project site (Anglo American).

The existing "**ESKOM road**" - running parallel to the southern boundary of Portions 9 and 10 of the Farm Wildebeestlaagte 411 KQ, may be used as main access throughout the construction period, whereas, during the operational period, the northern access road will instead be used as formal access to the solar park.

The Platinum Solar Park will be connected to the **Eskom Spitskop substation**, located on the **Remainder of the Farm Wildebeestlaagte 411 KQ**, adjacent to the project site. The new power line will be approximately 470 m long and will cross Portion 11 of the Farm GROOTKUIL 409 KQ; this small farm portion (1.0 ha), which corresponds to the south-eastern corner of the project site, is not registered yet and it is owned by the same landowner of the project site site (Anglo American).

As *alternative connection solution*, the Platinum Solar Park may be connected to one of the Eskom 88 kV or 132 kV power lines running along the eastern and the southern boundary of the site (loop-in loop-out connection).

Site location: Portion 5 of the Farm GROOTKUIL 409 KQ

T	0	K	Q	0	0	0	0	0	0	0	0	0	4	0	9	0	0	0	0	5

New access road:
Portion 4 of the Farm GROOTKUIL 409 KQ
Portion 3 (Remaining Extent) of the Farm KQLEEUWKOPJE 415 KQ

T	0	K	Q	0	0	0	0	0	0	0	0	0	4	0	9	0	0	0	0	4
T	0	K	Q	0	0	0	0	0	0	0	0	0	4	1	5	0	0	0	0	3

Possible corridor of the new power line / underground cables for the connection to the Eskom Spitskop substation:
Portion 11 of the Farm GROOTKUIL 409 KQ (to-be-registered)
Remainder Portion of the Farm WILDEBEESTLAAGTE 411 KQ

T	0	K	Q	0	0	0	0	0	0	0	0	0	4	0	9	0	0	0	1	1
T	0	K	Q	0	0	0	0	0	0	0	0	0	4	1	1	0	0	0	0	0

The Platinum Solar Park is participating to the IPP Procurement Programme issued on 3 August 2011 by the DoE (Department of Energy).

In order to develop the facility, Firefly Investments 224 must undertake an Environmental Impact Assessment (EIA) process and acquire an environmental authorization from the National Department of Environmental Affairs (DEA), in consultation with the Limpopo Department of Economic Development, Tourism and Environmental Affairs (LEDET), under the terms of the EIA Regulations published in terms of Section 24(2) and 24D of the National Environmental Management Act (NEMA, Act No. 107 of 1998). This project has been registered with the **DEA application reference number 12/12/20/2526.**

The EIA procedure of the Platinum Solar Park **includes the connection to the Eskom grid.** Eskom is the entity which assessed the connection solution included and described in this EIA Report. Eskom also coordinated the necessary liaising between Firefly Investments 224, Eskom Transmission, Eskom Distribution and Eskom Land & Rights Department.

It is important to highlight that all or part of the infrastructure required for the connection may be owned and/or operated by Eskom Distribution, this will depend on the Eskom grid code in relation to the IPP's (Independent Power Producers) and on the Connection Agreement to be finalized prior to or simultaneously with the conclusion of the PPA (Power Purchase Agreement) in respect of the options of retaining ownership of the connection works once completed.

The independent Environmental Assessment Practitioners (EAP's) which have been appointed for the undertaking of the detailed environmental studies in compliance with the 2010 EIA Regulations are **AGES (Pty) Ltd.**

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 Firefly Investments 224; therefore they are 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 Platinum Solar Park are defined and evaluated in this EIA Report and its annexures.

2. MOTIVATION AND RATIONALE OF THE PLATINUM SOLAR PARK IN LIGHT OF THE REIPP PROCURMENT PROGRAMME REQUIREMENTS

2.1. THE CHOICE OF THE LIMPOPO PROVINCE AND THE SITE LOCATION

The Platinum Solar Park will be located in the Limpopo Province. The Limpopo Province has been identified by Firefly Investments 224 as an ideal macro area for establishing a solar PV plant on the basis of several important considerations:

- solar resource is exceptionally high: the *global horizontal irradiation* of the site is 2,094.4 kWh / m^2 / year;
- there are few green projects currently under development in Limpopo 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 desolate lands with low ecological and agricultural value;
- Limpopo province and the local municipalities and communities are eager to start establishing an eco-green image in consideration of the burden of CO_2 emissions they have to bear.

In addition to these very favourable characters in terms of desirability of renewable solar energy projects in the Limpopo province, the site of the Platinum Solar Park has been chosen by Firefly Investments 224 on the grounds of several considerations, in particular:

- the availability of an easy connection solution due to the presence of the **Eskom "Spitskop" substation,** adjacent to the project site;
- the flatness of the land;
- the location of the project in a property which is part of the mining right area of Rustenburg Platinum Mines (Pty) Ltd (Anglo American Platinum Limited). **The proposed solar park will help the Eskom grid to meet the high energy demand related to the mining activities conducted in the area (Union North Mine on the Farm Zwartklip 405 KQ). Furthermore, being a renewable energy plant which doesn't generate CO2 emissions - it will help to compensate the CO2 emissions arising from these mining activities.**

The project site is located in the **Thabazimbi Local Municipality**. The Thabazimbi Local Municipality has a **Spatial Development Framework Plan (SDF)** for the entire jurisdiction of Thabazimbi. In terms of the SDF, the subject property is located in Northam, a Municipal Growth Point and nearby Road P16/2 that has been identified as a Municipal Development Corridor.

The application property is located adjacent to the earmarked urban development boundary (or so-called urban edge) of Northam, on land that forms part of the Anglo American Platinum Mine's land.

The land uses typically found in this area are:

- Subsistence agriculture areas;
- Conservation areas and nature reserves;
- Tourism facilities and related activities;
- Formal and informal residential areas;
- Business of office nodes;
- Industrial and commercial areas;
- Mines (Anglo American Platinum); and
- Governmental uses.

The proposed solar park is a unique land use. It could sort under an industrial land use, but it could also be regarded as a land use supplementary to a residential, business and commercial area in view of its service delivery function (energy provision) and limited impact on

surroundings. The fact that the development is proposed adjacent to the urban area of Northam is very positive as it supports the Municipality's objective of compact development, i.e. by the combating of urban sprawl, use of infill development and optimal usage of existing infrastructure services and land owned by the mine. It should be noted that only a part of the property will be utilised for the envisaged Solar Park whilst the rest of the land will be retained as it is, i.e. land associated with the Swartklip Mine and guesthouse with natural vegetation for grazing by local game species.

The SDF states that: "*Service industries and light industries may develop in close proximity of residential areas*". The solar park can be regarded as a complementary use to other developments such as residential, business or commercial; therefore the location of the proposed solar park specifically on the outer edge of the Northam Town can be regarded as beneficial and in line with the SDF proposals. It should be noted that the location of the proposed facility should also be viewed in context of the existing Eskom infrastructure south-east of the application property, *i.e.* the **Eskom Spitskop transmission substation** and existing power lines traversing the property. Other Municipal infrastructure services are also located to the west of Northam town and include the existing oxidation ponds as well as the future Waste Water Treatment Works that are planned on Portion 3 of the Farm Leeuwkopje, 415 KQ. It could therefore be accepted that the area to the west of Northam towards the Swartklip Mine land owned by Anglo American is already used for service utilities, including mine activities, and that the proposed solar park actually harmonises well with these land uses.

The proposed development area will furthermore strengthen the development corridor of Road P16/2, which has been earmarked in the SDF as the main development corridor between Growth Point 1 (Thabazimbi) and Growth Point 2 (Northam). This is a development spine for the Municipal area where commercial, industrial and residential uses are encouraged.

The proposed solar park development can thus be considered in line with the Council's spatial planning guidelines. This application will therefore give effect to the goals set in the SDF for development in the Northam area, as well as along the Road P16/2 – Municipal Development Corridor.

Furthermore, in the light of the IPP procurement Programme requirements, the **Platinum Solar Park** has been developed according to the following main characteristics:

- the installed capacity is within the "eligible capacity" defined by the rules of the RFP (from 1 MW to 75 MW);
- the construction phase will last approximately 15 months and the PV plant will be able to begin commercial operation before the end of 2020 (pursuant to the Revised RFP issued in May 2014 by the DoE).

With specific reference to the Platinum Solar Park, Eskom has indicated that the project does not interfere with Eskom's present and future developments and do not affect negatively the voltage in the area. Eskom, as an interested and affected party, recognized the positive outcome of the project in terms of the possibility of meeting the local growth of the energy consumption that is expected.

2.2. NEED AND DESIRABILITY OF THE PROJECT

South Africa currently relies principally on fossil fuels (coal and oil) for the generation of electricity. At the present date, Eskom generates approximately 95% of the electricity used in South Africa. On the other hand, South Africa has a largely unexploited potential in renewable energy resources such as solar, wind, biomass and hydro-electricity to produce electricity as opposed to other energy types (fuel or coal).
South Africa's electricity supply still heavily relies upon coal power plants, whereas the current number of renewable energy power plants is very limited.

In the last few years, the demand for electricity in South Africa has been growing at a rate of approximately 3% per annum.
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.
.
The development of clean, green and renewable energy has been qualified as a priority by the Government of South Africa with a target goal for 2013 of 10,000 GWh, as planned in the Integrated Resource Plan 1 (IRP1) and with the Kyoto Protocol.
Subsequently the Department of Energy of South Africa (DoE) decided to undertake a detailed process to determine South Africa's 20-year electricity plan, called Integrated Resources Plan 2010-2030 (**IRP 2010**).

The IRP1 (2009) and the IRP 2010 (2011) 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 particular, the IRP 2010 highlights the necessity of commissioning 1200 MW with solar PV technology by the end of 2015.

In order to achieve this goal, the DoE recently announced a renewable energy IPP (Independent Power Producers) Procurement Programme.

The REIPP Procurement Programme, issued on 3rd August 2011, envisages the commissioning of 3725 MW of renewable projects (1450 MW with solar photovoltaic technology) capable of beginning commercial operation before the end of 2020.

Therefore, the development of photovoltaic power plants will represent a key feature in the fulfilment of the proposed target goal and the reduction of CO_2 emissions.

The purpose of the Platinum Solar Park is to add new capacity for the generation of renewable electric energy to the national electricity supply in compliance with the REIPP Procurement Programme and in order to meet the "sustainable growth" of the Limpopo province.

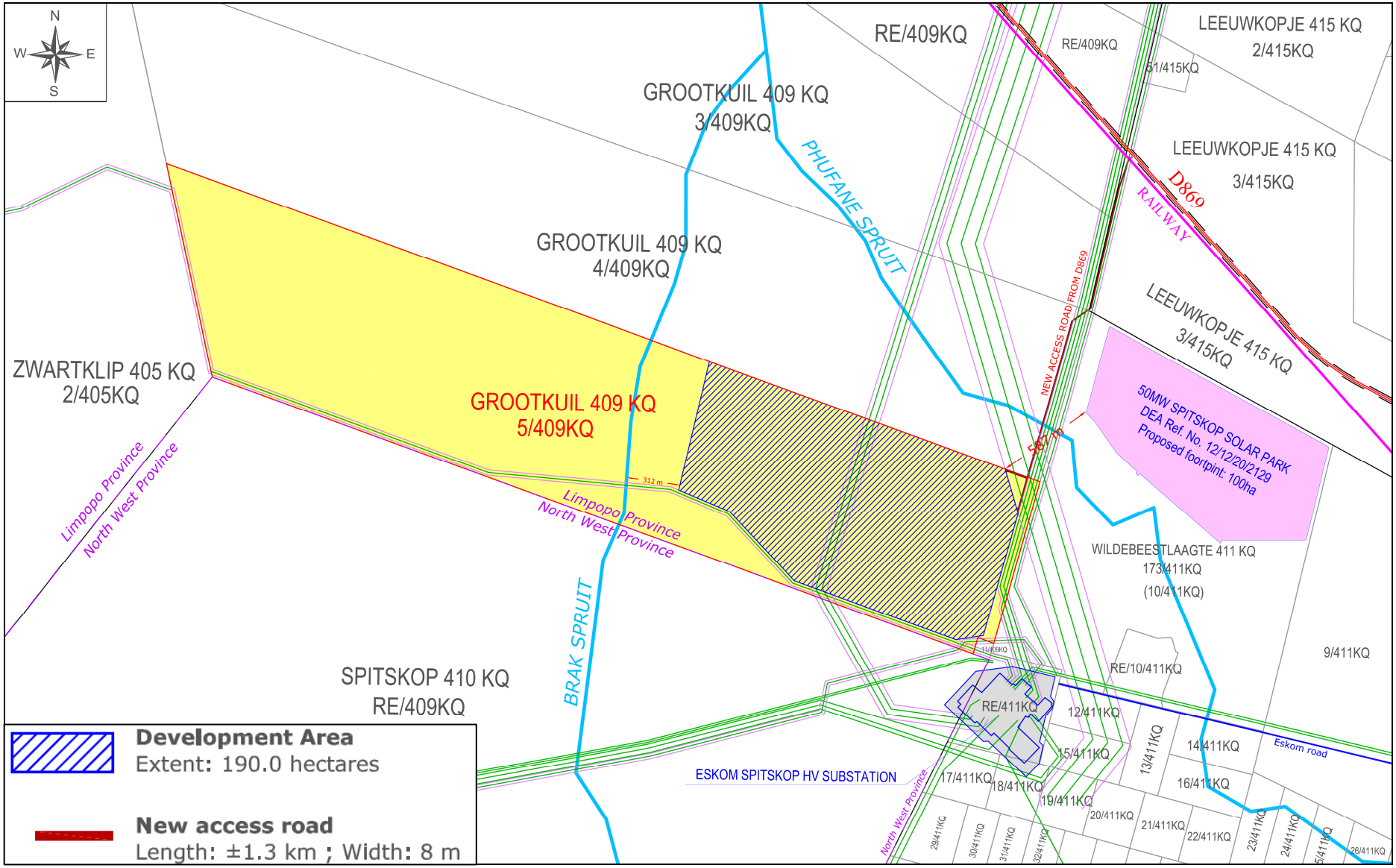
The use of solar radiation for power generation is considered a non-consumptive use and a renewable natural resource which does not produce greenhouse gas emissions. The generation of renewable energy will contribute to the growth of South Africa's electricity market, which has been primarily dominated 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 selected area is located on a property which is part of the mining rights area of Rustenburg Platinum Mines (Pty) Ltd (Anglo American Platinum Limited).

The reasons for the location of the project in the selected area can be synthesized 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
- attraction of environmentally aware (green) tourists to the area.

Figure 1: Locality map of the project site



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 Energy (DoE):* the Department is competent and responsible 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;
- *Department of Environmental Affairs (DEA):* the Department is competent and responsible for all environmental policies and is the controlling authority under the terms of NEMA and EIA Regulations. The DEA 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, in particular, issues the licence for independent power producers;
- *South African Heritage Resources Agency (SAHRA):* the 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):* the Agency is responsible for all National road routes.

3.1.2. Provincial Authorities

At provincial level, the main regulatory authority is the *Limpopo Department of Economic Development, Tourism and Environmental Affairs (LEDET):* the Department is responsible for environmental policies and is the Provincial authority in terms of NEMA and the EIA Regulations. The Department is also the commenting authority for the proposed project.
The project should comply with the *Limpopo Environmental Management Act, 2004* (LEMA).

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 Limpopo 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 *Thabazimbi Local Municipality* which is part of the *Waterberg District Municipality*.

Under the terms of the Municipal System Act (Act no. 32 of 2000), all municipalities are deemed to go through an Integrated Development Planning (IDP) process in order to devise a five-year strategic development plan for the area of reference.

The identification of priority areas for conservation and their positioning within a planning framework of core, buffer, and transition areas is the subject of bioregional planning. Priority areas are individuated and defined with reference to visual and scenic resources and their identification and protection is granted through visual guidelines drafted for the area included in bioregional plans.

The Thabazimbi Local Municipality has a **Spatial Development Framework Plan (SDF)** for the entire jurisdiction of Thabazimbi. In terms of the SDF, the subject property is located in Northam, a Municipal Growth Point and nearby Road P16/2 that has been identified as a Municipal Development Corridor.

The application property is located adjacent to the earmarked urban development boundary (or so-called urban edge) of Northam, on land that forms part of the Anglo American Platinum Mine's land.

The land uses typically found in this area are:

- Subsistence agriculture areas;
- Conservation areas and nature reserves;
- Tourism facilities and related activities;
- Formal and informal residential areas;
- Business of office nodes;
- Industrial and commercial areas;
- Mines (Anglo American Platinum); and
- Governmental uses.

The proposed solar park is a unique land use. It could sort under an industrial land use, but it could also be regarded as a land use supplementary to a residential, business and commercial area in view of its service delivery function (energy provision) and limited impact on surroundings. The fact that the development is proposed adjacent to the urban area of Northam is very positive as it supports the Municipality's objective of compact development, i.e. by the combating of urban sprawl, use of infill development and optimal usage of existing infrastructure services and land owned by the mine. It should be noted that only a part of the property will be utilised for the envisaged Solar Park whilst the rest of the land will be retained as it is, i.e. land associated with the Swartklip Mine and guesthouse with natural vegetation for grazing by local game species.

The SDF states that: "*Service industries and light industries may develop in close proximity of residential areas*". The solar park can be regarded as a complementary use to other developments such as residential, business or commercial; therefore the location of the proposed solar park specifically on the outer edge of the Northam Town can be regarded as beneficial and in line with the SDF proposals. It should be noted that the location of the proposed facility should also be viewed in context of the existing Eskom infrastructure south-east of the application property, *i.e.* the **Eskom Spitskop transmission substation** and existing power lines traversing the property. Other Municipal infrastructure services are also located to the west of Northam town and include the existing oxidation ponds as well as the future Waste Water Treatment Works that are planned on Portion 3 of the Farm Leeuwkopje, 415 KQ. It could therefore be accepted that the area to the west of Northam towards the Swartklip Mine land owned by Anglo American is already used for service utilities, including mine activities, and that the proposed solar park actually harmonises well with these land uses.

The proposed development area will furthermore strengthen the development corridor of Road P16/2, which has been earmarked in the SDF as the main development corridor between Growth Point 1 (Thabazimbi) and Growth Point 2 (Northam). This is a development spine for the Municipal area where commercial, industrial and residential uses are encouraged.

The proposed solar park development can thus be considered in line with the Council's spatial planning guidelines. This application will therefore give effect to the goals set in the SDF for development in the Northam area, as well as along the Road P16/2 – Municipal Development Corridor.

Local authorities also provide specific by-laws and policies in order 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 (S2): strategic environmental management goals and objectives of the government applicable within the entire Republic of South Africa to the actions of all organs of state, which may significantly affect the environment • NEMA EIA Regulations (GN R543, 544, 545, 546, & 547 of 18 June 2010) • 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 Member of the Executive Council of every province must establish a system of grading places and objects which form part of the national estate (S7) • Provision for the protection of all archaeological objects, paleontological sites and material and meteorites entrusted to the 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 the compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites for promotion of tourism (S44)
National Environmental Management: Biodiversity Act (Act no. 10 of 2004)	• Provision for the Member of the Executive Council for Environmental Affairs/Minister to

	publish a list of threatened ecosystems and in need of protection (S52) • Provision for the Member of the Executive Council 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 the present 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)
Limpopo Environmental Management Act (LEMA) (2004)	• No person may pick, import, export, transport, possess, cultivate or trade in a specimen of a specially protected or protected plant species. • The Appendices to the Act provide an extensive list of species that are protected. A permit is required for all these species, if they are expected to be affected by the proposed development.
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).	• The first Integrated Resource Plan (IRP1) was released in late 2009. Subsequently the DoE decided to undertake a detailed process to determine South Africa's 20-year electricity plan, called Integrated Resources Plan 2010-2030 (IRP 2010). • The IRP1 and the IRP 2010 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 particular, the IRP 2010 highlights the necessity of commissioning 1200 MW with solar PV technology by the end of 2015.**
Request For Qualification and Proposals For New Generation Capacity under the REIPP Procurement Programme (3 August 2011)	• The REIPP Procurement Programme, issued on 3rd August 2011 by the DoE, envisages the commissioning of **3725 MW** of renewable projects (**1450 MW with Solar photovoltaic technology**) **capable of beginning commercial operation before the end of 2020**.
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 involved in the proposed development are detailed in table 2 below:

Table 2: Listed Activities in terms of sections 24 and 24D of NEMA potentially involved in the proposed development

Relevant notice	Activity No.	Description
R.545, 18 June 2010	**1**	***The construction of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more*** The Platinum Solar Park will be established on **Portion 5 of the Farm Grootkuil 409 KQ** (563.95 ha), located in the Thabazimbi Local Municipality, Waterberg District Municipality, Limpopo province. The project will consist of construction, operation and maintenance of a Photovoltaic (PV) Power Plant with a generation capacity exceeding

		20 MW (up to 75 MW).
R.545, 18 June 2010	**15**	***Physical alteration of undeveloped, vacant or derelict land for industrial use where the total area to be transformed is 20 hectares or more*** The Photovoltaic Power Plant with associated infrastructure and structures will be constructed and operated on a development area of 190 ha within a farm portion measuring 563.95 ha. The project will be established on undeveloped land and the proposed activity is regarded as "industrial".
R.544, 18 June 2010	**10**	***The construction of facilities or infrastructure for the transmission and distribution of electricity:*** ***Outside urban areas or industrial complexes with a capacity of more than 33 kilovolts but less than 275 kilovolts*** The project will be established outside urban areas. The connection to the Eskom grid will be done according to the Eskom connection solution, which may require: (i) one small on-site high-voltage substation with one or more high-voltage power transformer(s) stepping up the voltage to the voltage of the Eskom grid (88 kV or 132 kV), a high-voltage busbar with protection an metering devices ("switching station") and a control building; (ii) a new 88 kV or 132kV power line, approximately 470 m long, for the connection of the solar park to the Eskom Spitskop substation, located on the Remainder Portion of the Farm Wildebeestlaagte 411 KQ, adjacent to the project site; (iii) a spare 88 kV (or 132 kV) feeder bay to be equipped at the Eskom Spitskop substation. As alternative connection solution, the Platinum Solar Park may be connected to one of the Eskom's 88 kV or 132 kV power lines running along the eastern and the southern boundary of the project site (loop-in loop-out connection). The connection may also entail interventions on the Eskom grid according to Eskom's connection requirements/solution.
R.544, 18 June 2010	**11**	***The construction of infrastructure or structures covering 50sq.m. or more, where such construction occurs within a watercourse or within 32m of a watercourse, measured from the edge of a watercourse,*** The new access road will cross the Phufane Spruit on Portion 4 of the Farm GROOTKUIL 409 KQ. A stream crossing is envisaged.
R.544, 18 June 2010	**18**	***The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, or rock or more than 5 cubic metres from:*** ***(i) a watercourse*** The new access road will cross the Phufane Spruit on Portion 4 of the Farm GROOTKUIL 409 KQ. A stream crossing is envisaged.

R.544, 18 June 2010	**22**	***The construction of a road, outside urban areas,*** ***(i) with a reserve wider than 13.5 metres*** Access to the project site will be from Road D869, North of the proposed development, via a new access road 8 m wide and approximately 1.3 km long, which will run parallel to four existing Eskom 132 kV power lines. The first section (920 m) of the proposed access road will run over the eastern side of Portion 3 (Remaining Extent) of the Farm LEEUWKOPJE 415 KQ, starting where the present level crossing over the railway line is situated. The second section (1200 m) of the proposed access road will run over the western side of Portion 4 of the Farm GROOTKUIL 409 KQ, owned by the same landowner of the project site (Anglo American). During the construction phase, the road reserve may be wider than 13.5 meters in order to allow the transportation of abnormal loads (e.g. the high-voltage step-up transformers of the new on-site high-voltage substation). Internal roads will be maximum 8 m wide with a road reserve maximum 12.0 m wide. At the turning points / intersection points the road reserve may be wider than 13.5 m due to the shape of the intersection / turning points.
R.546, 18 June 2010	**14**	***The clearance of an area of 5 hectares or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation,*** ***a) In Limpopo: All areas outside urban areas.*** The Photovoltaic Power Plant with associated infrastructure and structures will be constructed and operated on a development area of 190 ha within a farm portion measuring 563.95 ha. The required footprint (180 ha) should be cleared from the existing indigenous vegetation (bushes and trees).

The current EIA procedure of the Platinum Solar Park **includes the connection to the Eskom grid.** Furthermore, a part of the connection infrastructure (the busbar of the in-site substation and the power line) may be executed, owned and operated by Eskom.

Final layout and site plans drafted by Firefly Investments 224 have been completed following the inputs received via public participation. All information acquired have been analysed in order to determine the proposed final development layout and site plans.

Such approach ensures 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. It must also be pointed out that this application and all other development applications, in the area, are considered together in order to ensure general sustainability in the Thabazimbi Local Municipality and in the Waterberg District Municipality 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 up to 75 MW.**
The construction timeframe is estimated in approximately 15 months, whereas the commissioning date will depend on the REIPP Procurement Programme timeframe.

The preferred technical solutions envisage:

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

The estimated annual energy production is calculated in approximately:

- **1,950 kWh/kWp/year** (load factor = 0.223), in the case of PV modules mounted on fixed mounting systems; or
- **2,200 kWh/kWp/year** (load factor = 0.251) in the case of PV modules mounted on trackers.

Therefore, the Platinum Solar Park will generate:

- **160.1 GWh per year** in the case of PV modules mounted on fixed systems; or
- **190.1 GWh per year** in the case of PV modules mounted on trackers.

The calculation is made by the professional tool "PVSYST" and the simulation is done for 1 MWp (1 "PV field").
The site data (irradiation, temperature, etc.) charged on the database consists of hourly meteo-data registered by NASA satellites (NASA-SSE satellite data 1983-1993, release 6) and the simulation is made for the timeframe of 1 year.
The output (1,950 kWh/kWp/year and 2,200 kWh/kWp/year) is also called “full net equivalent hours”, which represent the average energy injected into the grid per 1 kWp of installed capacity.

The *global horizontal irradiation* of the site is 2,094.4 kWh/m^2/year (NASA-SSE satellite data, 1983-1993, release 6).

The energy generated by the Platinum 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 Platinum Solar Park.

The quantity of the avoided CO_2 is calculated as follows: the energy produced by the Platinum Solar Park (up to 160.1 GWh/y or 190.1GWh/y) is multiplied by the Eskom’s average emission factor which is 1.015 t CO_2/MWh (*source*: Energy Research Centre, University of Cape Town. (2009 *Carbon accounting for South Africa*).

This means that, in the case of the Platinum Solar Park, the **avoided CO_2 emissions** are approximately **192,931 tons of CO_2 per year** in the case of PV modules mounted on fixed mounting systems, or **162,564 tons of CO_2 per year** in the case of PV modules mounted on trackers.

Considering that 1 kg of coal generates approximately 3.7 kWh (supposing a caloric value of 8000 kcal/kg and a coal plant efficiency of 40%), **the coal saved by the Platinum Solar Park will be approximately 51,373 tons of coal / year** in the case of PV modules mounted on fixed mounting systems, or **43,287 tons of coal / year** in the case of PV modules mounted on trackers.

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

4.1. PROJECT LAYOUT

The layout of the proposed development is the result of a comparative study of various layout alternatives and had been defined in consideration of the results of some specialists 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 25-30 years.

The main drives of the chosen layout were:

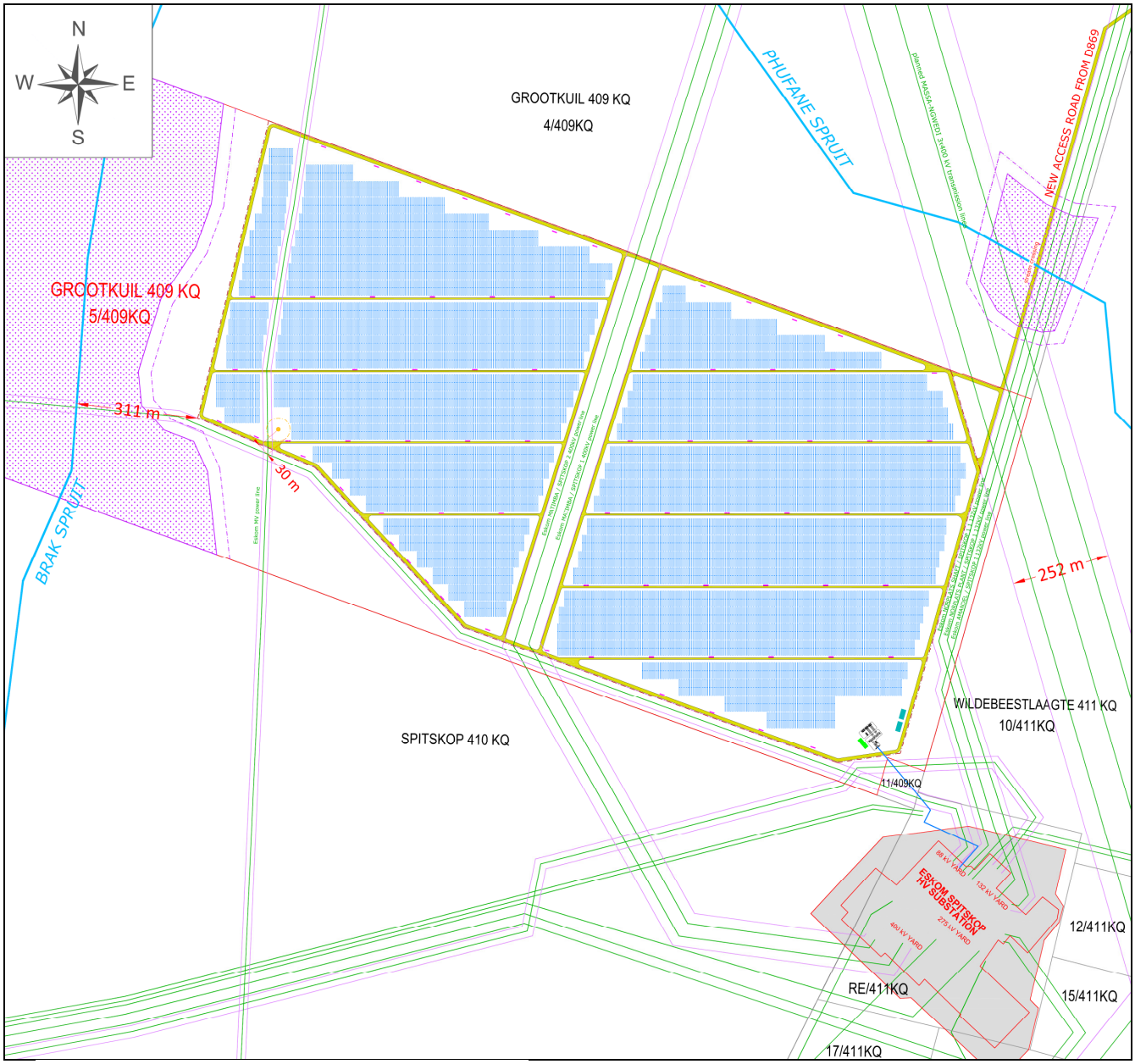
- to maximize the energy production, by choosing the best performing mounting system technology: thin-film or mono/polycrystalline solar modules mounted on single-axis horizontal trackers (SAT) or on fixed mounting systems;
- to locate the PV solar park on the eastern side of the property, avoiding the high-sensitivity zone of the central part of the property, affected by the *Brak Spruit* and associated wetland area;
- to avoid the western side of the farm, due to the presence of old fields, pursuant to the guidelines of the DAFF, which don't allow the development of renewable energy projects on areas which have been cultivated in the last 10 years;
- to avoid the *possible* Historical Period concrete wall feature (rated as low heritage significance by the Heritage specialist) found on the south-western corner of the proposed development area, providing a 30 m buffer.

The project layout of the Platinum Solar Park is set out in Figure 2 below.

The project layout and the other plant components are detailed in the following drawings of the Annexure A:

- PLSP_00.1_r1 Locality Map - Development Area and access road
- PLSP_01_r2 Layout plan - PV power plant up to 75 MW
- PLSP_02_r0 Mounting system - Alternative Option 1 (fixed mounting systems)
- PLSP_03_r0 Mounting system - Alternative Option 2 (SAT)
- PLSP_04_r0 Medium-voltage stations
- PLSP_06_r1 Control building and medium-voltage receiving station
- PLSP_07_r1 High-voltage substation
- PLSP_08_r0 Warehouse
- PLSP_09_r0 High-voltage overhead power line - steel monopole structure

Figure 2: Proposed Layout plan of the Platinum Solar Park



PROJECT SITE
Portion 5 of the Farm GROOTKUIL 409 KQ
Thabazimbi Local Municipality
Waterberg District Municipality
Limpopo province
LPI code: T0KQ00000000040900005
Extent: 563.9564 hectares
24° 57' 25" S ; 23° 13' 10" E

Fenced area
Extent: 190 ha

PV arrays

Medium voltage stations

High-voltage substation
2 x 40 MVA power transformers

Medium voltage receiving station and control building

new 132kV power line
Length: ±470 m

Warehouses

Internal roads

Eskom power lines and servitudes

Wetland area and 32 m buffer

Possible Historical Period concrete wall feature and 30 m buffer - Low heritage significance

4.2. PRIMARY COMPONENTS

The Photovoltaic (PV) Power Plant together with its connection infrastructures and structures will require the installation of the following equipment:

- Photovoltaic modules (monocrystalline, polycrystalline or thin-film solar modules)
- Mounting systems (fixed or single-axis horizontal trackers) for the PV arrays 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)
- Workshop & warehouses
- one small **on-site high-voltage substation** with high-voltage power transformers, stepping up the voltage to the voltage of the Eskom's grid (88 or 132 kV) and a 88 kV (or 132 kV) busbar with metering and protection devices and a control building (also called "**switching station**") - to be located within the PV plant development area
- a new power line - 470 m long - for the connection to the **Eskom Spitskop substation**
- A spare 88 kV (or 132 kV) feeder bay to be equipped at the Eskom Spitskop substation
- Electrical system and UPS (Uninterruptible Power Supply) devices
- Lighting system
- Grounding system
- External access road over Portion 4 of the Farm Grootkuil 409 KQ and Portion 3 (Remaining Extent) of the Farm Kqleeuwkopje 415 KQ
- Internal roads
- Fencing of the site and alarm and video-surveillance system
- Water access point and water extraction on-site borehole(s) point, water supply pipelines, water treatment facilities
- sewage system (*Ballam Waterslot* or *Lilliput* system).

The connection may also entail interventions on the Eskom grid according to Eskom's connection requirements/solution.

During the construction phase, the site may be provided with additional:

- water access point and water extraction on-site borehole(s) point, water supply pipelines, water treatment facilities;
- pre-fabricated buildings;

to be removed at the end of construction.

As *alternative connection solution*, the Platinum Solar Park may be connected to one of the Eskom's 88 kV or 132 kV power lines running along the eastern and the southern boundary of the site (loop-in loop-out connection).

Table 3: Project components

Component	Description/ Dimensions
Property / Project site	**Portion 5 of Farm Grootkuil 409 KQ** Thabazimbi Local Municipality Waterberg District Municipality Limpopo Province LPI codes: T0KQ00000000040900005 Latitude 24° 57' 25" S Longitude 27° 13' 10" E
PV plant footprint	**PV plant footprint (fenced area): up to 190 ha on the south eastern side of the property (Portion 5 of Farm Grootkuil 409 KQ)** Geo-graphical coordinates of the footprint / security fence: P01: 24°57'24.9" S, 27°13'42.6" E P02: 24°57'48.2" S, 27°13'35.4" E P03: 24°57'49.0" S, 27°13'29.6" E P04: 24°57'37.8" S, 27°12'55.6" E P05: 24°57'24.6" S, 27°12'42.0" E P06: 24°57'20.5" S, 27°12'31.3" E P07: 24°56'55.8" S, 27°12'37.7" E P08: 24°57'16.4" S, 27°13'39.9" E
Site access	Access to the project site will be from **Road D869**, North of the proposed development, via a new access road 8 m wide and approximately **1.3 km long.** <u>Access point from the secondary road coming from Road **D869:**</u> Latitude: 24° 56' 16.3"S Longitude: 27° 14' 06.6"E <u>Turning point 1:</u> Latitude: 24° 56' 45.6" S Longitude: 27° 13' 57.7" E <u>Turning point 2:</u> Latitude: 24° 56' 48.1" S Longitude: 27° 13' 53.9" E <u>Gate at the PV plant security fence / footprint:</u> Latitude: 24° 57' 24.3" S Longitude: 27° 13' 42.4" E
Generation capacity	up to 75 MW
Proposed technology	The preferred technical solutions are: **PV solar modules**: thin-film modules or monocrystalline or polycrystalline modules **Mounting systems:** fixed mounting systems or single-axis horizontal trackers (SAT)
Panel Dimensions	It depends on the technical solutions and electrical configuration. In any case the minimum and maximum height above the ground level will not exceed the values indicated at the item below.
Height of PV module supporting structures from ground level	maximum height (highest point of the PV arrays): 3.1 m above the ground level minimum height (lowest point of the PV arrays): 0.7 m above the ground level

Width and length of internal roads	The main internal road around the security fence is max. 8.0 m wide and approximately 5.7 km long. **<u>Main Internal Road around the security fence</u>** FIR01: 24°57'24.9" S, 27°13'42.4" E FIR02: 24°57'48.0" S, 27°13'35.1" E FIR03: 24°57'48.8" S, 27°13'29.6" E FIR04: 24°57'37.7" S, 27°12'55.7" E FIR05: 24°57'24.4" S, 27°12'42.1" E FIR06: 24°57'20.3" S, 27°12'31.7" E FIR07: 24°56'56.3" S, 27°12'38.0" E FIR08: 24°57'16.5" S, 27°13'39.7" E Secondary internal roads are 4.0 m wide (max. 5.0 m wide) and max. 9.7 km long **<u>Internal Roads</u>** <u>East to West</u> IR1: 24°57'16.3" S, 27°13' 37.8" E / IR1: 24°57'16.5" S, 27°13' 10.8" E IR2: 24°57'22.4" S, 27°13' 41.4" E / IR2: 24°57'22.5" S, 27°13' 08.7" E IR3: 24°57'28.5" S, 27°13' 41.0" E / IR3: 24°57'28.5" S, 27°13' 06.6" E IR4: 24°57'34.4" S, 27°13' 39.2" E / IR4: 24°57'34.5" S, 27°13' 04.5" E IR5: 24°57'40.4" S, 27°13' 37.4" E / IR5: 24°57'40.5" S, 27°13' 06.0" E IR6: 24°57'10.5" S, 27°13' 08.7" E / IR6: 24°57'10.6" S, 27°12' 34.3" E IR7: 24°57'16.5" S, 27°13' 06.6" E / IR7: 24°57'16.5" S, 27°12' 32.8" E IR8: 24°57'22.5" S, 27°13' 04.6" E / IR8: 24°57'22.6" S, 27°12' 38.4" E IR9: 24°57'28.5" S, 27°13' 02.5" E / IR9: 24°57'28.6" S, 27°12' 46.7" E <u>North to South</u> IR1: 24°57'08.1" S, 27°13' 13.4" E / IR1: 24°57'39.7" S, 27°13' 02.5" E IR2: 24°57'06.9" S, 27°13' 10.1" E / IR2: 24°57'38.6" S, 27°12' 59.2" E
Height of Fencing	security fence around the footprint: maximum height: 3.0 meters above the ground level
New on-site high-voltage substation	**<u>On-site high-voltage substation - within the fenced area</u>** Substation Fence: 60 m x 60 m Substation Footprint: 0.36 ha Latitude 24° 57' 46.7" S Longitude 27° 13' 32.7" E
Loop-in loop-out lines (Preferred connection solution)	**88 kV (or 132 kV) power line for the connection to a spare 88 kV (or 132 kV) feeder bay at the Eskom "Spitskop Substation** Length: 470 m <u>Starting point from **On-site high-voltage substation**</u> Latitude: 24° 57' 47.7"S Longitude: 27° 13' 33.3"E <u>Turning point 1:</u> Latitude: 24° 57' 52.9" S Longitude: 27° 13' 38.1" E <u>Turning point 2:</u> Latitude: 24° 57' 53.9" S Longitude: 27° 13' 37.5" E

	Turning point 3: Latitude: 24° 57' 55.9" S Longitude: 27° 13' 42.4" E 88 kV (or 132 kV) spare feeder bay at the **Spitskop Substation** Latitude: 24° 57' 57.7" S Longitude: 27° 13' 40.7" E

4.2.1. Project functioning and connection of the solar park to the Eskom grid

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:

- thin-film modules or mono / polycrystalline modules, mounted on:
- fixed mounting systems or mounted on 1-axis horizontal trackers (SAT), 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 (thin-film, mono-crystalline or polycrystalline) 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 development area - corresponding on the fenced area - will not exceed 190 ha, and the maximum height of the structures (PV modules and support frames) will be approximately 3.1 m above the ground level. Therefore the impacts and mitigation measures will not change. For further reference please refer to section 5.2.

The following description refers to “thin-film PV modules on fixed mounting systems” and “polycrystalline modules on trackers”, but the combination of “thin-film PV modules on trackers” and “polycrystalline PV modules on fixed mounting systems” are also possible and feasible.

The required **development area** (fenced area) will not exceed **190 ha.**

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 3.1 meters above ground level**.

Figure 3: Lateral views of PV arrays mounted on fixed mounting systems

Figure 4: Frontal view of PV arrays mounted on fixed mounting systems

For further details, Please refer to the Figures 3 and 4 above and to the drawing of the Annexure A:

- PLSP_02_r0 *Mounting System – Alternative option 1: fixed mounting systems*

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 a 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 **3.1 meters above ground level**.

Figure 5: Simulation views of the PV arrays mounted on horizontal 1-axis tracker

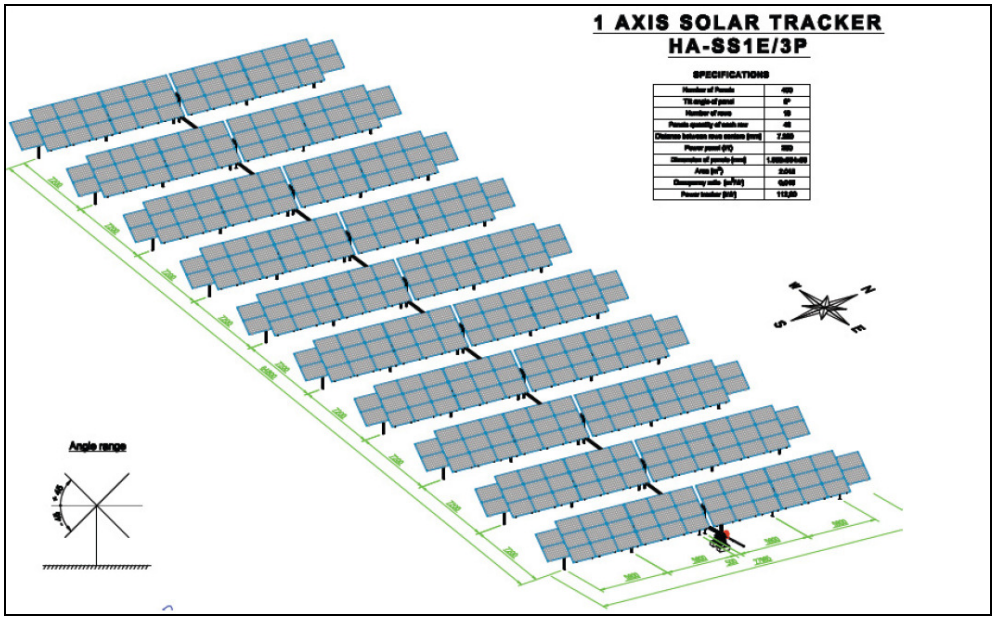


Figure 6: Frontal views of the PV arrays mounted on horizontal 1-axis tracker

For further details, see also the drawing of the Annexure A:

- PLSP_03_r0 *Mounting System – Alternative option 2: horizontal single-axis trackers*

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 **75 medium voltage stations**. Each station comprises two adjacent prefabricate buildings designed to host two **DC/AC inverters**, with a total nominal output AC power of 1,000 kW, and a **medium voltage power transformer** of 1000 kVA. The DC/AC inverters are deemed to convert direct current (DC) into alternate current (AC) at low voltage (270 V); subsequently the AC will pass through a medium-voltage transformer in order to increase the voltage up to 22 kV (or 11 kV).

The medium-voltage stations are detailed in the drawing of the Annexure A:

- PLSP_04_r0 *Medium-voltage stations*

The energy delivered from the 75 medium voltage stations will be collected into one (or more) **medium voltage receiving station**(s), parallel connecting all the 75 PV fields of the PV generator.

From the medium voltage receiving station, the energy will be delivered to two high-voltage power transformers (40 MVA each, plus one as spare), which will step up the electric energy from the medium voltage level (11 kV or 22 kV) to the Eskom required connecting voltage (i.e. 88 kV or 132 kV). The power transformers will be connected to an on-site 88 kV or 132 kV busbar (the so called "***switching station***"), to be equipped with protection and metering devices, according to Eskom requirements.

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**.**

Furthermore, two **metering devices and related kiosks** are foreseen inside the layout: one for Eskom, close to the busbar, and one for Firefly Investments 224, close to the power transformers. The kiosks (2.4 x 4.8 x 3.2 m) will contain the peripheral protection and control cabinets and the metering devices. The HV substation composed of the power transformers, the control building, the 88 kV or 132 kV busbar with protection and metering devices and the kiosks, will have a **footprint covering approximately 4,000 m^2**.

The new power line and the busbar (*switching station*) of the on-site HV substation may be owned and operated by Eskom Distribution.

The layout of the on-site high-voltage substation as well as of the control building and the subdivision between Eskom's side and Firefly Investments 224's side are detailed in the drawings included in Annexure A:

- PLSP_06_r0 *Control building and medium-voltage receiving station*
- PLSP_07_r0 On-site *High-voltage substation*

A **new 88 kV or 132 kV power line - 470 m long** - is required in order to connect the PV plant high-voltage substation (within the development area) to the **Eskom Spitskop substation**, located on the Remainder Portion of the Farm Wildebeestlaagte 411 KQ, adjacent to the project site. At the Eskom Spitskop substation, a spare 88 kV (or 132 kV) feeder bay will be commissioned and equipped.

The new 88 kV or 132 kV power line will consist of a series of steel structures (steel monopole) supporting the electrical cables and a communication cable, to be installed approximately 200 - 260 m apart. The proposed structures will be between 18 m and 25 m high and the basement of each tower will have a footprint of approximately 0.5 m^2.

Please refer to the drawing of the Annexure A:

- PLSP_09_r0 *New 132 kV power line: steel monopole structure*

The power generation capacity at the delivery point will be up to 75 MW.

4.2.2. Access road and internal roads

4.2.2.1. Access road

Access to the project site will be from **Road D869**, North of the proposed development, via a new access road 8 m wide and approximately **1.3 km long**, which will run parallel to four existing Eskom 132 kV power lines.

The first section (920 m) of the proposed access road will run over the eastern side of **Portion 3 (Remaining Extent) of the Farm LEEUWKOPJE 415 KQ,** starting where the present level crossing over the railway line is situated.
The second section (1200 m) of the proposed access road will run over the western side of **Portion 4 of the Farm GROOTKUIL 409 KQ**, owned by the same landowner of the project site (Anglo American).

The new access road will cross the **Phufane Spruit** at 24° 57' 11.2" S, 27° 13' 46.7" E, on Portion 4 of the Farm GROOTKUIL 409 KQ. For this reason, listed activities **11 and 18 of GN R 544** have been applied for. It is provisionally proposed that the stream crossing will be achieved using suitable corrugated iron culverts on a **1:1 year flood return period**.
A higher stream crossing, designed e.g. on the basis of a 1:50 year flood line, is not recommended, considering that most of the traffic is expected only during the 15 month construction period, while during operation the traffic to and from the site will be very low and without specific requirements (only normal vehicles / cars of the operational team).
Please refer to the Services Report (Annexure L) for details of the stream crossing.

A Water Licence Application will be submitted to the DWA with regard to the stream / wetland crossing.

The relevant servitudes will be registered over the affected properties (*i.e.* Portion 3 of the Farm LEEUWKOPJE 415 KQ and Portion 4 of the Farm GROOTKUIL 409 KQ) in favor of the Platinum Solar Park development in order to establish an access road.

The new access road is depicted in the drawings of the Annexure A:
- PLSP_00.1_r1 Locality Map - Development Area and access road
- PLSP_00.2_r1 Development Area (preferred and alternative) and Sensitivity Map

Table 4: Geographical co-ordinates of the new access road

Geographical co-ordinates of the new access road		
Point	**Latitude**	**Longitude**
access point from Road D869 (existing level crossing)	24° 56' 16.4" S	27° 14' 06.6" E
turning point 1	24° 56' 17.3" S	27° 14' 05.6" E
turning point 2	24° 56' 22.4" S	27° 14' 03.7" E
turning point 3	24° 56' 45.6" S	27° 13' 57.8" E
turning point 4	24° 56' 48.1" S	27° 13' 53.9" E
stream crossing (Phufane Spruit)	24° 57' 11.2" S	27° 13' 46.7" E
final point (up to the PV plant security fence):	24° 57' 24.3" S	27° 13' 42.5" E

The existing "**ESKOM road**" - running parallel to the southern boundary of Portions 9 and 10 of the Farm Wildebeestlaagte 411 KQ, may be used as main access throughout the construction period, whereas, during the operational period, the northern access road will be used instead as formal access to the solar park.

4.2.2.2. Internal roads

Internal roads will consist of gravel roads designed in accordance with engineering standards. The roads will have a maximum width of 8.0 meters allowing for the slow moving heavy vehicles.

Once the solar farm 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.

4.2.3. Lighting system

The lighting system will consist of the following equipment:

- Floodlight-towers: max. 10 meters high, with 6x400W directional lamps, installed around the HV 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, max. 5.5 meters high, every 20 meters, having a metal-haloids lamp of 400 W.
- 2x400 W spotlights (SAP type) mounted on the top of medium-voltage stations.

The lighting of the MV stations and on-site HV substation will be on only in case of intrusion/emergency or necessity to reach the MV stations 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).

4.2.4. Storm water 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 the existing drainage patterns will be left undisturbed.

4.2.5. Water requirements

4.2.5.1. Water requirements during the construction phase

The construction timeframe is estimated to be approximately **15 months.**

A) Construction of internal gravel roads

- Water is necessary for the construction of internal gravel roads, in order to get the gravel compacted to optimum moisture content (OMC).
- The surface of internal gravel roads will be approximately 100,000 m^2.
- 50 liters of water / m^2 of internal of roads will be required.

B) Workers

- Approximately 100 people are expected to be employed during the construction period, although this number can increase to 200 for short spaces of time during peak periods. Each worker needs 30 liters / 8 working hours for sanitary use.

- Water consumption will be:
  - 100 people x 20 l/person x 330 working days = 660 m^3 over 15 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 and the warehouse and for the foundations of the mounting systems. The overall amount of concrete to be produced will be approximately 10,000 m^3 per project.
- 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 no 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.

The overall and average water consumption during construction is detailed in the following table.

Table 5: Water consumption during the construction phase of the project

WATER REQUIREMENT DURING THE CONSTRUCTION PHASE OF THE PROJECT		
DESCRIPTION	**UNIT**	**TOTAL**
Timeframe of the construction activities	*months*	15
Timeframe of the construction activities	*days*	450
Timeframe of the construction activities	*working days*	330
Overall water consumption for internal roads	m^3	5,000
Overall water consumption for sanitary use	m^3	660
Overall water consumption for concrete production	m^3	2,000
OVERALL WATER CONSUMPTION	***m^3***	**7,660**
OVERALL WATER CONSUMPTION	***m^3/day***	**17.0**
EQUIVALENT WATER FLOW OVER 15 MONTHS (450 DAYS)	***l/s***	**0.20**

Storage tanks will be sized in order to provide a reserve of water approximately **200 cubic meters**.

4.2.5.2. Water requirements during the operational phase

During operation, water is only required for the operational team on site (sanitary use), as well as for the cleaning of the 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 25 - 30 years.
The Platinum Solar Park will be in operation 7 days per week; therefore personnel will operate according to shifts. The surveillance team will be present during day-time, night-time and weekends. The average number of people working at the site on the same time will be of **14 people daytime and 6 people at night**.

The average daily water consumption for sanitary use is estimated to be **60 litres** / **day** / **person** per **20 people** (14 people daytime and 6 people at night), The daily water consumption will be approximately **1,200 litres/day.**

B) Water consumption to clean the PV modules

The cleaning activities of the solar panels will take place **twice per year**.

It is assumed that up to 1.0 liters per m^2 of PV panel surface will be needed.
The amount of water for cleaning is up to **850 m^3 per cleaning cycle**, therefore **1,700 m^3per annum.**

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 **1,200 liters/day** over 12 months for sanitary use (i.e. **36,000 l/month** and **438 m^3/year**).

The water consumption will increase to **72,200 liters/day** during the cleaning of the solar modules (71,000 liters/day for cleaning activity and 1,200 for sanitary use), which will last less than a month and will occur twice a year during the dry period. PV modules are conceived as self-cleaning when it rains.

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.

The overall and average water consumption during operation is detailed in the table below.

Table 6: Water consumption during the operational phase of the project

WATER REQUIREMENT DURING THE OPERATIONAL PHASE OF THE PROJECT		
DESCRIPTION	**UNIT**	**TOTAL**
Average daily water consumption for sanitary use	*l/day*	1,200
Average daily water consumption during cleaning activity (*)	*l/day*	72,200
Average monthly water consumption for sanitary use (over 30 days)	*l/month*	36,000
Annual water consumption for sanitary use	***m^3/year***	**438**
Annual water consumption for PV modules cleaning activities (twice/year)	***m^3/year***	**1,700**
ANNUAL WATER CONSUMPTION DURING OPERATION	***m^3/year***	**2,138**
DAILY WATER CONSUMPTION DURING OPERATION (average over 365 day)	***m^3/day***	**5.86**
EQUIVALENT WATER FLOW OVER 365 DAYS	***l/s***	**0.067**

(*) over 12 working days, twice per year

4.2.5.3. Water provision during construction and operation

The water needed for both the construction phase (**7,660 m^3**) and the operational phase (**2,138 m^3/year**) will be provided from the **Magalies Water** (the local water services provider), by a direct connection to the "Eskom water pipeline" or by means of water tank trucks.

4.2.6. Sewerage

Considering that the proposed development will not include formal residential properties there is no need to connect the municipal sewer reticulation system. Sewer reticulation will be handled by the patented and commercially available *Lilliput*, *Ballam Waterslot* (or similar) sewer treatment system. The sewer system will therefore consist of an installation to serve the offices of the control building. It is foreseen that 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 *Ballam Waterslot* (or similar) system will be suitable for irrigation of lawns, or re-use in the dwellings as water for the flushing of toilets, or for fire fighting purposes. This could reduce the overall water requirement of the development substantially.

A Water Use License application will be submitted to the Department of Water Affairs by Firefly Investments 224 in this respect.

4.2.7. Refuse removal

During the construction phase, solid waste will mainly consist of vegetation material as a result of the clearing activity. Other type of solid waste will be: 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 landfill of the Municipality.

During the operational phase (25 - 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.

Firefly Investments 224 will enter into an agreement with the Thabazimbi Local Municipality for the PV plant's refuse at the nearby municipal refuse site. No refuse will be buried or incinerated on site.

4.3. CONSTRUCTION SITE

The construction site (approximately 10 hectares) will be located in the eastern corner of the site, covering the area where the last 4 MWp are planned. Consequently, the construction site area will be gradually reduced at the completion of the last four PV fields (4 MWp), and at the end of the works all the construction area will be converted into the last PV arrays.

The optimal location of the construction site is an important element of the planning phase also 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 distinct phases. The steps individuated hereinafter do not follow a time sequence, but it should be considered as 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, the most valuable trees, if any, 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 low value 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 (covered with compacted dry material in order to avoid direct contact with the ground);
- 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 (only key personnel should be allowed to stay overnight);
- technical cabins and management offices;
- medical care unit in a prefabricated module, in order to allow immediate first aid and minor surgical emergency;
- recreation area and canteen (prefabricated modules);
- parking lots for employees (located close to the staff housing), for visiting staff (located close to the offices area), and for 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;

- chemical toilets;
- *Ballam Waterslot* or similar sewer treatment system. The treated water may be used to moisten dusty areas and reduce dust gathering due to windy actions; and
- solid waste collection point.

All facilities present in the construction site will be covered with dry material in order to avoid mud formation in case of rain.

4.3.5. Earthworks

Clearing activity is required in order to remove shrubs and trees from the planned footprint (180 ha).

Due to the flatness of the development area, no 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 the driven piles or 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. Considering a road pavement thickness of 300 mm and an overall road surface approximately 100,000 m^2, the amount of cut or fill is estimated to be approximately 30,000 m^3.
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.

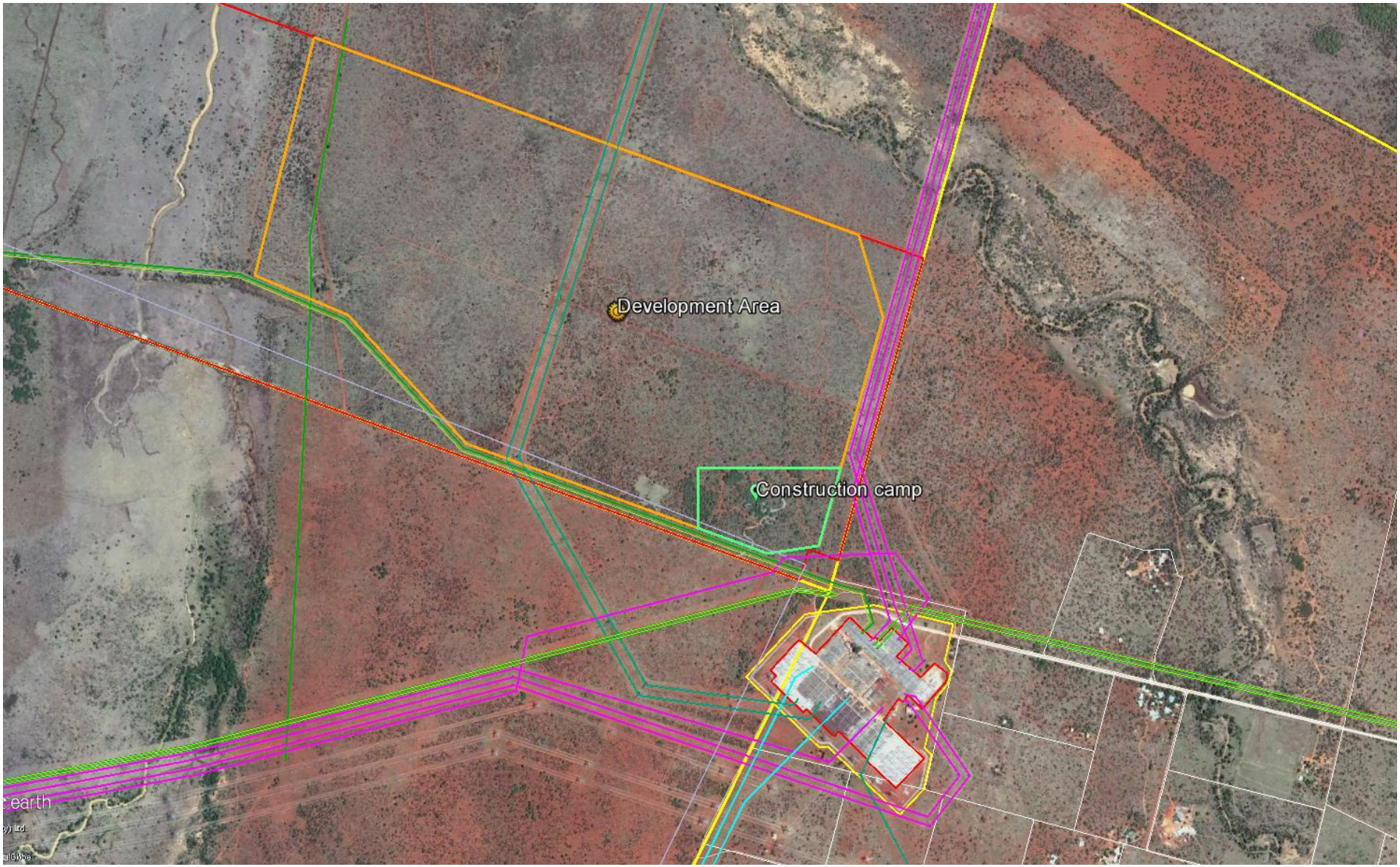
Small earthworks will be required for the installation of the medium-voltage stations. None of these activities should require earthworks in excess of 500 mm cut or fill.
Only the foundation plate for the small high-voltage substation may require earthworks in excess of 500 mm cut or fill (the footprint will be up to 4000 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 the commercial sources in the vicinity of the development (Northam or Thabazimbi).

Gravel necessary for the construction of internal roads may be provided from the commercial sources in the vicinity of the development (Northam or Thabazimbi).

Figure 7: Temporary construction camp (10 ha)



4.4. TRAFFIC IMPACT OF THE PROPOSED DEVELOPMENT

4.4.1. Traffic impact – construction phase

The construction timeframe is estimated to be approximately **15 months.**

Approximately 100 people are expected to be employed during the construction period (15 months), although this number can increase to 150 for short spaces of time during peak periods.

A small accommodation area with few prefabricated buildings inside the work site may be foreseen, if accommodation facilities in Northam or Thabazimbi are not sufficient to accommodate all workers.

Overall traffic to and from the work site will amount to approximately **1000 medium** / **heavy vehicle trips** over the whole construction period. As indicated in the table below, the average number of medium and heavy trucks to and from the site will be of **3 trucks per working day.**

Table 7: Construction timeframe: average daily trips of medium and heavy vehicles

Transportation of:	**months**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
fencing and tools	trips/month	8	8	0	0	0	0	0	0
clearance of the site (vegetation transportation)	trips/month	56	32	0	0	0	0	0	0
piles / frames for mounting systems	trips/month	0	0	20	20	20	20	20	0
sands&gravel for on-site concrete production	trips/month	0	30	48	48	48	52	52	54
PV modules	trips/month	0	0	0	0	0	0	0	0
MV stations	trips/month	0	0	0	0	0	12	12	12
HV substationcomponents	trips/month	0	0	8	8	8	0	0	0
cables	trips/month	0	0	0	0	0	0	0	16
Averagetrips per month	trips/month	**64**	**70**	**76**	**76**	**76**	**84**	**84**	**82**
Average trips per working day (*)	trips/day	**2.9**	**3.2**	**3.5**	**3.5**	**3.5**	**3.8**	**3.8**	**3.7**

Transportation of:	**months**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**TOTAL**
fencing and tools	trips/month	0	0	0	0	0	0	0	**16**
clearance of the site (vegetation transportation)	trips/month	0	0	0	0	0	0	0	**88**
piles / frames for mounting systems	trips/month	0	0	0	0	0	0	0	**100**
sands&gravel for on-site concrete production	trips/month	52	48	32	0	0	0	0	**464**
PV modules	trips/month	0	16	32	68	66	34	0	**216**
MV stations	trips/month	12	12	0	0	0	0	0	**60**
HV substationcomponents	trips/month	0	0	0	0	0	0	0	**24**
cables	trips/month	16	0	0	0	0	0	0	**32**
Averagetrips per month	trips/month	**80**	**76**	**64**	**68**	**66**	**34**	**0**	**1000**
Average trips per working day (*)	trips/day	**3.6**	**3.5**	**2.9**	**3.1**	**3.0**	**1.5**	**0.0**	**3.03**

(*) 22 working days per month

Medium and heavy trucks will access / leave the site only during the working days (Monday to Friday), on the daytime (8h - 17h).

The provision of a fuelling area on the work site could reduce the load of heavy vehicles on public roads. The installation of two steel fuel tanks (capacity of 30,000 litres each) is envisaged.

4.4.2. Traffic impact – operation phase

The traffic impact during the operation phase will be insignificant, considering that about 35-40 people will work on the PV facility, in the following manner:

- during the daytime approximately 14 people;
- during the night-time, 6 people.

4.5. MANAGEMENT OF THE SOLAR PARK DURING OPERATION

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

The Platinum Solar Park will be in operation 7 days per week; therefore personnel will operate according to shifts. The surveillance team will be ensured during day-time, night-time and weekends.

The operational team will consist of the following people:

The operational team of the project will consist of the following people:

- 1 person as plant manager
- 1 person for administration
- 4 people as technicians / plant operators
- 9/12 people for electric and generic maintenance
- 20/22 people as guards

The "**fire team**" will be composed of people for generic maintenance, who will attend a comprehensive fire fighting training program. After this training programme, the fire team will be able to drive/use/manage properly the fire extinguishers and the fire fighting vehicle, that will be available on the site.

5. PROJECT ALTERNATIVES

The EIA Regulations, 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.

In particular:
- 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 sites have been inspected in order to find out the best solution for the PV power plant. The following selection criteria were applied:

- Connection availability and proximity
- Land availability
- Proper land surface area (at least 100 hectares)
- Current land use
- Low environmental impact (low biodiversity)
- High solar radiance
- Socio-economic issues (land cost and local community unemployment)

The macro area of Northam town and surrounding farms was investigated, due to the high value of solar irradiation and to the presence of an Eskom high-voltage substation (the so called “Spitskop substation”).

Four sites were selected during the feasibility assessment:

- Portion 5 of Grootkuil 409 KQ
- Portion 9 of Wildebeestlaagte 411 KQ
- Portions 12, 15, 17, 18 and 19 of Wildebeestlaagte 411 KQ
- Portion 10 of Wildebeestlaagte 411 KQ

The location of the alternative sites is indicated in Figure 8 below.

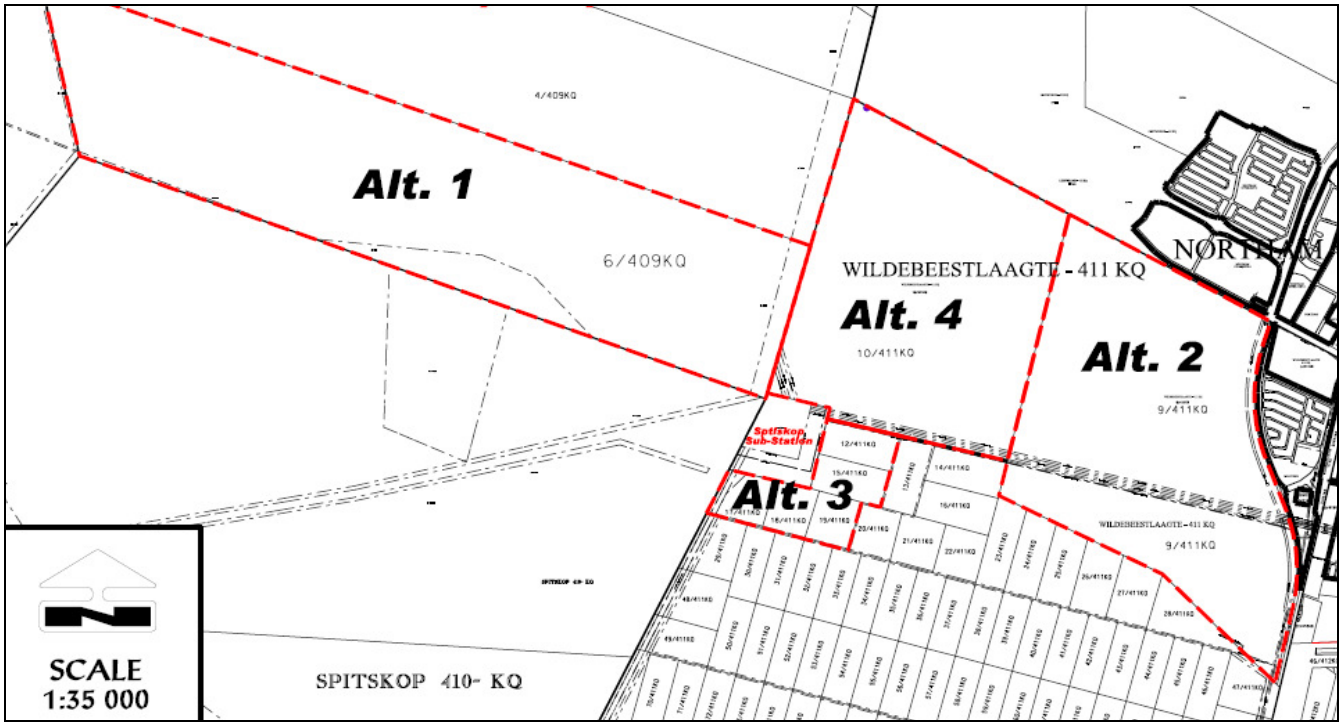
- **Alternative site 1 - Portion 5 of Grootkuil 409 KQ - (preferred site):**
    - The site was evaluated as a potential site for the solar project, due to its proximity to the Eskom Spitskop substation and fairly flat surface area.
    - The selected area is located in a property which is part of the mining right area of Rustenburg Platinum Mines (Pty) Ltd (Anglo American Platinum Limited).
    - A solar park project may help to balance CO2 emissions arising from mining activities conducted in the area and related energy consumption.

- **Alternative site 2 - Portion 9 of Wildebeestlaagte 411 KQ** :
  - Part of this portion is not suitable since it is already earmarked for a residential township called “Hlogoyatau” although the township has not yet been proclaimed.
  - Other parts of Portion 9 were found to be suitable for the development of the project but these areas are further away from the Spitskop substation than the preferred site.

- **Alternative site 3 - Portions 12, 15, 17, 18 and 19 of Wildebeestlaagte 411 KQ :**
  - These farm portions were also evaluated as potential sites for the development of the project, due to their proximity to the Eskom substation. However, the total area (60 hectares) is insufficient (in size) for the establishment of the proposed solar project.

- **Alternative site 4 - Portion 10 of Wildebeestlaagte 411 KQ :**
  - Portion 10 was evaluated as suitable for the development of the project, because of its proximity to the Spitskop substation, its fairly flat terrain and its sufficient size.
  - This property resulted being not available for a sale/purchase option agreement, indeed the development of a solar park is already undergoing in this property.

Figure 8: Location of the alternative sites



5.2. TECHNOLOGY ALTERNATIVES

5.2.1. PV Plant and Solar Thermal Power 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 through 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, considering that, among other factors, the PV solution requires a minor quantity of water.

5.2.2. Solar Photovoltaic Technology – PV

The project consists of a photovoltaic power plant with a maximum generation capacity of up to 75 MW, on a development area (fenced area) of up to 190 ha.

The preferred types of PV modules are:

- **monocrystalline or polycrystalline PV modules** and,
- **thin-film PV modules**,

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

At present, mono/polycrystalline modules provide higher solar conversion efficiency (14% to 16%), if compared to the thin-film /PV modules (9% to 13%).On the other hand, thin-film modules (or amorphous silicon / Cd-Te as well) are cheaper and best performing at high temperatures, having an efficiency degradation of only 0.25 %/℃ instead of 0.45 %/℃ in the case of mono/polycrystalline modules.

It is important to consider the fact that the PV technology is in continuous evolution and it may be possible that thin-film (or amorphous silicon / Cd-Te as well) PV modules achieve a higher solar conversion efficiency in a very short time.

It should be kept in mind the high volatility of prices of PV modules which depends on the worldwide availability of modules. Therefore the final choice will be taken at the commissioning date, on the basis of the prices and availability of mono/polycrystalline and thin-film / amorphous silicon / Cd-Te PV modules.

The development will not exceed the current planned fenced area (190 ha).Therefore, the final choice of the type of PV modules, whatever it is, will not imply any additional visual or environmental impacts nor the necessity of specific or different mitigation measures

5.2.3. Alternatives for Mounting System of the PV Modules

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

The tracking solution is the best performing in terms of efficiency, because its energy production is approximately 15% higher if compared with fixed systems. This type of technology is characterized by higher technical complexity and deeper 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: if addressed toward the fixed mounting system or toward horizontal single-axis trackers, the layout of the PV power plant will not imply any additional visual or environmental impacts or the necessity of specific or different mitigation measures.

The development will not exceed the currently planned development area (190 ha) and the height of the structures (PV modules and support frames) will be maximum 3.1 m above the 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. LAYOUT DESIGN AND CONNECTION ALTERNATIVES

5.3.1. Location alternatives

The site chosen for the establishing of the proposed Platinum Solar Park is **Portion 5 of the Farm Grootkuil 409 KQ**, 563.9564 ha in extent.

The development area of the solar park will be approximately 190 hectares.

Two alternative locations have been considered:

- **First alternative location (preferred):** on the eastern side of Portion 5 of Grootkuil 409 KQ.
  This option proved to be feasible due to the moderate ecological sensitivity of the selected area, not affected by any wetland areas. Furthermore, the proximity of the Eskom Spitskop substation entails a very short HV power line (470 m) for the connection of the solar park to the Eskom grid.

- **Second alternative location:** on the western side of Portion 5 of Grootkuil 409 KQ .
  Although this location alternative is suitable from the ecological point of view, this option proved to be unfeasible because partially located on old fields. Pursuant to the guidelines of the DAFF, the development of renewable energy projects is not allowed on areas which have been cultivated in the last 10 years.
  Furthermore, this location is 3.5 km away from the Eskom Spitskop substation, therefore the power line for the connection of the solar park to the Eskom grid would be 3.5 km long and would cross the wetland area and and Brak Spruit affecting the central part of the property. Should this second alternative be selected, the wetland and Brak Spruit will be affected also by the new access road.

For these reasons, the preferred alternative location is the first one, on the eastern side of the project site.

The two alternative location superimposed on the sensitivity map are depicted in Figure 9 below and the drawing of the Annexure A:

- PLSP_00.2_r1 Development Area (preferred and alternative) and Sensitivity Map

5.3.2. Connection alternatives

Two alternatives may be suitable for the connection to the Eskom grid:

- **First connection alternative (preferred):** The Platinum Solar Park will be connected to the **Eskom Spitskop substation**, located on the Remainder Portion of the Farm Wildebeestlaagte 411 KQ, adjacent to the project site. The new 88 kV or 132 kV power

line will be approximately 470 m long. A 88 or 132 kV busbay will be commissioned and equipped in the Eskom substation.

- **Second connection alternative:** As *alternative connection solution*, the Platinum Solar Park may be connected to one of the Eskom's 88 kV or 132 kV power lines running along the eastern and the southern boundary of the site (loop-in loop-out connection).

The first connection alternative is the preferred one, because already confirmed by Eskom in the Cost Estimate letter dated 23 July 2014 (Eskom Ref IPP 88680226).

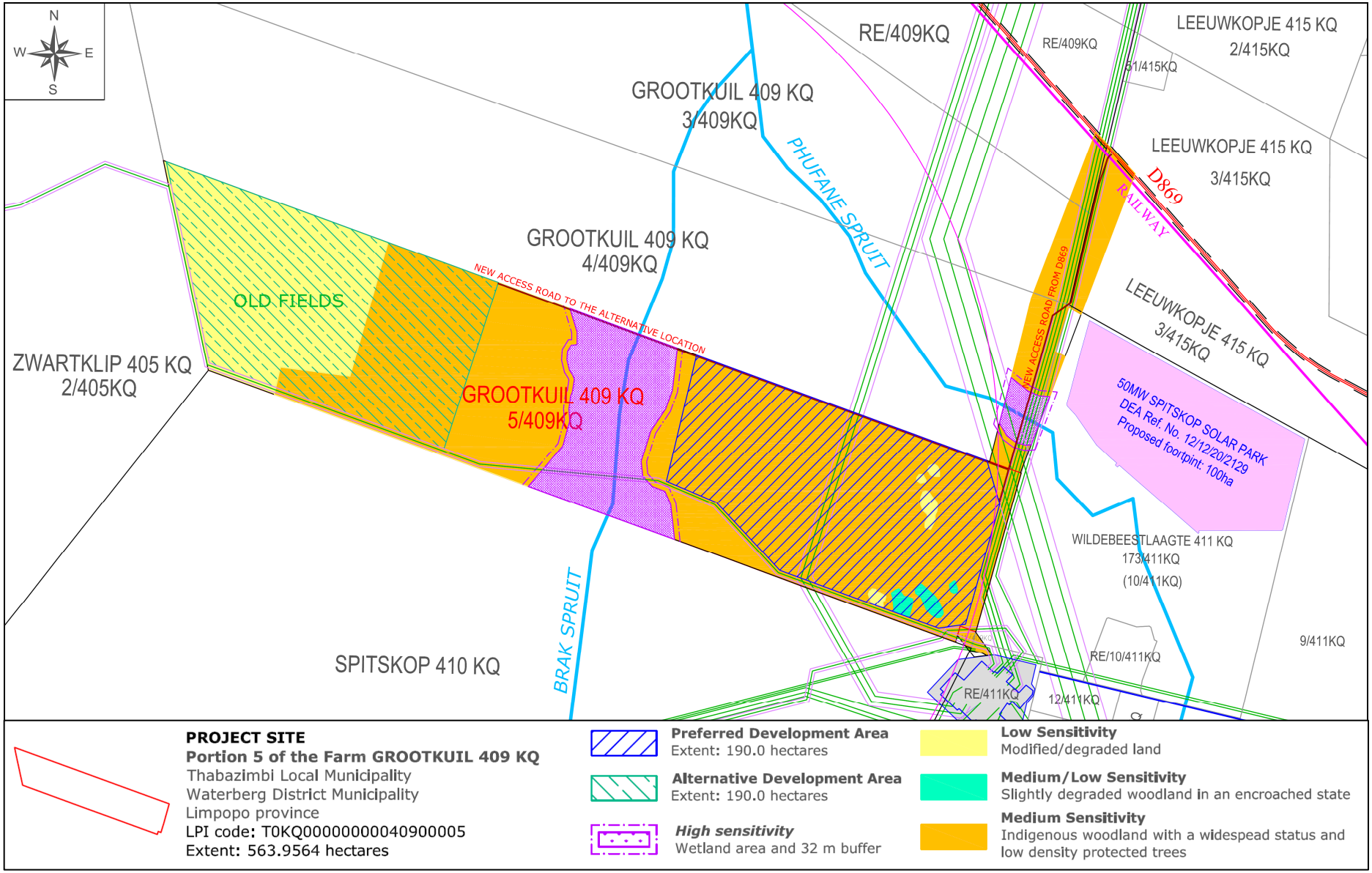
5.4. NO-GO ALTERNATIVE

The no-go alternative is the option of not establishing a Photovoltaic 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 (see the paragraph 6.4 *Socio-Economic Environment*).

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 could instead be saved if a renewable energy facility like the proposed one is put in operation.(the Energy White Paper envisages that the implementation of its targets will determine water savings of approximately 16.5 million kilolitres). 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 CO2 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.

Figure 9: Preferred and alternative locations and sensitivity map



6. STATUS QUO OF THE RECEIVING ENVIRONMENT

The receiving environment has been 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 will stretch over a part (±190 ha) of **Portion 5 of the Farm Grootkuil 409 K.Q.**

Portion 5 of the farm Grootkuil 409 K.Q.

Surveyor-general 21 digit site	T0KQ00000000040900005
Local Municipality	Thabazimbi
District Municipality	Waterberg
Province	Limpopo
Extent	563.9564 hectares
Land Owner	RUSTENBURG PLATINUM MINES LTD
Diagram deed number	T9142/924
Title deed number	T4817/2006
Registration date	20060116
Current land use	grazing

The proposed development site is located 4 km West of Northam and 45 km South of Thabazimbi and is currently being used for grazing purposes.

The **Union North Mine** is located on the **Farm Zwartklip 405 KQ**, adjacent to the eastern side of the project site. The mine extracts mostly UG2 Reef ore, but also produces limited Merensky Reef ore and treats low-grade surface ore and tailings. A solar park project may help to balance CO2 emissions arising from mining activities conducted in the area and related energy consumption.

The property is located North-West of the **Spitskop Substation** in an area that is already affected by **several Eskom overhead power lines**.

To the South-East of the property, there are smaller portions of the Farm Wildebeestlaagte 411 KQ and to the South, East and North-East, farm portions are presently used for cattle grazing, although they are earmarked for urban development.

6.2. OTHER RENEWABLE ENERGY PROJECTS IN THE PROXIMITY OF THE PROPOSED PLATINUM SOLAR PARK

The renewable energy projects currently under construction and/or already selected by the Department of Energy under the REIPP Procurement Programme closer to the proposed Platinum Solar Park are:

- **Rustmo_1 7 MW PV project**, selected by the DoE under the Window 1 of the REIPPPP and built near Rustenburg, in the North-West Province**, 90 km** South of the proposed Platinum Solar Park;
- **Witkop 30 MW PV project**, selected by the DoE under the Window 1 of the REIPPPP and currently under construction near Polokwane, **235 km** North-East of the proposed Platinum Solar Park;

- **Soutpan 28 MW PV project**, selected by the DoE under the Window 1 of the REIPPPP and currently under construction near Vivo, **300 km** North-East of the proposed Platinum Solar Park;
- **Tomburke 60 MW PV project**, selected by the DoE under the Window 3 of the REIPPPP and planned near the Eskom Tom Burke substation, in the Lephalale Municipality, **220 km** north of the proposed Platinum Solar Park.

Please refer to the Figure 10 below, which shows the projects under construction and / or already selected by the DoE (with a yellow place mark). The red circle has a radius of 50 km.

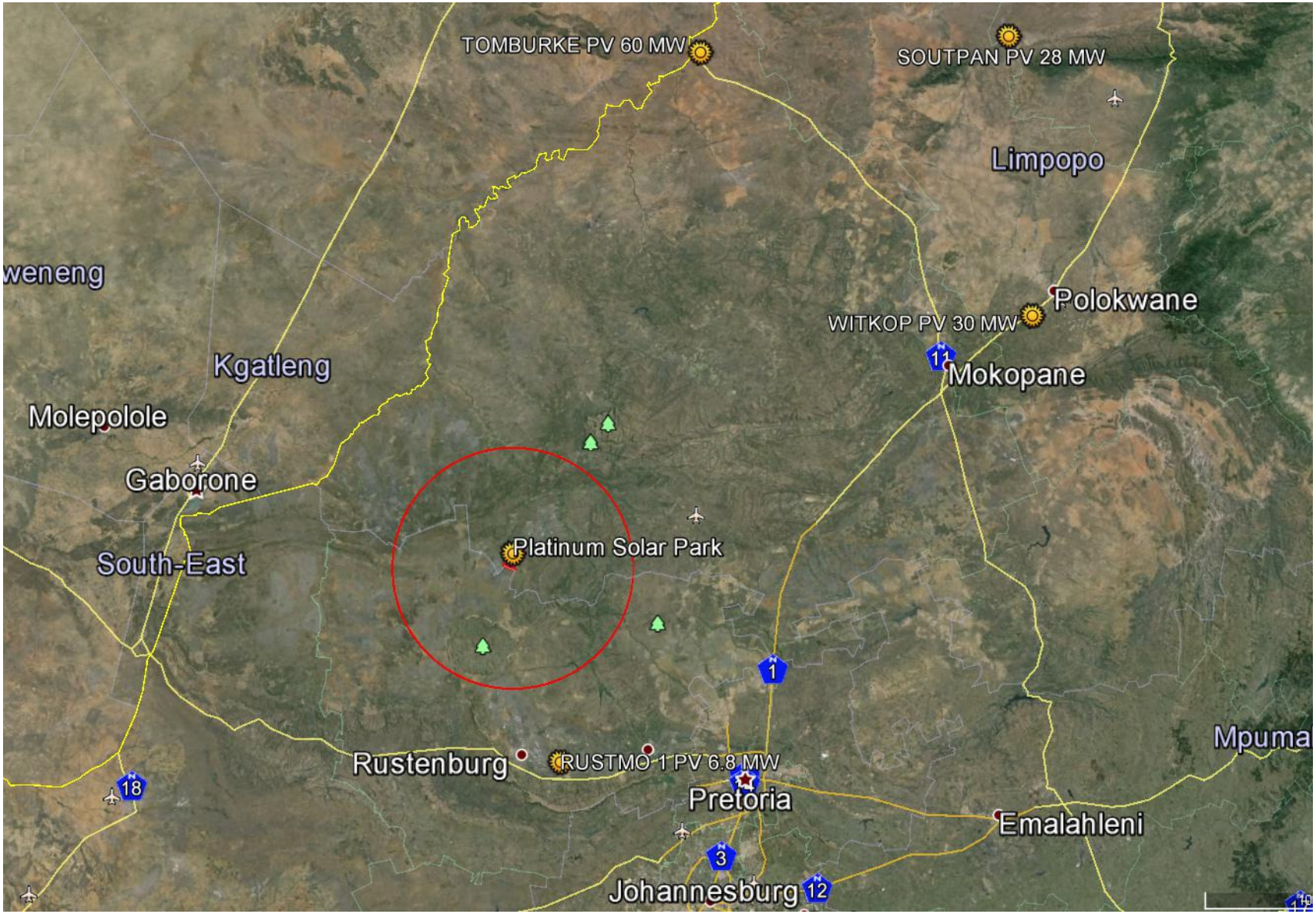
Due to the distance **(>90 km)** of the projects under construction from the proposed Platinum Solar Park, the cumulative impact is very low / not applicable.

The projects not yet selected by the DoE as preferred Bidders can't be taken into account for the potential cumulative impact, being the construction of them subject to the appointment of the DoE. It's very unlikely that two projects close each other are selected by the DoE.

The closest PV project already authorised by the DEA (DEA Ref. 12/12/20/2129) is the **50 MW Spitskop Solar Park**, planned on Portion 10 of the farm Wildebeestlaagte 411 KQ, **600 m** North-East of the Platinum Solar Park.
Due to the high competition of this programme, it's very unlikely that both of the PV projects are selected by the DoE. This project has never been selected by the DoE under the previous Windows 1, 2 and 3, therefore it can't been taken into account in terms of cumulative impact, also because in competition with the Platinum Solar Park in terms of grid availability, being both of the PV projects (Platinum and Spitskop Solar Parks) envisaged to be connected to the same Eskom substation (i.e. the Eskom Spitskop substation).

The location of the Spitskop Solar Park in respect of the Platinum Solar Park is depicted in the drawing of the Annexure A:
- PLSP_00.1_r1 Locality Map - Development Area and access road

Figure 10: Other renewable energy projects in the proximity of the proposed Platinum Solar Park



6.3. ENVIRONMENTAL FEATURES

6.3.1. Climate

The area in general is characterized by dry sunshine days and hot summer afternoons in the summer months (October to March) averaging 27ºC. The mean monthly maximum and minimum temperatures for the Thabazimbi area is 36.0°C and -3.7°C for February and June respectively.
Climate in the broad sense is a major determinant of the geographical distribution of species and vegetation types. However, on a smaller scale, the microclimate, which is greatly influenced by local topography, is also important.
The proposed development site falls within the Dwaalboom Thornveld vegetation type, where summer rainfall and dry winters occur. In terrestrial environments, limitations related to water availability are always important to plants and plant communities.
The region normally receives about 500-600 mm per year, with most rainfall occurring mainly during mid-summer.

6.3.2. Topography and drainage

The site is located on a valley floor land facet. The highest point on the property is at the south-western corner at an elevation of 1016 m amsl. The lowest point is 988 m amsl, where the north-south trending drainage exits the property along its northern fence. The *Phufane stream* flows past the property (close to the north eastern corner).

Two land facets are present on the site. The majority of the site is underlain by a valley floor land facet, flanking the drainage channel/floodplain land facet, cutting through the middle of the site from South to North (*Brak Spruit*).

6.3.3. Soils and geology

The Geo-technical Report is attached as Annexure I.

The property is situated on a **valley floor land** and **drainage channel** / **floodplain land facets**.

The land facets are underlain by transported fluvial deposits and Ferro Gabbro and Gabbro of the Rustenburg Layered Suite.

The transported alluvium soil encountered on the valley floor is not compressible, but the reworked residual gabbro can be active. The completely to highly decomposed Gabbro does not exhibit heave, collapse and settlement potential. The transported fluvial deposits encountered in the drainage channel and floodplain land facet is moderately active and potentially compressible.

The depth to bedrock is expected to be variable and is expected to range from 1.5 to 3.0 m. Bedrock here is defined as in-situ fractured rock with a uniaxial compressive strength exceeding 25 MPa (Medium Strong Rock).

The potential for collapse of side walls of deep excavations is low. It is however recommended that the sidewalls excavated be battered back to a 1:1.5 grade slope or shored in excavations deeper than 1.5m to comply with minimum safety regulations.

Two LAND USE AREAS across the property have been assessed.

LAND USE AREA A is classified as **DEVLOPABLE with low risk with precautions**. The soil profile consists of transported soil underlain by weathered gabbro, grading into competent bedrock material. Excavatability will be soft to intermediate to 1.5 m.
The recommended foundation solution for the solar panel frames is either rammed or pre-bored rammed mini-piles. Normal strip foot foundation is recommended for other structures.

The drainage area (**LAND USE AREA B**) defined is **UNDEVELOPABLE**, due to the possibility of flooding and the occurrence of active soils.

No evidence of current or past surface mining is evident on the property. Underground mining occur in the area. No mining is occurring directly underneath the site under consideration at depths shallower than 140 m. There are however exploration permits issued for the property.

The soil and weathered rock present on site is not expected to be suitable for use as construction materials. Construction materials are however available from local suppliers in the area. Good quality aggregate and crushed rock can be sourced from waste rock dumps at nearby mines.

No shallow groundwater levels or perched water tables were observed in the trial pit excavations.

The Geo-technical Report assessed that the property is suitable for the proposed development if restricted to the Land Use A.

With reference to the proposed access road and steam crossing: a hydrological assessment of the Phufane Spruit is recommended for the final design phase prior the construction. The aim of the study should be to determine the flood limit (1:1 year flood line) of the Phufane Spruit to design the road level and culvert structures to maintain access to the site during construction and operation.

6.3.4. Ecology (fauna & flora)

An Ecological Impact Assessment (Annexure D) was conducted by AGES in order 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. For this purpose, detailed ecological (fauna habitat & flora) surveys were conducted during May 2014 to verify the ecological sensitivity and ecological components of the site at ground level.

6.3.4.1. Vegetation types

The development site lies within the Savanna biome which is the largest biome in Southern Africa. It is characterized by a grassy ground layer and a distinct upper layer of woody plants (trees and shrubs). The environmental factors delimiting the biome are complex and include altitude, rainfall, geology and soil types, with rainfall being the major delimiting factor. Fire and grazing also keep the grassy layer dominant. The most recent classification of the area by Mucina & Rutherford shows that the site is classified as Dwaalboom Thornveld.

The Dwaalboom Thornveld vegetation type has a least threatened conservation status, with 14% transformed and 6% statutorily conserved. This vegetation type in its pristine state is characterized by plains with layer of scattered, low to medium high deciduous microphyllous trees and shrubs with a few broadleaved tree species, and an almost continuous herbaceous layer dominated by grass species.

The proposed development is planned on a landscape that varies from slightly undulating to flat plains. The importance to survey the area as a whole to have a better understanding of the ecosystem and the potential impact of the development on the natural environment was identified as a key factor, and subsequently the property was completely surveyed. The proposed development is currently managed as livestock and game farm.

The vegetation units on the site vary according to soil characteristics, topography and land-use. The western section of the site and small pockets of the eastern section represent old cultivated fields and old kraals respectively. Most of the site is characterized by microphyllous woodland that varies in density and species composition. Vegetation units were identified and can be divided into 6 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 Ecological Impact Assessment. A species list for the site is included in Appendix A of the Ecological Impact Assessment; while a plant species list for the quarter degree grid square (QDS) is included in Appendix B of the Ecological Impact Assessment.

The following vegetation units were identified during the survey.

- Acacia tortilis – Grewia flava – Ziziphus mucronata woodland;
- Acacia erubescens thickets;
- Acacia tortilis – Acacia nilotica woodland;
- Stunted Acacia tortilis – Acacia tenuispina shrubveld;
- Grewia flava shrubveld;
- Ziziphus mucronata – Grewia flava shrubveld
- Drainage channels & floodplains;
- Old fields / kraals.

6.3.4.2. Fauna

A survey was conducted during May 2014 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 QDS. The area represents microphyllous woodland with some broadleaf elements in isolated areas. Detailed fauna species list for the area is included in Appendix C (birds), D (mammals) and E (herpetofauna) of the Ecological Impact Assessment.

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. The 500 meters of adjoining properties were scanned for important fauna habitats.

6.3.4.3. Summary and results of the Ecological Impact Assessment

Following the investigation and potential ecological impact of the proposed Platinum Solar Park and associated infrastructure on the fauna and flora of the area, some conclusions can be made.
All aspects of the environment, especially living organisms, are vulnerable to disturbance of their habitat. The proposed development will potentially impact and modify the vegetation and faunal habitats on the footprint areas to a certain extent varying according to the state of the environment (vegetation and fauna habitats).

Most sensitive sections: It is evident from the distribution of biodiversity, presence of threatened species and sites of scientific interest, that the proposed renewable energy 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 Phufane and Brakspruit River and associated floodplains.

Most sensitive habitats: Many threatened species are woodland and wetland specialists, linked to these habitats either for breeding, feeding or shelter. Major impacts on wetlands and riverine areas should be avoided wherever possible during construction. Existing hydrodynamics must be protected to ensure that water regimes are maintained. The areas below the power line servitude and solar panels must be maintained to serve as buffer zones to prevent the immediate impact of chemical pollution or increased fire risk.

Monitoring of threatened species: A large number of endemic and protected species have been recorded in the 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 plant should be considered a high priority.

The proposed site for the development varies from being in a degraded state (old fields) to pristine (natural woodlands). A sensitivity analyses was conducted to identify the most suitable site for the development.

From these investigation and ecological surveys the following main observations was made:

- The old fields have a low sensitivity and are the preferred area for the solar plant from the ecological point of view, in combination with the surrounding microphyllous woodland to the East.
- The woodland variations associated with the vertic clay soils and red apedal soils have a *medium sensitivity*. Limited mitigation is needed for the preservation of some sections of this natural vegetation entity, and the eradication of any protected tree species (*Acacia erioloba)* would need a licence from DAFF.
- The herbaceous layer should preferably be preserved below the solar panels and managed through slashing during the entire lifetime of the project.
- The riparian woodland and floodplains has a high sensitivity and should be preserved as important fauna and flora habitats.

The following **protected tree species** occur in the area, namely ***Acacia erioloba*** **(Camel thorn).** A licence application should therefore be submitted to DAFF before any of these trees can be removed during construction.

Some plant species are protected according to the Limpopo Environmental Management Act. According to this Act, no person may pick, import, export, transport, possess, cultivate or trade in a specimen of a specially protected or protected plant species. A permit is required for all these species, if they are expected to be affected by the proposed project. The **protected plant species *Ammocharis coranica*** was found on site and is habitat-specific, which makes search and rescue efforts and relocation difficult and often unsuccessful.
The following specific management measures and guidelines should however be implemented for protected plant species documented on the proposed development site:

- Should impacts be unavoidable the following principles would apply. A detailed species rescue, relocation and re-introduction plan should be developed and implemented by a qualified person before any excavations or disturbance commence. This plan should at the least address the following:
    - Harvesting of seeds from herbaceous and woody vegetation to be used in the ex situ nursery and future rehabilitation.
    - Intact removal of protected plant species under permit. Permits should be obtained from the LEDET where protected flora is to be disturbed or relocated. Plant material that is to be "rescued" must be potted up into bags utilising local soil obtained from the previously stored topsoil heap. Adequate root systems per plant material type must be carefully excavated and retained in order for plant material to remain viable. Search and Rescue activities would include the removal of grass clumps, smaller transplantable shrubs and trees and endangered species such as geophytes and succulents should be placed into bags using local soil.
- Options to be considered for the above-mentioned protected and general floral specimens:
    - Suitable translocation areas: e.g. protected areas such as the Marakele National Park or other game farms in the area;
    - Translocation to suitable areas earmarked for public open spaces, restoration and rehabilitation, both on and off-site.
    - Use of removed plants in an indigenous nursery for future restoration and rehabilitation programs.
    - Translocation to other areas suitable for survival of the removed specimens.
- Proper habitat suitability assessments before reintroductions to reduce the risk of mortalities in both source and destination populations.
- Compile a Protected Plant policy for the study area. This should list those species under threat, reasons for their demise and measures that must be taken to ensure for their continued existence, including access to adequate and appropriate areas of suitable habitat condition.

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 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 in order to protect species habitat;
- Corridors are important to allow fauna to move freely between the areas of disturbance. The preservation of the herbaceous layer below the solar panels will play an important

role in this regard and therefore habitat fragmentation for smaller mammals, birds and herpetofauna will be minimal.

A number of 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;
- 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;
- Impacts of power line on avifauna (electrocutions and collisions).
- 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*.** Furthermore, the proposed layout plan of the development should be consistent with the sensitivity map and recommendations stipulated in the Ecological Report, and the impact on the sensitive habitats on site should be kept to a minimum.

6.3.5. Avifauna

An Avifauna Impact Assessment (Annexure E) was conducted by AGES in order to determine whether the proposed development would have negative impact on avifauna.

Considering the proposed development of the Platinum Solar Park and associated infrastructure, the following key findings were made:

- Natural bird habitats will be modified through the development if one considers the vegetation type (Dwaalboom Thornveld) associated with the larger area;
- The following bird habitats were identified in the study area during the field surveys that formed part of the avifauna scoping study:
    - Microphyllous woodland habitat;
    - Broadleaf woodland habitat;
    - Old agricultural fields;
    - Riparian habitat / seasonal pools in channels;
- The project area still supports low densities of priority species such as secretary bird, kori bustard, vulture species and lanner falcons. The presence of these birds could cause collisions and increase mortality rate of these species;
- The impact associated with the proposed power line development include the following:
    - Habitat destruction, fragmentation and human disturbances (Indirect impacts);
    - Electrocutions and collisions (direct impacts);
- The implementation of the mitigation measures should be considered a requirement for the proposed development if approved by authorities;
- Baseline monitoring should be implemented on the avifauna during the pre-construction, construction and operational phases of the power line. This is one of the main recommended conditions of approval for power line developments to monitor and reduce potential impacts on avifauna by Birdlife South Africa and Endangered Wildlife Trust.

6.3.6. Visual

A Visual Impact Assessment (Annexure J) was conducted to determine the visual impact of the proposed solar park.

The sense of place of the study area can be described as mostly pastoral, punctuated with mining activities and power line infrastructure. Although the area can no longer be regarded as 'pristine', preserving the existing landscape quality and character should be part of the goals for the area. As such the level of change to the landscape by any new proposal should not dominate views, and changes should repeat the basic elements found in the predominant natural features of the characteristic landscape (according to BLM recommendations).

It is clear from the *Relevance* of Visual Impacts map (Figure 9 of the Visual Report) that that important visual impacts might occur for a small handful of Visually Sensitive Receivers (VSRs), namely;

- the farmsteads within Grootkuil, north of the site (VSR R1),
- on parts of the roads to these farmsteads (VSR T2), and
- to the rural settlements of Sefikile (VSR R2), south of the site.

These are the areas where additional mitigation measures should be considered if existing vegetation does not fulfil that role. Figure 9 also shows general scenic areas within Grootkuil where views might be impacted by the proposal. These mostly follow the riverine areas around the site (Brakspruit and Phufanespruit).

A summary of impacts to important VSRs is shown in Table 4 of the Visual Report.

Photo-simulations in Figures 10 and 11 of the Visual Report show that for the most part, existing vegetation will adequately conceal most of the proposal (the vast stretch of PV panels), but not likely the large warehouses (6m high) and connecting 132kV connecting power line (pylons 20 m high).

The project brief states that the only regular lighting would be the internal street lighting. This is needed as some low lighting is required for the infra-red security sensors to operate. Much larger security lighting would only be activated upon illegal entry to the site.

The *final EIA Significance* of the visual impact would be *moderate* during construction and decommissioning phases, and *moderate to high* for the operational phase. However, when the effect of the existing vegetation, as well as other correct and effectively applied mitigation measures are incorporated, the ***significance*** for all phases would likely reduce to ***low to moderate***.
It is thus important that the integrity of the existing vegetation within the project site, as well as the other proposed mitigation measures be correctly and effectively implemented.

6.4. SOCIO-ECONOMIC ENVIRONMENT

A report on the socio-economic considerations related to the proposed project was compiled by Glen Steyn & Associates - development economists (Annexure K).

The following items were highlighted:

- The national and local economies will benefit from civil contractor work, labour and building materials that will be required on site. On the whole, a minimum share of approximately **40% of total CAPEX (investment costs)** will be sourced locally. This share is likely to increase once there will be a specific and competitive industry in the Republic of South Africa able to supply PV modules and other technological components.
- After approval, the project will take approximately 15 months to be built and will have a lifetime of 25-30 years. Approximately **100 people** are expected to be employed during the construction period, although this number can increase to 200 for short spaces of time during peak periods.
- During operational phase, the power plant will require a permanent staff of approximately **35 people**. That impact will be positive, also in consideration of the slowing down of the recruitment rate due to mining stabilization activities.
- Approximately **50% of the operation 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 (25÷30 years).
- Furthermore, the project will comply with the Economic Development Requirements, as requested by the IPP Procurement Programme, issued on 3rd August by the DoE. This economic development programme identifies needs of the surrounding communities in order to have a positive socio-economic impact. In particular, Firefly Investments 224 is required to identify a **Local Community** for the purpose of entering into a partnership for the Project.

6.5. AGRICULTURAL POTENTIAL

An Environmental Report on the Soils, Land Use, Agricultural Potential and Land Capability is attached as Annexure F; the site survey was conducted during May 2014.

The current land-use of the proposed development site is grazing by livestock and game. Neighbouring farms are also being used for livestock grazing and game farming, with mining further away from the site.

The soils were classified into broad classes according to the dominant soil form and family as follows:

- Vertic black clayey soilsof the Arcadia Soil Form;
- Deep, red apedal soils of the Hutton soil form;
- Seasonally wet soils of the Rensburg / Oakleaf soil form.

The area is expected to receive an annual total rainfall between 500 and 600 mm, mostly between October and April. This amount is moderate to low. The site is considered to be located in an area marginal for rain-fed arable crop production. The high variability in rainfall distribution within the area and the high incidence of frost during the winter months could however render dryland farming a risky venture, even under irrigated conditions. The climatic conditions are the main factor determining the soils to be marginally suitable for arable agriculture.

Even though there is evidence in the western section of the site that crop cultivation occurred many years ago, it is clear that the climatic conditions is unsuitable to sustain arable crop cultivation.

The current vegetation at the proposed site of development consists mainly of shrubland with a well-developed grass layer. According to databases (ARC) the grazing capacity of the area for livestock is **4 to 7 LSU's per hectare** which indicates the veld to be sweet with a medium to high palatability as a result of the clayey nature of the soils. When applying the national norms applicable to Act 70 of 70, which indicates the land unit to be able to carry 60 LSU's per farm unit, an economically viable farm for this area will be between 240 ha and 420 ha.

The project site has a **moderate to high potential for grazing**. The soil form is suitable for livestock grazing purposes, although it is limited due to the low nutrient content of the sandy soils and the palatability of the grass layer.

It should be noted that RUSTENBURG PLATINUM MINES LTD is the landowner not only of the project site **(Portion 5 of Grootkuil 409 KQ, 563.9564 ha** in extent)**, but also of Portion 4 (586.0435 ha) of the same farm.** The size of these farm portions combined is **1150 ha** and therefore constitutes an economically viable piece of land that can support between **164** and **287 LSU's**.

The proposed development (190 ha) would entail a reduction of its grazing potential for **only 27 to 47 *potential* LSU's**, therefore it will not have a negative impact on the land, being an economically viable unit if one considers that **the combined farm portions can still support between 137 and 240 LSU's with the development in place.**

The **low agricultural potential and moderate to high grazing potential of the soils** is confirmed by the Agricultural Maps below (Figures 13 to 16):

- **Agricultural Potential Map** - indicating that the project site is classified as *Low Agricultural Potential land.*
- **Land Capability Map** - indicating that the site is classified as *Marginal Potential Arable Land* with a *high potential for grazing*.
- **Potential Grazing Capacity Map (1993)** - indicating that the project site has a potential grazing capacity of **4 to 7 ha/large stock units**. As indicated in the previous map, this grazing potential is *moderate to high*.
- **Potential Grazing Capacity Map (2007)** indicating that the project site has a potential grazing capacity of **7 to 8 ha/large stock units** which is *moderate to high*. This map (2007) is not official yet and should be further confirmed by the Department of Agricultural, therefore in the calculation below we refer to the Map (1993).

These maps were generated from the Website: ***http://www.agis.agric.za/agisweb/agis.html***
[AGIS (Agricultural Geo-Referenced Information System) Comprehensive Atlas, commissioned by the Department of Agricultural to CETI Development CC (http://www.ceit.cc/)]

6.6. CULTURAL AND HERITAGE RESOURCES

An archaeological-cum-heritage assessment (Annexure H1) was conducted by Exigo to ascertain whether there are any remains of significance in the area that will be affected by the proposed development.

A single section of cemented brick wall, as well as a large metal frame structure occurs towards a central portion of the study area, next to a cement dam and cattle drinking trough (**Site Exigo-GK409-FT01 @ 24.955966° S , 27.210753° E**). The provenance and function of the structures are not known but they might date to the Historical period. However, the features are not significant in terms of its heritage value and it is recommended that the general surroundings in this area be carefully monitored by the ECO in order to avoid the destruction of previously undetected heritage sites. Should any subsurface paleontological / archaeological / historical material and /or graves/human remains be uncovered, all activities should be suspended and the archaeological specialist should be alerted immediately.

One area of low heritage value has been documented in the Platinum Photovoltaic Power Plant footprint area and impact on the resource is anticipated. However, in the opinion of the author of the Archaeological Impact Assessment Report, the proposed Platinum Solar Park Project may proceed from a culture resources management perspective, provided that mitigation measures provided in this assessment, endorsed by the relevant Heritage Resources authority, are implemented where applicable.

A Palaeontological Desktop Study (Annexure H2) was conducted by Prof. Rubidge.

The proposed development of the Platinum Solar Park will extend over Precambrian rocks of the Bushveld Igneous Complex and possibly Quaternary alluvial deposits. According to the report, it is extremely unlikely that fossils will be exposed as a result of the solar park development. It is considered that, from a palaeontological perspective, the development of the proposed Platinum Solar Park should proceed, but that if fossils are uncovered in the course of construction activities, the developer immediately calls in a qualified palaeontologist to assess the situation and, if necessary, undertake excavation of the fossils.

Figure 11: Vegetation Map of the project site

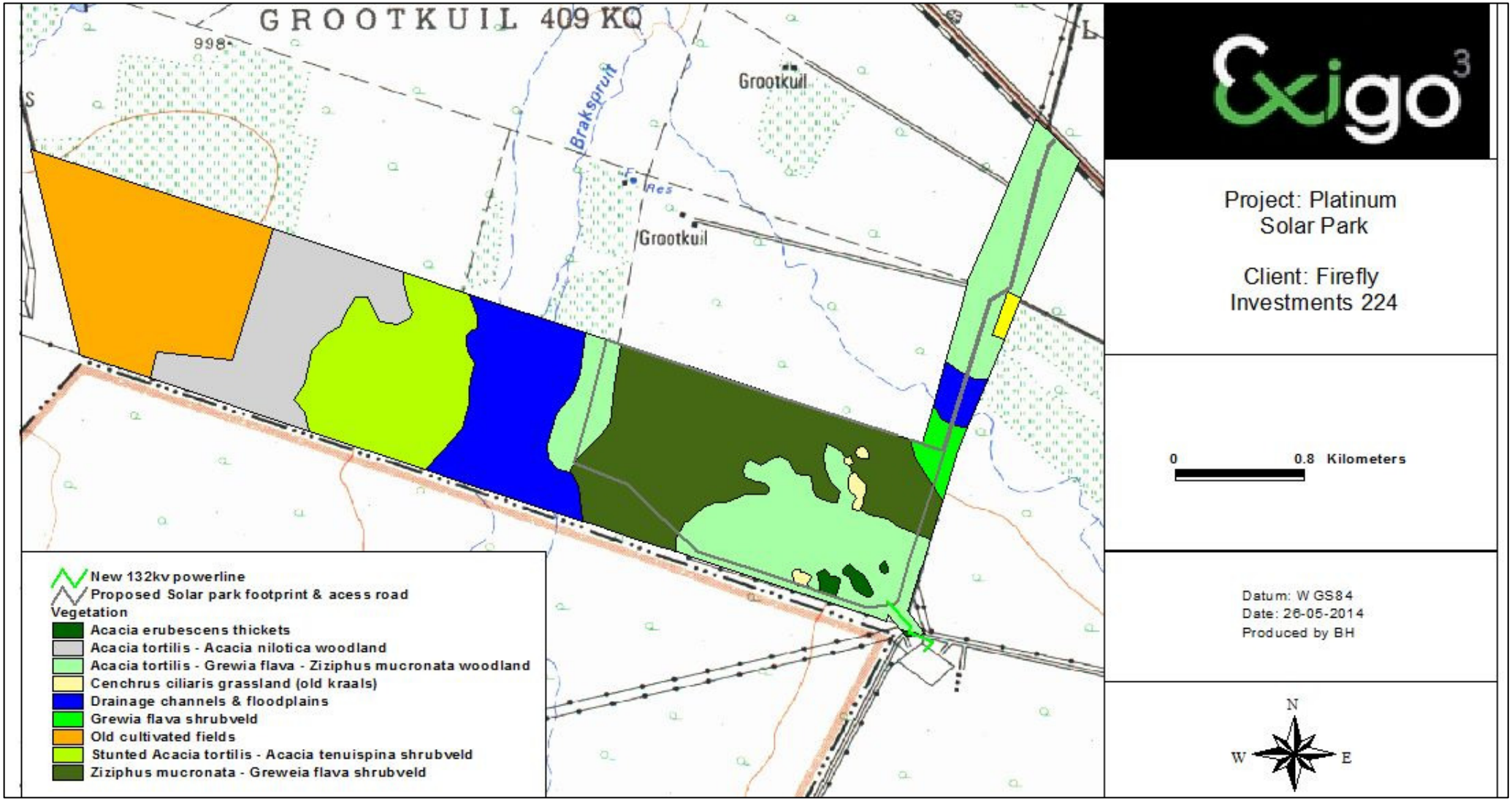


Figure 12: Sensitivity Map of the project site

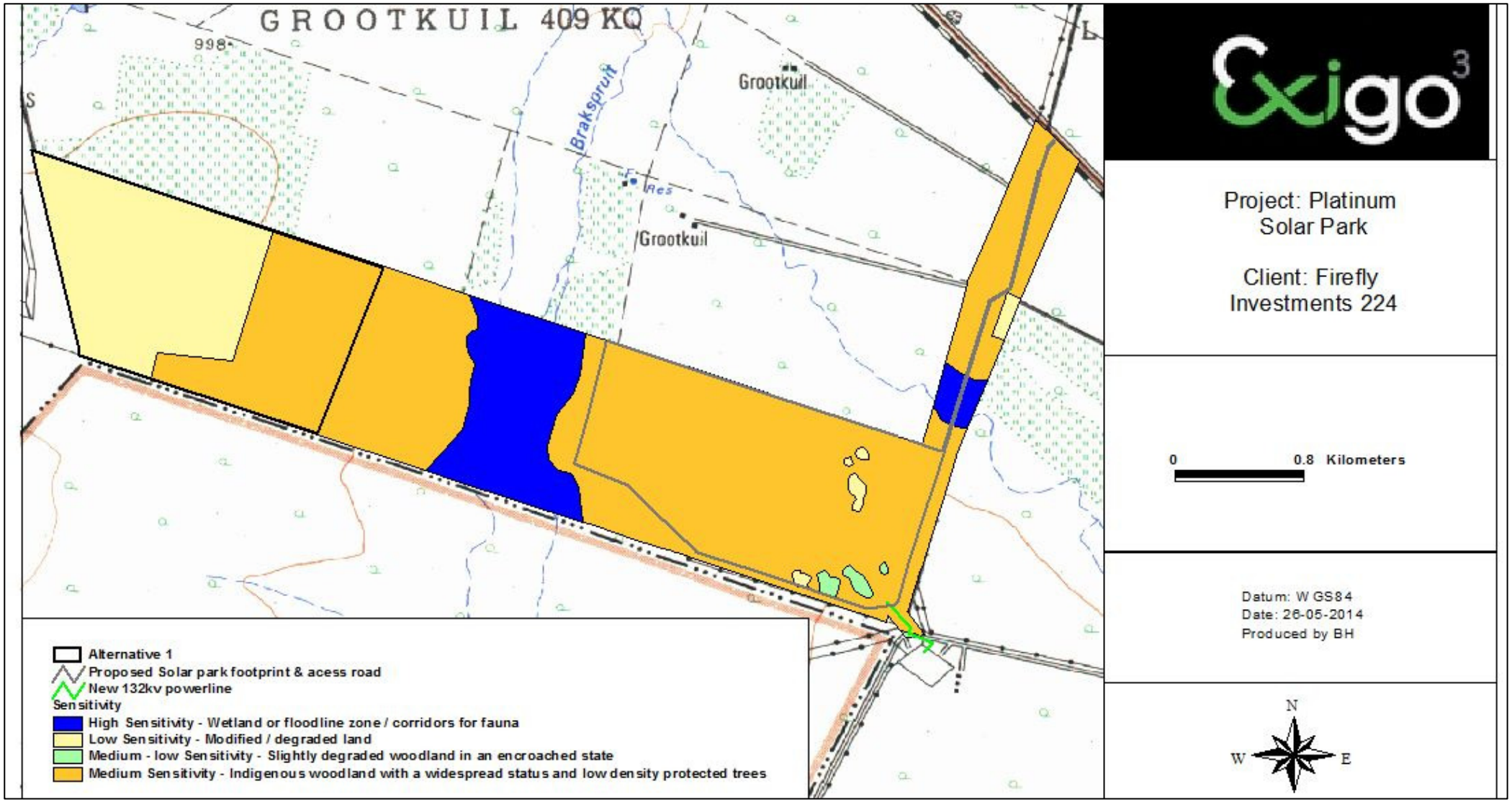


Figure 13: Agricultural Potential Map of the project site

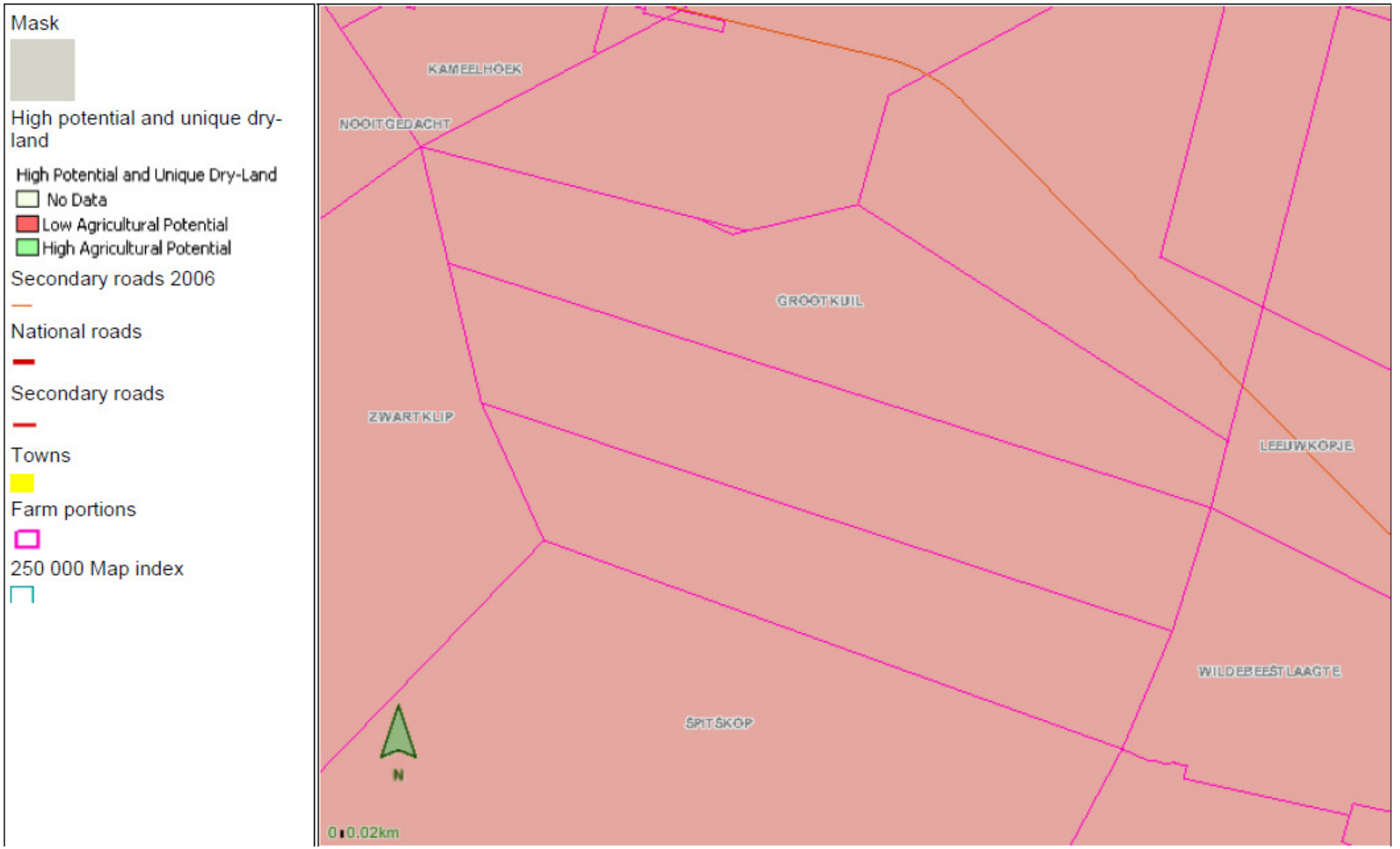


Figure 14: Land Capability Map of the project site

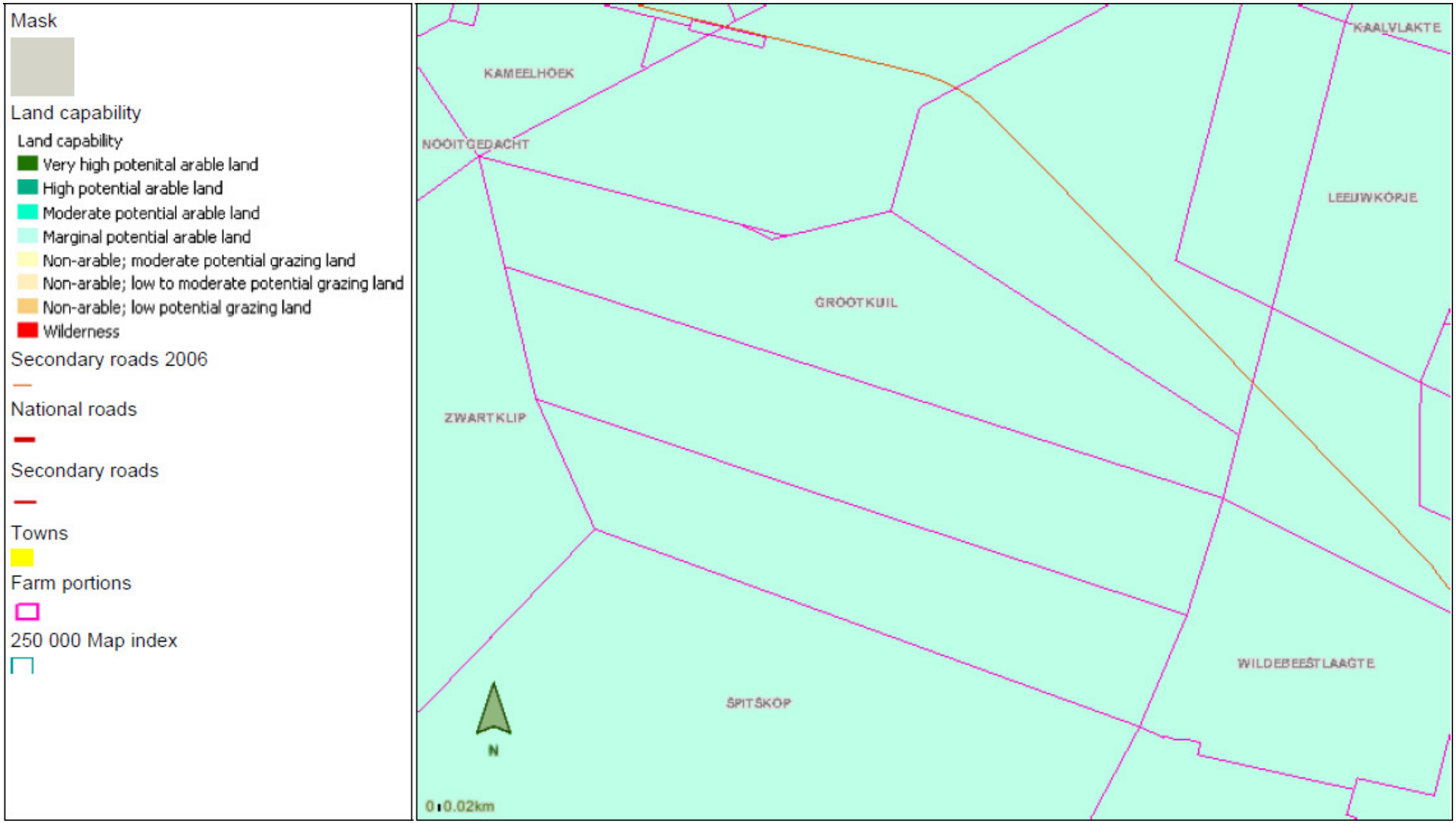


Figure 15: Potential Grazing Capacity Map (1993)

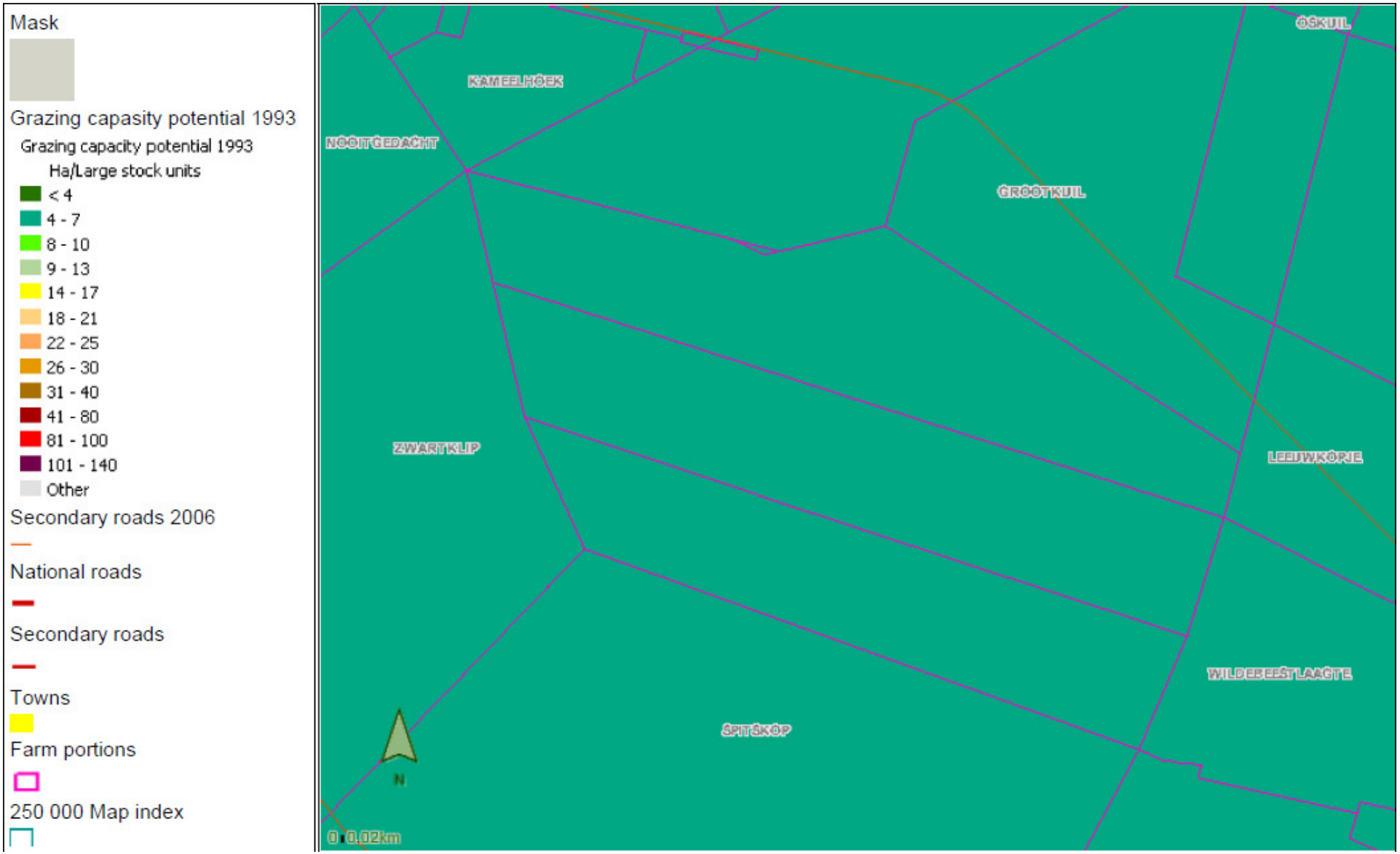
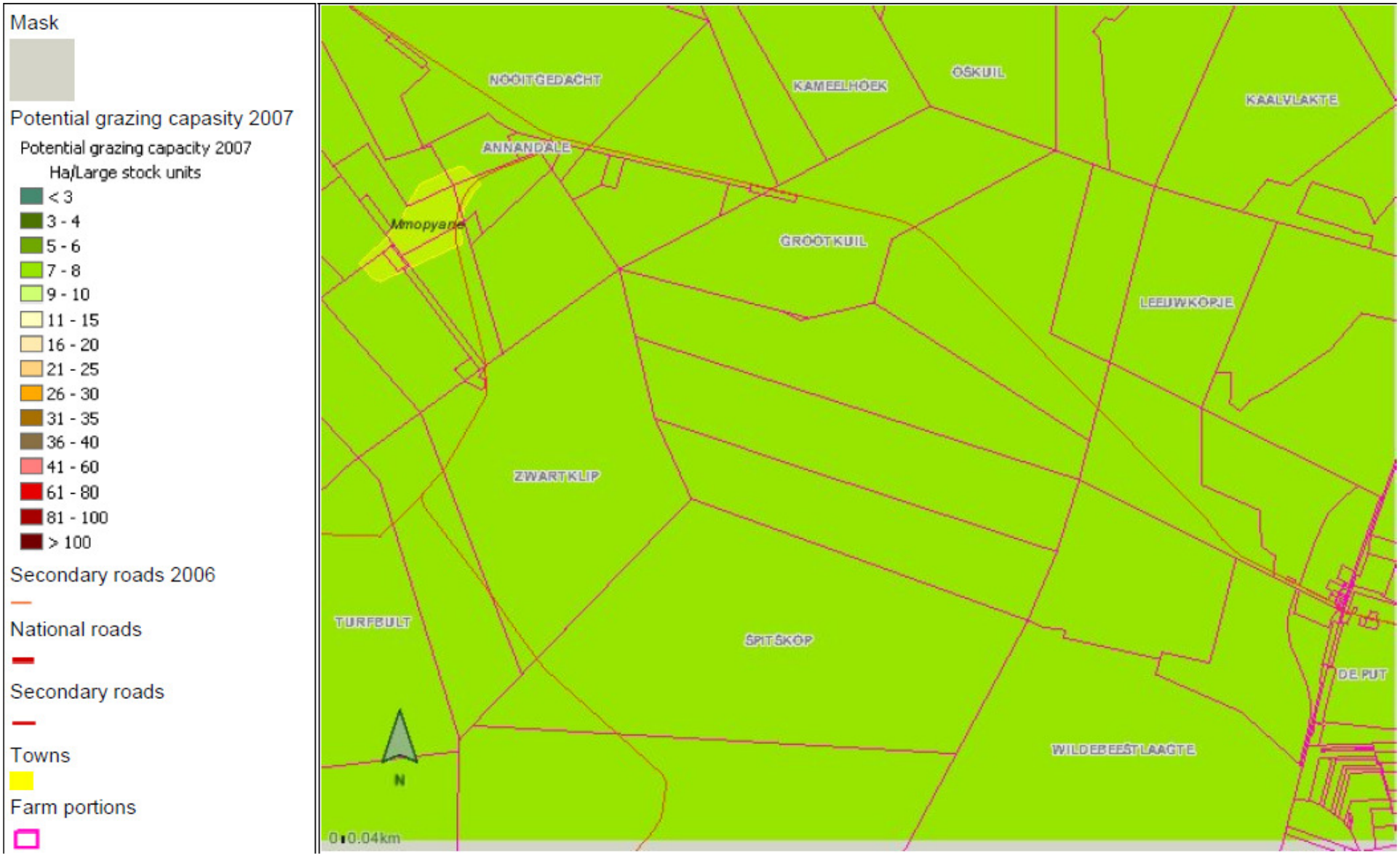


Figure 16: Potential Grazing Capacity Map (2007)



7. 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 Study (ESS)
- Phase 2: Environmental Impact Assessment (EIA) and Environmental Management Program (EMP)

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 2010.

7.1. 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 initial Public Participation Process. The PPP has the aim to identify concerns and issues by the interested and affected parties (I&AP’s).

In particular, in the case of the proposed development, issues and concerns raised by the I&AP’s and key stakeholders during the Public Participation Process have been collected, processed and addressed in the Comments and Response document which formed a part of the Final Scoping Report.

All issues and concerns identified during the Scoping Phase have been documented in the Final Scoping Report which was submitted to the DEA together with a Plan of Study for EIA.

7.2. EIA PHASE

The next (current) 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 scoping process are 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 are further investigated and assessed during the EIA Phase of this project. The EIA involves various specialist studies and provides an overall assessment of the biophysical, social and economic environment affected by the proposed project.

A detailed assessment is carried out in terms of environmental criteria and rating of significant impacts of all options identified in the scoping phase. Appropriate mitigation measures are identified and recommended for all significant impacts. These measures are included in an Environmental Management Programme (EMPr), submitted together with the Environmental Impact Assessment Report (EIAR) to the DEA.

During the EIA phase stakeholders and I&AP’s are notified in writing of the continuation of the project to the EIA Phase and are informed as to the way forward and where and when the

Environmental Impact Assessment Report is made available for review. Comments from the stakeholders and I&AP's on the Draft EIR and the Draft EMPr where incorporated into the Final EIAR.

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

7.3. PUBLIC PARTICIPATION PROCESS

All relevant I&AP's have been identified during the public participation process from the beginning of the project as per sections 54, 55, 56 and 57 of the EIA regulations 2010.

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

7.3.1. Initial Public Participation Process

The initial informative stage of the public participation was done from 4 November 2011 until 14 December 2011.

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

All components of the public participation process are included in Annexures B & C.

The public was informed of the project by means of:
- site notices;
- notices in local and national newspapers; and

A data base of registered I&AP's has been established to date and will be maintained and added to as required.

Site notices were put up on site in two different locations on the fence surrounding the proposed development area. This was done on Friday 4 November 2011.

A newspaper advertisement was published in the 7 November 2011 edition of the Daily Sun, which is a national daily newspaper.
A newspaper advertisement was also published on 4 November 2011 in a local newspaper called "Die Kwêvoël", which is published weekly.

No responses were received during the public participation process, however, if any further correspondence is received it will be recorded and included in a spread-sheet designed as a data base to be used during the public participation process.

A spread-sheet indicating all identified I&AP's is included in Annexure C.

A copy of the draft and final Scoping report were made available to all adjacent landowners and other I&AP's although none has formally registered as I&APs. The Draft and Final Scoping Report was also made available to all identified relevant governmental departments and stakeholders.

The draft and final scoping reports were available for comments for a 40 day period from 23 April to 4 June 2012.

Due to the fact that the Draft Scoping was submitted such a long time ago (June 2012), the Draft EIA was sent out to most of the I&APs.

The Draft EIA report was made available for a commenting period of 40 days from 18 July 2014 until 29 August 2014.

NO COMMENTS were received on the draft from adjacent landowners.

The only comments received were from the Limpopo Department of Economic Development, Environment and Tourism (LEDET). The only concern LEDET had was the issue of the provision of services to the site.

7.3.2. 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:

- Notifications were sent out to indicate that the Final EIA Report is available for a commenting period of 21 days. These notifications were sent out to inform registered I&APs and governmental organizations.
- All I&AP's and governmental organizations will be notified about the final decision of the DEA (Environmental Authorisation granted or not).
- A notice with regard to the department's decision will be published in a local newspaper.

7.3.3. Results of the Public Participation Process

Mr. John Geeringh from Eskom - Land Development sent comments that are specifically related to requirements for works at or near Eskom infrastructure. These requirements were forwarded to the applicant as a matter of priority. Mr. Geeringh will also be sent all reports that still need to be drafted during this EIA application process.

There were further consultation with the landowner and comments were received from LEDET.

After the notifications for the final EIA report were sent out only LEDET and the landowner requested a copy. Copies were duly forwarded to them.

8. METODOLOGY USED FOR THE IDENTIFICATION AND ASSESSMENT OF THE IMPACTS

The potential environmental impacts identified in the study have been quantified and the significance of the impacts has been assessed according to the criteria set out below. Each impact has been assessed and rated. The assessment of the data, where possible, has been based on broadly accepted scientific principles and techniques. In defect, judgements and assessments are necessarily based on the consultant's professional expertise and experience.

8.1. PROJECT PHASING

For the purpose of assessing these impacts, the project has been divided into phases from which impacting activities can be identified:

- **Planning**
- **Site clearing & construction phase**
- **Operational phase**

The phases have been carefully examined in relation to the PV plant and in relation to the connection infrastructure. Indeed, as already described, in this document all impacts and mitigations are defined also for the connection infrastructure, although this part of the project may be executed, owned and operated by Eskom.

As far as the **decommissioning** phase is concerned, it is important to specify that this phase will be subject to a decommissioning plan once the project is nearing its operational life (25-30 years). Decommissioning will also be subject to an environmental authorization (Activity 27 of R544 of 18 June 2010).

This phase is important because it states the **reversibility of the development** and has to be carefully planned and executed, in order to enable the natural re-growth of indigenous vegetation and fauna re-population as well as the reuse of the area for agricultural and grazing purposes. For this reason, in the Draft Environmental Management Plan the decommissioning phase has been included and carefully analyzed, in order to anticipate activities and actions to be taken in order to minimize the relevant impacts.

The decommissioning phase, as described in Chapter 10, is similar to the commissioning phase but all possible care must be considered for the recycling of the materials and for the re-establishment of the site as it was the *status quo – ex ante* the development.

8.2. ASSESSMENT CRITERIA

The terms of reference for the study 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 Department of Environmental Affairs and Tourism in terms of the Environmental Impact Assessment. These criteria include:

Table 8: 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.

The general approach to this study has been guided by the principles of Integrated Environmental Management (IEM). In accordance with the IEM Guidelines issued by the DEA, an open, approach, which encourages accountable decision-making, has been adopted. The underpinning transparent principles of IEM require:

- informed decision-making;
- accountability for information on which decisions are made;
- a broad interpretation of the term “environment”;
- an open participatory approach in the planning of proposals;
- consultation with I&APs;
- due consideration of alternatives;
- an attempt to mitigate negative impacts and enhance positive impacts of proposals;
- an attempt to ensure that the social costs of development proposals are outweighed by the social benefits;
- democratic regard for individual rights and obligations;
- compliance with these principles during all stages of the planning, implementation and decommissioning of proposals; and
- the opportunity for public and specialist input in the decision-making process.

The study is also guided by the requirements of the EIA Regulations in terms of the NEMA. The NEMA EIA Regulations, which are more specific in their focus than the IEM principles, define the detailed approach to the EIA process.

9. POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

9.1. POTENTIAL IMPACTS

Potential impacts associated with the construction and operational phases of the Platinum Solar Park together with its connection infrastructure are outlined and evaluated hereinafter.

As previously described, **construction activities** for the establishment of PV power plants 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;
- construction of the on-site high-voltage substation and construction of the new power line - approximately 470 m long - which will deliver the energy to the Eskom Spitskop substation.

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;
- 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;
- Visual impacts.

9.2. CUMULATIVE IMPACTS

Cumulative impacts were assessed and it was found that due to the distance of other renewable energy developments from the proposed Platinum Solar Park, the cumulative impacts will be very low / negligible. Also, a number of mitigation measures are proposed which will lead to the impacts that may result from the establishment of the Platinum Solar Park to be low. The cumulative impacts of each of the possible impacts are also assessed hereunder.

9.3. SPECIALIST STUDIES

Due to the nature of the project, a number of specialist studies are required in the EIA process in order to investigate the potential environmental impacts associated with the proposed development.

Detailed studies on potentially significant impacts have been carried out to address these impacts throughout the EIA process. The public participation process provides valuable information in the identification of issues requiring further and specific investigation throughout the EIA process.

The specialist studies which have been conducted and attached to the EIA Report are the following:

- Ecological Impact Assessment (Annexure D)
- Avifauna Impact Assessment (Annexure E)
- Agricultural Potential Assessment (Annexure F)
- Wetland Delineation Study (Annexure G)
- Heritage Impact Assessment (Annexure H1)
- Palaeontological Impact Assessment (Annexure H1)
- Geo-technical Report (Annexure I)
- Visual Impact Assessment (Annexure J)
- Socio-economic Impact Assessment (Annexure K)
- Services Report (Annexure L)

9.4. IMPACTS & MITIGATION MEASURES

9.4.1. Construction & operational phases impacts and mitigation measures

All the possible impacts that can be predicted in both the construction and operational phases of the PV plant are addressed. Specific mitigation measures are proposed and the significance of these impacts is described with and without the mitigation measures.

Furthermore, considering that all or part of the construction infrastructure may be owned and/or operated by Eskom, the mitigation measures described in the following paragraphs and in particular in the attached Environmental Management Plan can be, accordingly, of the responsibility of Eskom or of the developer.

The following section is referred to the **preferred location for the Development Area, being the eastern side of the property**. The alternative location (on the western side of the property) is not considered, being unfeasible.

9.4.1.1. Atmospheric pollution and noise

Construction Phase

During this phase there will be a concentration of earthmoving equipment and construction vehicles that will level the area, clear vegetation for construction purposes and in the process will create dust and exhaust smoke that will impact on air quality. There will also be more noise created by the vehicles during this phase. Burning of waste and fires at construction sites may also create smoke.

Operational phase

The increased traffic volumes and people will lead to increased levels of air pollution and noise. Smoke from burning of waste can cause air pollution.

PREFERRED AND ALTERNATIVE LOCATIONS									
Project Phase	Impact :Atmospheric Pollution and noise								
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Construction	Earthworks and Vegetation clearance	Air pollution : Dust	Low-medium	Medium-high	Low-medium	Medium-high	Medium-high	Low-medium	Medium
	Vehicle movement	Air pollution : Smoke	Low	Medium-high	Low-medium	Medium-high	Medium-high	Low-medium	Medium
	Vehicle movement	Air pollution : Dust	Low	Medium-high	Low-medium	Medium-high	Medium-high	Low-medium	Medium
	Vehicle movement	Noise pollution	Low-medium	Medium-high	Low-medium	Medium-high	Medium-high	Low-medium	Medium
	Burning of cleared vegetation, solid waste & veld fires	Air pollution by excessive smoke	Low-medium	Medium-high	Low-medium	Medium	Medium	Low-medium	Medium
	Cooking fires of workers	Air pollution : Smoke	Low	Medium-high	Low-medium	Medium	Medium	Low	Medium
Operation	Vehicle movement	Noise pollution	Low-medium	Medium-high	Low-medium	High	Medium-high	Low-medium	Medium
	Fireplaces and veldt fires	Air pollution caused by smoke	Low-medium	Medium-high	Low-medium	High	Medium-high	Low-medium	Medium
	Burning of vegetation refuse and solid waste	Air pollution by excessive smoke	Low-medium	Medium-high	Low-medium	High	Medium-high	Low-medium	Medium
Cumulative impacts	Pollution & Noise	Increase in release of smoke and increase in noise levels	Low	Medium-high	Low-medium	Medium	Medium	Low	Medium

Mitigation measures - Construction Phase

- Vehicles must be well serviced so that it does not produce excessive smoke and noise.
- Speed of construction vehicles should be kept as low as possible to reduce the generation of dust and noise.
- Construction areas must be damped to prevent excessive dust formation.
- The clearing of the site should be done in phases as the construction progresses.
- Construction should only take place during the hours between sunrise and sunset on weekdays and Saturdays.
- Contractors must comply with Provincial noise regulations. The construction machinery must be fitted with noise mufflers and be maintained properly.
- Vegetation cleared from the site and solid waste generated by the construction teams may not be burned on site or the surrounding areas, but be regularly removed to the

municipal waste disposal site.
- Fire belts must be made around the development according to the regulations of the Veld and Forest Fire Act.
- The cleared vegetation should stock-piled and removed to a licensed waste disposal site on a regular basis.

Mitigation Measures - Operational Phase
- Speed of vehicles on roads should be controlled e.g. speed bumps and speed restrictions.
- All roads should preferably be sealed to eliminate dust formation caused by strong winds and vehicle movement.
- Solid waste should not be burned on the project area.
- Fire belts around the development must be made according to the regulations of the Veld and Forest Fire Act.
- Vegetation refuse should be composted if possible and re-used.

9.4.1.2. Groundwater and surface water pollution

Construction Phase
- Lack of sanitation could result in ground water pollution and associated health risks.
- Construction vehicles will be refuelled at the construction camp.
- Spillage of fuel and lubricants from construction vehicles could occur. Storm water contamination by solid waste could lead to groundwater and surface water pollution.
- In this phase the soil cover as well as the vegetation is removed and storm water over the area could cause erosion as well as siltation of watercourses. Road construction will also increase the possibility of erosion and the siltation/sedimentation of surface water streams, because of increased storm water run-off.

Operational Phase
- Pollution by sanitation leakages, solid waste and erosion may lead to water pollution. Storm water run-off over open areas can cause erosion as well as the washing of soil into the surface water streams.
- Storm water flowing over sealed and/or paved areas could lead to ground and surface water pollution. Chemicals from the vehicle wash area could negatively impact on the quality of surface and groundwater resources.
- Fertilizers, pesticides and herbicides used at the project during operation can create pollution if not handled and applied correctly.

Project Phase	Impact: Groundwater and Surface water Pollution								
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Construction	Spillage of fuel and lubricants from construction vehicles	Water Pollution	Medium	Medium-high	Low-medium	Medium-high	Medium-high	Low	Medium
	Clearing of vegetation	Erosion & siltation of streams	Low-medium	Medium-high	Low-medium	Medium	Medium-high	Low-medium	Medium
	Solid waste disposal freshwater resources	Pollution of freshwater resources	Low	Medium-high	Low-medium	Medium-high	Medium-high	Low-medium	Medium
	Sanitation seepage from chemical toiletsand/or from the temporary sanitation system	Water Pollution	Medium	Medium-high	Low-medium	Medium	Medium	Low	Medium
Operation	Spillage of fuel and lubricants from vehicles	Water Pollution	Medium	High	Low-medium	Medium-high	Medium-high	Low-medium	Medium
	Solid waste disposal-freshwater resources	Water Pollution	Low	High	Low-medium	Medium-high	Medium-high	Low-medium	Medium
	Leakage from the permanent Sanitation system	Water Pollution	Medium-high	High	Medium	Medium	Medium-high	Low-medium	Medium-high
	Use of fertilizers, insecticides and herbicides	Pollution of streams & rivers	Low-Medium	High	Low-medium	Medium	Medium	Low-medium	Medium
	Storm water runoff	Erosion & siltation of streams	Low-medium	Medium-high	Low-medium	Medium	Medium-high	Low	Medium
Cumulative impacts	Water pollution and increased water run-off	Increased potential for water pollution and increased water run-off	Low-Medium	High	Low-medium	Medium	Medium	Low-medium	Medium

Mitigation measures - construction phase

The following precautionary measures are recommended to prevent any surface or groundwater pollution:

- Cleared areas should be rehabilitated by reintroducing a grass layer as soon as possible to limit the occurrence of erosion.
- Care must be taken that unnecessary clearance of vegetation does not take place. Where possible, natural vegetation must be retained. Clearance of vegetation should be restricted to the proposed 190 ha development area / fenced area and to the new access road.

- Construction activities should be restricted to the proposed 190 ha development area / fenced area.
- Berms to limit the flow of water over cleared areas will limit erosion and the siltation of surface streams. Preference should be given to plant species indigenous to the area.
- Drip pans should be used during re-fuelling and servicing of construction vehicles. Used parts like filters should be contained and disposed of at a site licensed for dumping of these waste products.
- Oil traps must be installed in the vehicle wash bay to prevent pollution. Oil traps must be serviced on a regular basis by an approved service agent.
- Diesel storage must not exceed 80,000 litres at construction camps. Diesel tanks and other harmful chemicals and oils must be within a bunded area.
- The vehicle maintenance yard and construction storage area should be placed 100 m away from watercourses. This area should have bund walls and lined with impermeable material to prevent ground and surface water pollution.
- Chemical sanitation facilities and the temporary sanitation system in the construction site should be regularly serviced by appropriate companies to ensure that no spills or leaks to surface and groundwater take place. Chemical toilets and the temporary sanitation system should not be placed within 100 m from any watercourse.
- Solid waste must be kept in adequate waste bins. Building rubble and various waste should be removed on a regular basis to a licensed landfill site.
- If all possible soil pollution is restricted and prevented, there would be no cumulative impacts as a result of the establishment of the Platinum Solar Park.

Mitigation measures - operational phase

- Solid waste must be kept in adequate waste bins and removed on a weekly basis to a waste disposal site.
- The use of eco-friendly products e.g. Organic Compost, herbicides and insecticides should be promoted.
- The permanent sanitation system should be regularly inspected to ensure that no spills or leaks from sanitation system to groundwater take place.
- All possible pollution can be prevented and therefore there would be no cumulative impacts where soil pollution is concerned.

9.4.1.3. Water use / water quantity

The water needed for both the construction phase (**7,660 m^3**) and the operational phase (**2,138 m^3/year**) will be provided from the **Magalies Water** (the local water services provider), by a direct connection to the "Eskom water pipeline" or by means of water tank trucks.

Construction phase

During this phase, water consumption will be the highest because it will be utilized for gravel roads and building constructions.

Operational phase

Water use will be limited except for short periods (twice per year) when the PV modules are cleaned.

PREFERRED AND ALTERNATIVE LOCATIONS	
Project Phase	Impact: Water use

	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Construction	Construction process	Depletion of water resources: Water consumption	Low-medium	Medium-high	Medium-high	High	High	Medium	Medium-high
Operational	Water use & cleaning of panels	Depletion of water resources: Water consumption	Low	High	Medium	High	High	Low-Medium	Medium
Cumulative impacts	Water use	Increased pressure on local water resources	Medium	Medium - High	Very Low	Low	Low-Medium	Low-Medium	Medium

Mitigation measures – Construction Phase

- No groundwater can be used without a licence from the DWA.
- Water should be used sparingly and it should be ensured that no water is wasted.
- Roads should be treated with chemicals to lower the use of water.
- Washing of construction vehicles should be limited to once or twice a month and must be done with high-pressure sprayers to reduce water consumption.
- Drinking water supply for the staff on site should be treated through an osmotic water filtration system.

Mitigation measures - Operational Phase

- No groundwater can be used without a licence from the DWA.
- Cleaning of panels should be done only when necessary, twice per year.
- Roads should be treated with chemicals to lower the use of water.
- Washing of vehicles should be limited to once a week and must be done with high-pressure sprayers to reduce water consumption.
- Care must be taken not to waste any water. In the offices, half-flush systems in the toilets as well as water aerators in all taps must be installed to reduce water consumption.
- The workers should be educated on the value of water and how to use it sparingly.
- Drinking water supply for the staff on site should be treated through an osmotic water filtration system.

9.4.1.4. Land and soils

Planning phase

The first alternative location is preferred because the new access road and power line will not affect the wetland and Brak Spruit bisecting the project site from North to South.

Construction phase

During construction, the vehicles used have the potential to spill diesel and lubricants that can pollute the soil. The storage of solid waste before it can be disposed of has the potential to pollute the soil and becomes a nuisance.

Operational phase

Solid waste can be a nuisance and has the potential to pollute the soil if not managed correctly. The use of conventional fertilizers, herbicides and insecticides should be limited as far as possible. Wastewater from activities can pollute the soil.

PREFERRED LOCATION									
Project Phase	Impact: Land and soils								
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Construction	Spilling of oil/diesel by construction machines	Contamination of soil	Medium	Medium-high	Low-medium	Medium-high	Medium-high	Low	Medium
	Solid waste disposal	Soil pollution + nuisance	Low	Medium-high	Low-medium	Medium-high	Medium-high	Low-medium	Medium
	Storm water over roads and cleared areas	Erosion	Low-medium	Medium-high	Low-medium	Medium	Medium-high	Low-medium	Medium
	Trenches for electric cables and water and sewerage pipes	Erosion	Low-Medium	Medium-high	Low	Medium	Medium-High	Low-medium	Medium
Operation	Solid waste	Soil pollution + nuisance	Low	High	Low-Medium	Medium-High	High	Low	Medium
	Storm water from paved areas and roofs	Erosion	Low-medium	High	Low-medium	Medium	Medium-high	Low	Medium
	Use of fertilizers, insecticides and herbicides	Pollution	Low-Medium	High	Low-medium	Medium	Medium	Low-medium	Medium
Cumulative impacts	Increased potential for negative impacts on soil resource	Increased potential for erosion and soil pollution	Low-medium	High	Low-medium	Medium	Medium-high	Low	Medium

ALTERNATIVE LOCATION

Project Phase	Impact: Land and soils								
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Construction	Spilling of oil/diesel by construction machines	Contamination of soil	Medium	Medium-high	Low-medium	Medium-high	Medium-high	Low	Medium
	Solid waste disposal	Soil pollution + nuisance	Low	Medium-high	Low-medium	Medium-high	Medium-high	Low-medium	Medium
	Storm water over roads and cleared areas	Erosion	Medium	Medium-high	Low-medium	Medium	Medium-high	Medium	Medium-high
	Trenches for electric cables and water and sewerage pipes	Erosion	Low-Medium	Medium-high	Low	Medium	Medium-High	Low-medium	Medium
Operation	Solid waste	Soil pollution + nuisance	Low	High	Low-Medium	Medium-High	High	Low	Medium
	Storm water from paved areas and roofs	Erosion	Low-medium	High	Low-medium	Medium	Medium-high	Low	Medium
	Use of fertilizers, insecticides and herbicides	Pollution	Low-Medium	High	Low-medium	Medium	Medium	Low-medium	Medium
Cumulative impacts	Increased potential for negative impacts on soil resource	Increased potential for erosion and soil pollution	Low-medium	High	Low-medium	Medium	Medium-high	Low	Medium

Mitigation measures - Construction Phase

- Construction vehicles must be well maintained and serviced to minimise leaks and spills.
- Spill trays must be used during refuelling of vehicles on site.
- Diesel storage must not exceed 80,000 litres at construction camp. Diesel tanks and other harmful chemicals and oils must be within a bunded area.
- Solid waste must be kept in containers and disposed of regularly at licensed dumping site.
- Any building rubble must be removed to a licensed disposal site on a regular basis during construction.
- Trenches that are dug for the supply of services and electrical cables must be filled up and compacted well and slightly higher than the areas around it.
- The clearing of the site should be done in phases as the construction progresses.
- Slopes produced by removing soil must be kept to a minimum to reduce the chances of erosion damage to the area.

Mitigation measures - Operational Phase

- Solid waste must be kept in adequate waste bins and removed on a weekly basis to the waste disposal site.
- The surface drainage system should be monitored after storms and storm water damage should be repaired. The maintenance of the roads must be kept up to standard to prevent and reduce the incident of erosion next to the roads.
- The use of eco-friendly products e.g. organic compost, herbicides and insecticides should be promoted.

9.4.1.5. Archaeological, Cultural and Social Features

Construction phase

The clearing of the site may have a negative impact on the archaeological features of the site. Care must be taken in the excavations and moving of soil to observe any archaeological feature of importance, which must be left and reported to the archaeological consultant for comments and actions.

Operational phase

The operational phase will not have any negative impact on the archaeological features of the site, if the recommendations of the Heritage Impact Assessment (Annexure H1) and Palaeontological Study (Annexure H2) to be undertaken will be adhered to.

PREFERRED AND ALTERNATIVE LOCATIONS									
Project Phase	Impact: Loss of Archaeological, Cultural and social features								
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Construction	Earth moving and soil clearance	Destroy archaeological evidence and heritage and graves	Low-medium	Medium-high	Low	Low	Low-medium	Low	Low-medium
Operation	Operational activities of development	Destroy archaeological evidence and heritage and graves	Low-medium	High	Low	Low	Low-medium	Low	Low-medium
Cumulative impacts	Activities on site during construction and operational	Increase in potential to unearth archaeological evidence and graves	Low-medium	High	Low	Low	Low-medium	Low	Low-medium

Mitigation measures – Construction and operational phases

- The *possible* Historical Period concrete wall feature (rated as low heritage significance by the Heritage specialist) found on the south-western corner of the proposed development area should be avoided, providing a 30 m buffer.
- General surroundings in this area should be carefully monitored by the ECO in order to avoid the destruction of previously undetected heritage sites. Should any subsurface paleontological / archaeological / historical material and /or graves/human remains be uncovered, all activities should be suspended and the archaeological specialist should be alerted immediately.
- If fossils are uncovered in the course of construction activities, the developer should immediately call in a qualified palaeontologist to assess the situation and, if necessary, undertake excavation of the fossils.

9.4.1.6. Impact of the development on the ecology (fauna & flora) of the area

Planning and construction phase

The removal of natural vegetation will have a negative effect on the biodiversity. Clearance of vegetation should be restricted to the proposed 190 ha development area / fenced area and to the new access road. The specific mitigation measures included in the Ecological and Avifauna Impact Assessment (Annexures D & E) should be adhered to.

The high sensitivity area (*wetland*) located on the central part of the project site should remain undeveloped - providing a buffer zone 32 m wide - in compliance with the requirements highlighted in the Ecological Impact Assessment (Annexure D) and in the Wetland Delineation Study (Annexure G).

The access road will cross the Phufane Spruit and the related wetland zone. A Water Licence Application should be submitted to the DWA in this respect.
A hydrological assessment of the Phufane Spruit is recommended for the final design phase prior the construction. The aim of the study should be to determine the flood limit (1:1 year flood line) of the Phufane Spruit to design the road level and culvert structures to maintain access to the site during construction and operation.

The following **protected tree species** occur in the area, namely ***Acacia erioloba* (Camel thorn).** A licence application should therefore be submitted to DAFF before any of these trees can be removed during construction.

Plant species are also protected according to the Limpopo Environmental Management Act. The **protected plant species *Ammocharis coranica*** was found on site. A permit is required for these species.

Operational phase

The operation of the development can have a negative impact on the bio-diversity if it is not managed correctly. Exotic invasive plant species can have a negative impact on the indigenous vegetation.

PREFERRED AND ALTERNATIVE LOCATIONS									
Project Phase	Environmental Aspect: Ecology (Fauna and Flora)								
	Activity that causes impact	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Construction	Earthworks and vegetation clearance at construction site	Loss of indigenous plant species & disturbance to sensitive habitat	Medium	Medium	Low-Medium	Medium	Medium-High	Low-medium	Medium
	Vegetation clearance and the use of herbicides to control re-growth at the different development areas	The eradication and control of exotic invasive plant species Loss of indigenous plant species	Medium	Medium	Medium	Low-Medium	Medium-High	Low-Medium	Medium

PREFERRED AND ALTERNATIVE LOCATIONS									
Project Phase	Environmental Aspect: Ecology (Fauna and Flora)								
	Activity that causes impact	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
	The occurrence of veldt fires on site	Destruction of flora/habitats Loss of indigenous fauna	Medium-High	Medium	Medium	Medium-High	High	Medium	Medium-high
	Littering (e.g. cans and plastics) along access road and at construction site	Public nuisance and loss/death of indigenous fauna	Low-Medium	Medium	Medium	Medium-High	Medium	Low	Medium
	The control of animals on site Killing, poisoning or hunting of animals	Loss of indigenous fauna to the area	Medium-High	Medium	Medium	Medium	Low-Medium	Low-Medium	Medium
Operation	Rehabilitation of cleared areas	The spreading of exotic invasive plant species Loss of habitat and indigenous flora	Medium	High	Medium	Low-Medium	Medium	Low-Medium	Medium
	The occurrence of veldt fires	The loss of indigenous fauna and flora	Medium-High	Medium	Medium	Low-Medium	High	Medium	Medium-high
	The functioning of the permanent sewage treatment systems – treated sewage outflow	Deterioration in the habitat for avifauna and aquatic life	Medium-High	High	Medium	Medium-High	Medium	Low-Medium	Medium-High
	Disposal and storage of solid waste and littering	The death/loss of indigenous fauna e.g. raptors, mammals and reptiles	Medium-High	High	Medium-High	Medium-High	Medium	Low-Medium	Medium
	The control of pests and vermin	Killing and poisoning of fauna feeding on the poisoned vermin or pest	Low-Medium	High	Low-Medium	Medium-High	Medium	Low	Medium
	The feeding of fauna e.g. birds & small mammals	Disturbance to bio-diversity and the natural movement of the animals through the site The death/loss of indigenous fauna	Low-Medium	High	Low-Medium	Medium-High	Low-Medium	Low	Medium
	Catching of wild animals e.g. reptiles, bids and small mammals as pets	Disturbance to bio-diversity and decline in indigenous faunal numbers	Medium-High	High	Low-Medium	Low-Medium	Low	Low	Medium

PREFERRED AND ALTERNATIVE LOCATIONS									
Project Phase	Environmental Aspect: Ecology (Fauna and Flora)								
	Activity that causes impact	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
	Birds colliding with power line and panels	Electrocution of birds	Medium-High	High	Low-Medium	Low-Medium	Low	Low	Medium
	The erection of fences and the construction of roads with a kerb	The fragmentation of available habitat and the restriction of movement of small mammals, reptiles and amphibians	Low-Medium	High	Low-Medium	High	Medium	Low	Medium
Cumulative Impacts	Increased potential of negative impacts on ecology of the area	Increase in natural vegetation to be removed.	Low-medium	High	Low	Low	Low-medium	Low	Low-medium

Mitigation measures – Construction phase

- Unnecessary clearance of vegetation should not take place. Where possible, natural vegetation must be retained. Clearance of vegetation should be restricted to the proposed 190 ha development area / fenced area and access road.
- Construction activities should be restricted to the development area / fenced area.
- A licence application should be submitted to DAFF before any of the ***Acacia erioloba*** **(Camel thorn)** trees can be removed during construction.
- The **protected plant species *Ammocharis coranica*** was found on site. A permit is therefore required for these species in terms of LEMA.
    - The following specific management measures and guidelines should be implemented for protected plant species at the proposed development site:
        - Should impacts be unavoidable the following principles would apply. A detailed species rescue, relocation and re-introduction plan should be developed and implemented by a qualified person before any excavations or disturbance commence. This plan should at the least address the following:
        - Harvesting of seeds from herbaceous and woody vegetation to be used in the ex situ nursery and future rehabilitation.
        - Intact removal of protected plant species under permit. Permits should be obtained from the LEDET where protected flora is to be disturbed or relocated. Plant material that is to be “rescued” must be potted up into bags utilising local soil obtained from the previously stored topsoil heap. Adequate root systems per plant material type must be carefully excavated and retained in order for plant material to remain viable. Search and Rescue activities would include the removal of grass clumps, smaller transplantable shrubs and trees and endangered species such as geophytes and succulents should be placed into bags using local soil.
    - Options to be considered for protected and general floral specimens:
        - Suitable translocation areas: e.g. protected areas such as the Marakele National Park or other game farms in the area;

        - Translocation to suitable areas earmarked for public open spaces, restoration and rehabilitation, both on and off-site.
        - Use of removed plants in an indigenous nursery for future restoration and rehabilitation programs.
        - Translocation to other areas suitable for survival of the removed specimens.
    - Proper habitat suitability assessments before reintroductions to reduce the risk of mortalities in both source and destination populations.
    - Compile a Protected Plant policy for the study area. This should list those species under threat, reasons for their demise and measures that must be taken to ensure for their continued existence, including access to adequate and appropriate areas of suitable habitat condition.
- The access road will cross the Phufane Spruit and a Water Licence Application will be submitted to the DWA. A hydrological assessment is recommended for the final design phase prior to construction which should determine the flood limit (1:1 year flood line) to design the road level and culvert structures to maintain access to the site during construction and operation.
- The following general measures will have to be adhered to in order to mitigate impacts of the access road:
    - Coordinate erosion control measures with construction activities, including the staging of works;
    - Minimize soil exposure during construction;
    - Re-vegetate quickly and extensively;
    - Manage water effectively on, to, within, and from this site;
    - Provide suitable access tracks and loading, unloading, maintenance and wash-down areas;
    - Incorporate effective litter management and “house-keeping” practices;
    - Employ sediment capture techniques and stormwater attenuation techniques (if applicable).
- The herbicides used to control the invasive plant species should be chosen in consultation with an ecologist, as some of the agents might be detrimental to the surrounding indigenous fauna and flora e.g. Roundup is for example extremely toxic to frogs.
- Poisons for the control of problem animals should rather be avoided since the wrong use thereof can have disastrous consequences for the raptors occurring in the area. The use of poisons for the control of rats, mice or other vermin should only be used after approval from an ecologist.
- Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.
- Fires should only be allowed in designated places within the construction camp and extra care should be taken to prevent veldt fires of occurring.
- Firebreaks should comply with the National Veldt and Forest Fire Act, 1998 (Chapter 4: Duty to Prepare and maintain firebreaks).
- Cleared areas should be rehabilitated by reintroducing a grass layer as soon as possible to limit the occurrence of erosion.
- The cleared vegetation should not be burned on site. The cleared vegetation should be stockpiled and taken to the closest available landfill site.
- Solid waste must be kept in adequate animal proof waste bins at the construction camp and construction sites. Building rubble and various wastes should be removed on a regular basis to the closest available landfill site.
- Regular clean-up programs should be put into effect along the access road and throughout the premises to limit the impact of littering caused by construction

activities.

- The stockpiled topsoil and construction material should be managed in such a way that the material is not transported by wind or rain. This can be done by restricting the height of the stockpiles, sandbagging and avoiding steep slopes.
- No animals may be killed, captured or hunted on site by construction workers. Do not feed any wild animals on site.
- Where trenches pose a risk to animal safety, they should be adequately cordoned off to prevent animals falling in and being trapped and/or injured. This could be prevented by the constant excavating and backfilling of trenches during construction process.
- Existing game on the developed area will be relocated when the proposed solar park is developed. The relocation of the game will be executed according to the relevant legislation.
- Cumulative impacts on the ecology of the area can be significant. However, with the mitigation measures in place, the potential is very low for significant negative impacts on the ecology of the area.
- The EMPr will have to be adhered to both during the construction as well as operational phases and regular monitoring should be done to ensure that there is sound environmental practice at the Platinum Solar Park.

Mitigation measures – Operational phase

- An ecologist should be consulted on the use of herbicides/eco-friendly products to control exotic tree and shrub species.
- Poisons for the control of problem animals should rather be avoided since the wrong use thereof can have disastrous consequences for the raptors occurring in the area. The use of poisons for the control of rats, mice or other vermin should only be used after approval from an ecologist.
- Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.
- The high-risk sections of the power line should be marked with a suitable anti-collision marking device on the earth wire as per the Eskom guidelines.
- Solid waste must be kept in animal proof waste bins.
- A monitoring program should be compiled and implemented to ensure that the sewage treatment system is functioning properly and that the treated wastewater conforms to the standards set by the Department of Water Affairs.
- Staff members should be discouraged from attempting to catch or kill any wildlife for use as food, pets or to feed any wild animals.
- Firebreaks should comply with the National Veldt and Forest Fire Act, 1998 (Chapter 4: Duty to Prepare and maintain firebreaks).
- The impact on the flying invertebrates will be minimized through the use of sodium vapour (yellow) lights as outside lighting.
- The use of eco-friendly products e.g. Organic Compost and/or Effective Microorganisms (EM), which reduces the frequency of application of conventional fertilizers, herbicides and insecticides, should be promoted.
- The EMPr will have to be adhered to both during the construction as well as operational phases and regular monitoring should be done to ensure that there is sound environmental practice at the Platinum Solar Park.

9.4.1.7. Visual impacts

Construction phase

The natural aesthetic character of the site will be changed. The Eskom 132 kV and 400 kV power lines crossing the project site and the adjacent Eskom Spitskop substation have already changed the visual characteristics of the site.

Operational phase

Buildings and the solar modules have a *visual impact* and lights at night can be a *nuisance.*

PREFERRED AND ALTERNATIVE LOCATIONS									
Project Phase	Impact: Visual disturbance								
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Construction	Buildings & panels	Visual	Low	High	Low-Medium	High	High	Low-Medium	Medium
	Lights	Visual	Low	Medium	Low-medium	Medium-high	High	Low-Medium	Medium
Operation	Buildings and panels	Visual	Medium	High	Medium	High	High	Medium-High	Medium
	Lights	Nuisance	Low	High	Low-medium	Medium-High	High	Low-Medium	Medium
	Electrical lines	Visual	Low	High	Low	High	High	Low-Medium	Low-Medium
Cumulative Impacts	Increased in visibility of yet another solar park in the area	Increased visual intrusion and nuisance	Low-medium	High	Low	Low	Low-medium	Low	Low-medium

Mitigation measures

- Earth works should be executed in such a way that only the footprint and a small 'construction buffer zone' around the proposed components are exposed. In all other areas, the natural occurring vegetation, more importantly the indigenous vegetation should be retained.
- Care must be taken that unnecessary clearance of vegetation does not take place. Where possible, natural vegetation must be retained. Clearance of vegetation should be restricted to the proposed 190 ha development area / fenced area and to the new access road.
- Install light fixtures that provide precisely directed illumination to reduce light "spillage" beyond the immediate surrounds of the project site.
- Minimise the amount of light fixtures to the bare minimum and connecting these lights to motion sensors can also considered in reducing light pollution.
- A video-surveillance system using infrared or microwave video cameras, which do not need a switched on lighting system, is recommended.
- Cumulative impacts will be low as it was possible to mitigate the visual impact at Platinum Solar Park successfully as a result of the natural characteristics of the area.

9.4.1.8. Safety, security and fire hazards

Construction phase

Construction activities such as excavating of foundations and trenches, movement of construction vehicles, the use of equipment and the congregation of workers and staff on site further increases the risk of injury. The activities of construction personnel on site may contribute to an increase in the level of crime in the area and may also contribute to an increase in the risk for fires.

Operational phase

Fires and criminal activities pose a significant risk during the operation of the development.

PREFERRED AND ALTERNATIVE LOCATIONS									
Project phase	Impact: Safety, security and fire hazards								
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Construction	Construction activities – excavation of foundations, trenches etc.	Loss or injury to human life	Low-medium	Medium-high	Low	High	Medium	Low	Medium
	Security	Crime	Medium	Medium-high	Low-medium	Medium	Medium-high	Low - medium	Medium
	Fire hazards	Loss of human life and construction equipment etc.	High	Medium-high	Medium	Low	Low-Medium	Low-Medium	Medium
Operation	Security	Crime	Medium	High	Medium	Medium	Medium-high	Medium	Medium-high
	Fire hazards	Loss of human life, bio-diversity, buildings, infrastructure etc.	High	Medium	Medium -High	Low	Low	Low	Medium
Cumulative Impacts	Higher number of people in the area increases safety risks	Potential for an increase in criminal activity	High	Medium	Medium -High	Low	Low	Low	Medium

Mitigation measures

- The Contractor shall conform to the stipulations of the Occupational Health and Safety act (Act 85 of 1993) and regulations applicable. The Act requires the designation of a Health and Safety representative when more than 20 employees are employed.
- Open trenches or excavations must be marked with danger tape.
- The number of construction workers to stay on site should be limited to the minimum.
- Proper access control (I.D. cards) should be enforced to ensure that no authorised persons enter the site.
- No solid waste or vegetation may be burnt on the premises or surrounding areas.
- Firebreaks should comply with the National Veldt and Forest Fire Act, 1998 (Chapter

4: Duty to prepare and maintain firebreaks).
- Fire extinguishers and firefighting equipment must be available.
- A fence should be constructed along the boundary of the development.
- The cumulative impacts of this impact can be successfully mitigated if managed properly.

9.4.1.9. Socio-economic impact

Construction phase

The construction and operation phases of the development will have a positive impact on the socio-economic environment of beneficiary communities through employment opportunities and training and skills development.

Operational phase

A number of permanent jobs will be created for local people during this phase.
Firefly Investments 224 should identify a local Community for the purpose of entering into a partnership for the Project, as required by the rules of the IPP Procurement programme.

PREFERRED AND ALTERNATIVE LOCATIONS									
Project phase	Impact: Job creation								
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Operation	Job creation	Job Creation	High +	High +	Medium-high +	High +	High +	N/A	High +
Operation	Local Community development	Local Community development	High +	High +	high +	High +	High +	N/A	High +
Cumulative impacts	Increased potential for job creation.	Increased potential for local Community development	High +	High +	high +	High +	High +	N/A	High +

Mitigation measures

- During the construction and operational phases, jobs must be created for unemployed local people and skills must be transferred to them.
- Where viable, the work must be executed in a labour intensive manner to create as many jobs possible.
- The cumulative impact of this impact can just be positive. As one of the poorest provinces in South Africa, the Limpopo is definitely in need of more job opportunities.

9.5. POTENTIALLY SIGNIFICANT IMPACTS

Impacts with a rating of Medium-high or High are impacts which are regarded as potentially significant, rated without any mitigation measures. In this impact assessment, the following impacts were regarded as potentially significant impacts:

i. Water pollution by the inadequate functioning of the sanitation system.
ii. Water consumption and depletion during construction phase.
iii. The occurrence of veldt fires.

These impacts (i-iii) will now briefly be discussed.

9.5.1. Cumulative impacts

i. The effect of water pollution (surface and groundwater) by a malfunctioning of the sanitation system will have a cumulative effect only if it is not detected by a regular monitoring and if it takes place on a regular basis.
ii. This effect is cumulative only if care is not taken to conserve water and if water usage and the water levels of boreholes are not monitored regularly.
iii. This can have a cumulative effect if preventative measures are not followed.

9.5.2. Nature of impact

i. This is pollution of a renewable resource.
ii. This is a negative impact that affects water quantity available for use in the area.
iii. Damage to property, ecology and safety of people.

9.5.3. Extent and duration of impact

i. The extent could potentially be within the farm of the proposed development and the surrounding farms.
ii. The extent could potentially be within the area of the proposed development and the surrounding farms. The duration is only during construction.
iii. The extent is potentially on the development area as well as surrounding properties and even regional. The duration is for the life of the development.

9.5.4. Probability of occurrence

i. The probability is unlikely.
ii. The probability is possible.
iii. The probability is infrequent or seldom.

9.5.5. Degree to which impact can be reversed

i. Impact is reversible if mitigated in time.
ii. This impact is reversible because the higher abstraction will only be during the construction period.
iii. If the development is not continuing there will be no guarantee that veldt fires will not occur on the property. This impact must therefore be managed accordingly.

9.5.6. Degree to which impact can cause irreplaceable loss of resource

i. If this impact takes place over a very long time and there is gross negligence, the water resource can be damaged to a point where it will take very long to recover and where it could almost be seen as being irreplaceable.
ii. The recovery of the water resource is linked to rainfall and will recover accordingly. The negative impact is during the construction period.
iii. Veldt fires can create such damage that it will take a long time for the veldt to recover but the fact is that the vegetation has been subjected to veldt fires ever since. Loss of property (buildings) can be replaced.

9.5.7. Degree to which impact can be mitigated

i. Successful mitigation is possible
ii. Successful mitigation is possible
iii. Successful mitigation is possible

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 (25 - 30 years) and will last approximately 6 months, involving a team of 50 workers.

Decommission will be subject to a decommissioning plan once the project is nearing its operational life (25-30 years). Decommissioning will also be subject to an environmental authorization (Activity 27 of R544 of 18 June 2010).

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 laydown 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 (25 ÷ 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

The EIA Report describes the activities undertaken for the development of the Platinum Solar Park.

The purpose of this report is to provide the relevant authorities and interested and affected parties with sufficient information regarding the potential impacts of the development to render meaningful comments. Potential impacts were identified in consultation with I&AP's and technical specialists (where applicable) and were assessed using a matrix and by applying professional knowledge.

The potentially significant negative impacts that have been identified should be mitigated through the implementation of the mitigation measures highlighted in this report. It is submitted that the proposed mitigation measures, will effectively diminish the impacts to acceptable levels. Given the socio-economic imperatives of the development, the residual impacts are not of sufficient importance to thwart the development.

The site of the Platinum Solar Park has been chosen by Firefly Investments 224 on the grounds of several considerations, in particular:

- the availability of an easy connection solution due to the presence of the **Eskom "Spitskop" substation,** adjacent to the project site;
- the flatness of the land;
- the location of the project in a property which is part of the mining right area of Rustenburg Platinum Mines (Pty) Ltd (Anglo American Platinum Limited). **The proposed solar park will help the Eskom grid to meet the high energy demand related to the mining activities conducted in the area (Union North Mine on the Farm Zwartklip 405 KQ). Furthermore, being a renewable energy plant which doesn't generate CO2 emissions - it will help to compensate the CO2 emissions arising from these mining activities.**

The project site is located in the **Thabazimbi Local Municipality**. The Thabazimbi Local Municipality has a **Spatial Development Framework Plan (SDF)** for the entire jurisdiction of Thabazimbi. In terms of the SDF, the subject property is located in Northam, a Municipal Growth Point and nearby Road P16/2 that has been identified as a Municipal Development Corridor.
The application property is located adjacent to the earmarked urban development boundary (or so-called urban edge) of Northam, on land that forms part of the Anglo American Platinum Mine's land.

The land uses typically found in this area are:

- Subsistence agriculture areas;
- Conservation areas and nature reserves;
- Tourism facilities and related activities;
- Formal and informal residential areas;
- Business of office nodes;
- Industrial and commercial areas;
- Mines (Anglo American Platinum); and
- Governmental uses.

The proposed solar park is a unique land use. It could sort under an industrial land use, but it could also be regarded as a land use supplementary to a residential, business and commercial area in view of its service delivery function (energy provision) and limited impact on surroundings. The fact that the development is proposed adjacent to the urban area of Northam is very positive as it supports the Municipality's objective of compact development, i.e. by the combating of urban sprawl, use of infill development and optimal usage of existing infrastructure services and land owned by the mine. It should be noted that only a part of the property will be utilised for the envisaged Solar Park whilst the rest of the land will be retained as it is, i.e. land associated with the Swartklip Mine and guesthouse with natural vegetation for grazing by local game species.

The SDF states that: "*Service industries and light industries may develop in close proximity of residential areas*". The solar park can be regarded as a complementary use to other developments such as residential, business or commercial; therefore the location of the proposed solar park specifically on the outer edge of the Northam Town can be regarded as beneficial and in line with the SDF proposals. It should be noted that the location of the proposed facility should also be viewed in context of the existing Eskom infrastructure south-east of the application property, *i.e.* the **Eskom Spitskop transmission substation** and existing power lines traversing the property. Other Municipal infrastructure services are also located to the west of Northam town and include the existing oxidation ponds as well as the future Waste Water Treatment Works that are planned on Portion 3 of the Farm Leeuwkopje, 415 KQ. It could therefore be accepted that the area to the west of Northam towards the Swartklip Mine land owned by Anglo American is already used for service utilities, including mine activities, and that the proposed solar park actually harmonises well with these land uses.

The proposed development area will furthermore strengthen the development corridor of Road P16/2, which has been earmarked in the SDF as the main development corridor between Growth Point 1 (Thabazimbi) and Growth Point 2 (Northam). This is a development spine for the Municipal area where commercial, industrial and residential uses are encouraged.

The proposed solar park development can thus be considered in line with the Council's spatial planning guidelines. This application will therefore give effect to the goals set in the SDF for development in the Northam area, as well as along the Road P16/2 – Municipal Development Corridor.

The development of clean, green and renewable energy has been qualified as a priority by the Government of South Africa. The **Renewable Energy IPP Procurement Programme (REIPPPP)**, issued on 3rd August 2011 by the Department of Energy, envisages the commissioning of 3725 MW of renewable projects (1450 MW with solar photovoltaic technology) capable of beginning commercial operation before the end of 2020.

The development of photovoltaic power plants will represent a key feature in the fulfilment of the proposed goals and the reduction of CO_2 emissions.

The purpose of the Platinum Solar Park is to add new capacity for the generation of renewable electric energy to the national electricity supply in compliance with the REIPP Procurement Programme and in order to meet the "sustainable growth" of the Limpopo Province.

Thanks to the Platinum Solar Park:

- the **avoided CO_2 emissions** will be from approximately **162,000 to 193,000 tons of CO_2 per year**;
- the **coal saved** is estimated from approximately **43,000 to 51,000 tons of coal** / **year**.

The following socio-economic benefits where found in the Socio-economic Impact Assessment:

- The national and local economies will benefit from civil contractor work, labour and building materials that will be required on site. On the whole, a share approximately **40% of total CAPEX (investment costs)** will be sourced locally. This share is likely to increase once there will be a specific and competitive industry in the Republic of South Africa able to supply PV modules and other technological components.
- After approval, each project will take approximately **15 months** to be built and will have a lifetime of 25-30 years. For each project, approximately **100 people** are expected to be employed during the construction period, although this number can increase to 150 for short spaces of time during peak periods..
- During operational phase, each power plant will require a permanent staff approximately **35/40 people**. That impact will be positive, also in consideration of the slowing down of the recruitment rate due to mining stabilization activities.
- Approximately **50% of the operation 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 (25÷30 years).
- The project will comply with the Economic Development Requirements, as requested by the REIPP Procurement Programme, issued on 3rd August by the DoE. This economic development programme identifies needs of the surrounding communities in order to have a positive socio-economic impact. In particular, Firefly Investments 224 is required to identify a **Local Community** for the purpose of entering into a partnership for the project.

It is the professional opinion of AGES that the proposed development is **highly desirable** and **does not present any fatal flaws in terms of negative impacts to the environment** and therefore will not have any significant detrimental impacts to render the project unfeasible.

It is proposed that the following conditions must be included in the Record of Decision if the project is authorised:

- The mitigation measures contained in this report must be implemented.
- The management and or mitigation measures contained in the Environmental Management Plan must be implemented.
- The responsibilities to obtain any further authorisations and/or licenses will rest on the proponent of the project, PRIOR to any activities on site.