Amended Final EIA Report **14/12/16/3/3/2/533**

PROPOSED ESTABLISHMENT OF A RENEWABLE ENERGY GENERATION PROJECT ON PORTION No. 3 OF THE FARM MACHOROGAN No. 106, BARKLY WEST RD, DIKGATLONG LOCAL MUNICIPALITY, FRANCES BAARD DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE

Short name: ANJUTONE 2 SOLAR PARK

June 2014

Commissioned by: Anjutone (Pty) Ltd
Document version 3.0 – Amended Final

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Proposed establishment of a Renewable Energy Generation Facility on Portion No. 3 of the Farm Machorogan No. 106, Barkly West RD, Dikgatlong Local Municipality, Frances Baard District Municipality, Northern Cape Province

Short name: Anjutone 2 Solar Park

June 2014

PROJECT APPLICANT

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Mr. Mothibi	Department of Agriculture, Land Reform & Rural Development
Ms. D Werth	Northern Cape Department of Environment & Nature Conservation
Municipal Manager	Dikgatlong Local Municipality
Municipal Manager	Frances Baard District Municipality
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	Registered Interested and Affected Parties

DOCUMENT HISTORY

Report no	Date	Version	Status
14/12/16/3/3/2/533	June 2014	3.0	Amended Final
14/12/16/3/3/2/533	March 2014	2.0	Final
14/12/16/3/3/2/533	December 2013	1.0	Draft

PROJECT MAIN FEATURES

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

General site information

Site location	
Farm	**MACHOROGAN 106, Barkly West RD**
Portion	**Portion 3**
Surveyor-general 21 digit site	C00700000000010600003
Local Municipality	Dikgatlong
District Municipality	Frances Baard
Province	Northern Cape

Property details	
Extent	857.1512 ha
Land Owner	COOKE CATHRINA WILEHLMINA
Diagram deed number	T20402/1930
Title deed number	T3761/2003
Registration date	20031030
Current land use	livestock farm

Site data	
Latitude	28°10.8' S
Longitude	24°22.2' E
Altitude	1130 m a.m.s.l.
Ground slope	flat

Adjacent farm portions	
Farm **Portion** Surveyor-general 21 digit site Land Owners Diagram deed number Title deed number Registration date Extent Current land use	**MACHOROGAN 106, Barkly West RD** **Portion 2** C00700000000010600002 KATFONTEIN CC T1977611928 T142811973 19731112 428.7281 hectares livestock farm
Farm **Portion** Surveyor-general 21 digit site Land Owners Diagram deed number Title deed number Registration date Extent Current land use	**MACHOROGAN 106, Barkly West RD** **Portion 5** C00700000000010600005 COOKE CATHRINA WILHELMINA T20404/1930 T376112003 20031030 1027.8442 hectares livestock farm
Farm **Portion** Surveyor-general 21 digit site Land Owners Diagram deed number	**MACHOROGAN 106, Barkly West RD** **Portion 13** C00700000000010600013 BURGER ANDRIES JOHANNES T620/1960

Title deed number	T550/2002
Registration date	20020301
Extent	427.4095 hectares
Current land use	livestock farm
Farm	**MACHOROGAN 106, Barkly West RD**
Portion	**Portion 18 (Remaining Extent)**
Surveyor-general 21 digit site	C00700000000010600018
Land Owners	DE & P 29 INV PTY LTD
Diagram deed number	T2442/1992
Title deed number	T4777/2000
Registration date	20001215
Extent	1586.1210 hectares
Current land use	livestock farm
Farm	**MACHOROGAN 106, Barkly West RD**
Portion	**Portion 21 (Remaining Extent)**
Surveyor-general 21 digit site	C00700000000010600021
Land Owners	MARITZ CHRISTINA JOHANNA, MARITZ DIRK PIETER JACOBUS
Diagram deed number	T1112/2008
Title deed number	T2146/2004
Registration date	20040531
Extent	549.6858 hectares
Current land use	livestock farm

PV power plant design specifications and connection to the Eskom grid

Project data	
Project name	**ANJUTONE 2 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	
Installed power capacity - AC side	**up to 75 MW**
Installed power capacity - DC side	**up to 86.4 MWp**
Number of PV modules	up to 608,400 thin film modules of 135 Wp each up to 288,000 mono/polycrystalline modules of 300 Wp each
Number of structures (PV arrays)	up to 15,600 mounting systems (fixed or trackers)
Minimum structure height above ground level	1.0 m
Maximum structure height above ground level	3.1 m

Other information	
Footprint, including internal roads (fenced area)	up to 230 ha
PV power plant lifetime	25 - 30 years
Construction camp (temporary)	10 ha
Construction timeframe	up to 15 months

Connection to the Eskom grid (**)	
Preferred connection solution: description	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 high-voltage power transformers, stepping up the voltage to the voltage of the Eskom's grid, a control building and one busbar with metering and protection devices (also called "switching station"); (ii) two new small sections of high-voltage power line allowing the **Eskom "ULCO-GANSPAN 1" 132 kV power line** - crossing the project site - to loop in and out of the 132 kV busbar of the new on-site loop-in loop-out substation. The connection solution may also entail intervention on the Eskom's grid.
Point of connection (preferred)	**"ULCO-GANSPAN 1" 132 kV power line**
Point of connection (farm, portion)	Portion 3 of the Farm MACHOROGAN 106
Delivery point: voltage level	132 kV
New sections of power line - overall length	2x100 m
New HV substation inside the property - footprint	approximately 4,000 m^2
Servitudes for new power lines	not required
(**) already included in the current EIA application	

Water requirements	
Water consumption	See paragraph 4.2.5 - water requirements

Site maps and GIS information

Status quo information - site	***ESRI shapefiles***
Site	Ptn 3 of Machorogan 106, adjacent farm portions
Building and other structures	boreholes
Agricultural field	Not applicable
Natural and endangered vegetation areas	vegetation map, sensitivity map
Cultural historical sites and elements	MGS01
Contours with height references	1m contours
Slope analysis	1m contours
High potential agricultural areas	Not applicable
Eskom's substation(s) / power line(s)	Eskom ULCO-GANSPAN_1 132kV power line

Development proposal maps	***ESRI shapefiles***
Project site	Ptn 3 of Machorogan 106, cadastrals
Access road and internal roads	access road, internal roads
Position of solar facilities	PV arrays
Permanent laydown area footprint	footprint (fenced area)
Construction period laydown footprint	construction camp
River, stream, water crossing	Not applicable
Substation and transformers	High-voltage loop-in loop-out substation
Connection routes	new sections of 132kV power line
Buildings	MV stations, control building, warehouses

Other information

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- AJ2SP_01_DE_Rev.03/EIA Layout of the PV power plant
- AJ2SP_03_DE_Rev.00/EIA Mounting System – Alternative option 1: fixed mounting systems
- AJ2SP_04_DE_Rev.00/EIA Mounting System – Alternative option 2: horizontal single-axis trackers
- AJ2SP_05_DE_Rev.00/EIA Medium-voltage stations
- AJ2SP_06_DE_Rev.00/EIA Control building and medium-voltage receiving station
- AJ2SP_07_DE_Rev.00/EIA High-voltage loop-in loop-out substation
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Annexure B Photos of the project site

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Annexure N Comments and Responses

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
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
GHG	Green House Gases
GIS	Geographic Information Systems
GN	Government Notice
GWh	Giga Watt hour
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
IPP	Independent Power Producer
kV	kilovolt
MW	Mega Watt
MWp	Mega Watt peak
NEMA	National Environmental Management Act - Act no. 107 of 1998
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act - Act no. 25 of 1999
NWA	National Water Act - Act no. 36 of 1998
PoS	Plan of Study
Property	Portion 3 of the Farm Machorogan 106, Barkly West RD
Project company	Anjutone (Pty) Ltd (applicant)
Project site	Portion 3 of the Farm Machorogan 106, Barkly West RD
PV	Photovoltaic
REFIT	Renewable Energy Feed-in Tariffs
RFP	Request For Qualification and Proposals For New Generation Capacity under the 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
Anjutone	Anjutone (Pty) Ltd (applicant)

BACKGROUND

The purpose of this report is to amend the Final EIA Report submitted on 19 March 2014, in order to include the additional information requested by the Department of Environmental Affairs with a letter dated 26 May 2014, in which the Final EIA Report is rejected.

The additional information requested by the DEA and are listed below:

a) [DEA] The Northern Cape Department of Environment and Nature Conservation raised concerns in their letters dated 09 October 2013 and 17 February 2014 respectively. These concerns and comments have not been addressed in the Draft and Final EIAR. You are hereby requested to address all the concerns raised and must be included in the amended EIAR.

1) [DENC] The comments that was made by the Department on the draft scoping report was not addressed in the Draft EIR report, kindly address the comments that was made and forward the comments and response report to the Department of Environment and Nature Conservation.
1) As indicated in the paragraph 7.3. PUBLIC PARTICIPATION PROCESS of the submitted Final EIA Report, the Draft EIA Report was revised to the final version addressing the comments of DENC.
A copy of the Final EIA report and a letter indicating how and where the comments of the DENC were addressed was sent to the DENC by e-mail and courier on 6 June 2014. A copy of this Amended Final EIA Report, Draft EMPr and Annexures were sent to the Department of Environment and Nature Conservation, as well as to the registered I&APs for a 30 day commenting period.

2) [DENC] On page 6 there was referred to the Department as "Northern Cape Department of Tourism, Environmental Affairs and Conservation", it is presently called the Department of Environment and Nature Conservation. This should be corrected for throughout the document.
2) The Departments' name was corrected throughout the Final EIA report, as well as in this Amended Final EIA Report.

3) [DENC] On page 7, the Northern Cape Nature Conservation Act No. 09 of 2009 was not mentioned on the Legislation Regulations and Guidelines involved in the proposed development. It is important that the developers become aware that all the indigenous floral species are protected under the NCNCA; no indigenous floral species may be removed from the site without the necessary permits from DENC. This includes the removal of bird nests, specially of raptor species, and no animals (including snakes) may be hunted (poached), trapped, injured or removed (transported) in any way without the necessary permits (during the construction phase or thereafter).
3) The legislation as identified by DENC was included in the Final EIA Report on page 9 (Table 1 - Review of relevant legislation). The issue of hunting and snaring of animals is specifically addressed in the EMPr (point 1.4.1), attached to the Final EIA Report. A further statement is made under this point reading as follows: "*no indigenous floral species may be removed from the site without the necessary permits from DENC*".
The plant species *Olea europaea* (wild olive), protected under the NCNCA, were found in the riparian vegetation in the southern section of the farm, while the proposed development area (PV plant footprint) is located at a minimum distance of 500 m from the riparian area.
As indicated in the Ecological Impact Assessment: *should any other individuals be found on the site during construction, the trees should not be eradicated but a licence application should be submitted to Northern Cape DENC, although after the survey it can be anticipated that no further impact will occur on the species.*
As indicated e.g. on paragraph 9.3.1.6. *Impact of the development on the ecology (fauna & flora) of the area* of the Final EIA Report: *Protected trees can only be removed once the necessary permits have been obtained.*

4) [DENC] The occupational health and safety Act No. 85 of 1993: as amended by Occupational Health and Safety Amendment Act No.181 of 1993. All necessary legislation has to be compiled with for an EIA development. Kindly include this act in the report.

4) The legislation as identified by DENC was included in the Final EIA report on page 9 (Table 1 - Review of relevant legislation), as well as in this Amended Final EIA Report.

5) [DENC] No Protected tree species (e.g. Boscia Albitrunca) which are protected under the Forestry Act may be removed from the area without the necessary permits from the Department of Agriculture, Forestry and Fisheries {DAFF).

The protected tree species *Boscia albitrunca* (shepherd's tree) were found across the project site; an application to remove protected trees on the development area (footprint) will be submitted to the DAFF in this respect.

As indicated e.g. on paragraph 9.3.1.6. *Impact of the development on the ecology (fauna & flora) of the area* of the Final EIA Report: *Protected trees can only be removed once the necessary permits have been obtained.*

6) [DENC] The 30m wetland buffer zones around the wetlands in the south are interceded by the proposed access road that will join the proposed development site with the R370 (pg 15). The proponent is advised that disturbance in this area is strictly kept to the proposed access road.

6) A wetland area was identified in the southern section of the site and was classified as channel wetland including a riparian zone. This was identified in the Wetland Delineation Report as included in the Final EIA report and in the Amended Final EIA Report. The wetland specialist recommended 30 m buffer zones, which were incorporated in the project lay out plan in order to protect the riparian vegetation; this will be enforced.

The proposed development area (PV plant footprint) is located at a minimum distance of 500 m from the riparian area, therefore any *potential* impact to the riparian habitat is only related to the first section (300 m) of the new access road. Although the proposed route of the first section (±300 m) of the access road from R370 has been planned in such a way to avoid the wetland area, activities 11 and 18 of GNR 544 has been applied for, due to the proximity of the first section if this road to the wetland area. However, no infilling or depositing of any material or the dredging, excavation, removal or moving of soil will take place in the wetland area. An ECO will be appointed to do the monitoring of construction activities. A Water Use Licence application is being drafted and will be submitted to the Department of Water Affairs by Anjutone (Pty) Ltd in respect of the first section of the new access road.

7) [DENC] A tributary of the Harts River (permanent river system less than 3km away) can be found on the property proposed for development. Through this system has an ephemeral flow, it is impeccable that no spillage of any sort be dumped in it, accidental or deliberate. Stringent methods must thus be incorporated within the EMP of the proposed development to avoid spillage. Kindly provide the Department with the stringent methods.

7) A solar plant of this nature does not produce effluent and/or spillages. The only risk is from construction activities and this is thoroughly and specifically addressed in the EMPr in sections 1.3.1 and 1.4.1 as included in the Final EIA Report.

A tributary of the Harts River is crossing the south western boundary of the project site, **900 m** away from the development area, therefore no potential impact is envisaged, neither during construction, being the construction activities **restricted to the development area**.

8) [DENC] On page 36, the rocky ridge northern section of the site was not surveyed needs to be surveyed to assess the possible effects of the construction of the proposed solar plant.

8) The rocky ridge in the northern section was identified during the ecological survey and classified as a sensitive area and was totally excluded from the development site. This rocky ridge is **more than 1,6 km from the proposed development area (footprint)** and the construction activities will not take place near the rocky ridge but **will be restricted to the planned footprint**. The site lay out plan (Annexure A and Figure 2 of the FEIAR) is specifically based on the sensitivity map as drawn up by the specialist and this is adhered to, throughout the process.

9) [DENC] The proponent needs to obtain and provide written confirmation from the organisations such as Eskom and the Dikgatlong Local Municipality witch confirms that basic services such as water and electricity provision can be provided for the proposed development.
[DENC - comment on DSR] On page 22 of the draft scoping report there were stated that storage tanks will be used for water supply an in the report there were mentioned that a water use license will be obtained. The Department would kindly want know from where the water will be obtained from for the proposed project.
9) A letter was received from the Dikgatlong Local Municipality in which the municipality pledges their support for the project. Also, they requested that they be consulted for services and a rezoning / change of land use application. This is currently undergoing by a Town and Regional Planner appointed by Anjutone (Pty) Ltd.
As indicated in the Services Report (Annexure L), in the Geo-technical and Geo-hydrological Report (Annexure I) and on the paragraph *4.2.5.3. Water provision during construction and operation* of the Final EIA Report and of this amended Final EIA Report, water will be provided by a new on-site borehole or by the existing borehole on Portion 4, owned by the same landowner of the project site. A Water Use Licence is under drafting and will be submitted to the DWA in this respect. Indeed groundwater can't be used without a permit from the DWA.
Electricity is available in the site and it is expected that a suitable connection can be applied for, in order to meet the internal consumption of the solar park (offices in the control building, lighting and video-surveillance systems, electrical devices on stand-by during the night, etc.). The application to Eskom should be submitted 6 months before the starting of the construction activities, subject to the appointment of the Anjutone (Pty) Ltd as Preferred Bidder by the Department of Energy under the REIPPP Procurement Programme.

10) [DENC] Mitigation and management actions/recommendations on pages 54-67 should be incorporated into the EMP and strictly adhered to.
10) Management actions have been incorporated into the Amended Draft EMPr submitted with the Final EIA Report and will be adhered to; an ECO will be appointed to see to it that this is being done.

[DENC - comment on DSR] With reference to page 22, there was stated that there will be between 100 and 150 workers employed, can you kindly indicate if the workers will be local or non-local.
The most part of the workers will be local. This is a requirement of the REIPPP Procurement Programme issued by the DoE. The construction of the proposed Anjutone 2 Solar Park is subject the appointment of the Anjutone (Pty) Ltd as Preferred Bidder by the Department of Energy under the REIPPP Procurement Programme; the local content and the economic development to be proposed by the bidders are key factors for the success of the solar projects under the tender. Please refer to the Socio-Economic Impact Assessment (Annexure K) for more details.

[DENC - comment on DSR] With regards to the workers and heath awareness. Can you kindly provide the Department with methods that will be used to make the worker's aware of the health risk such as HIV/Aids?
Informative posters can be posted on site during the construction and operational phase.
It should be noted that during the construction phase workers will not be allowed to stay on the site overnight; only key personnel (e.g. guardians) will be allowed to stay on site overnight.
During the operational phase, only guardians will stay on site overnight. The construction and operational activities will be restricted to the proposed footprint. The surveillance camera will monitor the site 24h.

b) [DEA] The amended EIAR must provide a final wetland delineation study as the Final EIAR contains a draft wetland study. The recommendations and mitigation measures of the abovementioned study must be included into the amended EIAR and draft Environmental Management Programme.

The Wetland Delineation Study has been re-submitted as final version. The previous version submitted with the Draft and Final EIA Reports is confirmed.

As far as the other reports and annexures are concerned (Visual Impact Assessment, Ecological Impact Assessment, Avifauna Impact Assessment, Agricultural Potential Assessment, Geo-technical and Geo-hydrological Study, Heritage Impact Assessment, Services Report), they are confirmed without the need of any amendments.

c) [DEA] A Cumulative Impact Assessment is required to be part of the amended EIAR should there other similar facilities in the region.

The new paragraph **6.2. OTHER RENEWABLE ENERGY PROJECTS IN THE PROXIMITY OF THE PROPOSED ANJUTONE 2 SOLAR PARK** has been added, as well a map indicating the renewable energy projects in the proximity of the proposed Anjutone 2 Solar Park (Figure 9).

As explained in the paragraph 6.2, **the cumulative impact is NOT APPLICABLE**, because there are no renewable energy projects currently planned and selected by the Department of Energy in the proximity (< 50 km) of the proposed PV project. The closer project under construction is the Mainstream Droogfontein 48 MW PV project, located at **60 km** from the proposed solar park.

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 and impossible in the case of the proposed Anjutone 2 Solar Park, considering that **they would be in competition also in terms of "grid availability". Indeed the Anjutone 2 Solar Park is going to be connected to the Eskom " ULCO-GANSPAN" 132 kV power line which crosses the project site, which is available for only one project (75 MW).** There are no other high-voltage power lines close to the project site available for connection.

Copies of the Amended EIAr must be circulated to all key stakeholders, Organs of State and registered I&AP's for a duration of 30 days for comment. The issues raised by I&AP's must be addressed in a table format indicating the issue/concern raised and the EAP's response thereto and must include copies of the I&AP's correspondence as well as a copy of this Department's rejection letter.
The EAP must provide proof that all registered I&AP's have been notified of the availability of the amended EIAr.

The Amended Final EIA Report is submitted to all registered I&AP's for a 30 day commenting period.
The issues raised by I&AP's have been addressed in a table format included in the **Annexure C Public Participation Process.**
The **Annexure C Public Participation Process** includes copies of the I&AP's correspondence as well as a copy of this Department's rejection letter.

1. INTRODUCTION

ANJUTONE (Pty) Ltd (Reg. No. 2011/122767/07) 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 the favourable solar irradiation.

The proposed site is located on the central part of **Portion 3 of the Farm Machorogan 106, Barkly West Registration Division (Dikgatlong Local Municipality, Frances Baard District Municipality, Northern Cape Province),**for the establishment of a solar energy facility with associated infrastructure and structures.

The *preferred* access to the Anjutone 2 Solar Park will be from R370. As this road is not directly adjacent to the property, a new section of road from R370 - approximately 200 m long - will be built over Portion 21 of the Farm Machorogan 106, Barkly West RD. The overall length of the access road - from the R370 up to the proposed footprint - is 1.3 km.

As *alternative* access, the development area may be reached from an existing dirt road starting from the R370 and leading to the project site via Portion 5 of the farm Machorogan 106, Barkly West RD, owned by the same landowner of the project site. **This alternative access is not preferred due to the long distance from the planned development area, therefore it's not envisaged anymore.**

Site location: Portion 3 of the Farm Machorogan 106, Barkly West RD
Surveyor-general 21 digit site codes:

C	**0**	**0**	**7**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**6**	**0**	**0**	**0**	**0**	**3**

Access road (preferred): Portion 21 of the Farm Machorogan 106, Barkly West RD
Access road (alternative - not envisaged): Portion 5 of the Farm Machorogan 106, Barkly West RD
Surveyor-general 21 digit site codes:

C	**0**	**0**	**7**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**6**	**0**	**0**	**0**	**0**	**5**
C	**0**	**0**	**7**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**6**	**0**	**0**	**0**	**2**	**1**

The name of the project is **ANJUTONE 2 SOLAR PARK** and it envisages a **photovoltaic (PV) power plant having a maximum generating capacity of 75 MW**.

The **footprint** (fenced area) of the proposed development is up to **230 ha** within Portion 3 of the Farm Machorogan 106 (857.1512 ha in extent).

The Anjutone 2 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, Anjutone (Pty) Ltd must undertake an Environmental Impact Assessment (EIA) process and acquire environmental authorization from the National Department of Environmental Affairs (DEA), in consultation with the *Northern Cape Department Environment & Nature Conservation*, in terms of the EIA Regulations (2010) 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 14/12/16/3/3/2/533** and with the **NEAS reference number DEA/EIA/0001815/2012**.

The Anjutone 2 Solar Park will deliver the electrical energy to the **Eskom "ULCO - GANSPAN 1" 132 kV power line**, which crosses the project site. The Eskom's 132 kV power line will loop in and out of the 132 kV busbar of the new on-site substation, via two new sections of 132 kV line approximately 100 m long. **In the Cost Estimate letter dated 12 May 2014, Eskom already confirmed that this connection solution is viable and that the Eskom "ULCO - GANSPAN 1" 132 kV power line is available for the connection of the proposed 75 MW Anjutone 2 Solar Park.**

The EIA procedure of the Anjutone 2 Solar Park **includes the connection to the Eskom grid.** Eskom is the entity which assesses the connection solution included and described in this EIA Report. Eskom also coordinated the necessary liaising between the developer, 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 (all located inside the site) may be owned and/or operated by Eskom Distribution, this will depend on the Eskom grid code in relation to the IPPs (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 (EAPs) 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 Anjutone (Pty) Ltd; 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 Anjutone 2 Solar Park are defined and evaluated in this Amended Final EIA Report and its annexures.

2. MOTIVATION AND RATIONALE OF THE ANJUTONE 2 SOLAR PARK IN LIGHT OF THE IPP PROCURMENT PROGRAMME REQUIREMENTS

2.1. THE CHOICE OF THE NORTHERN CAPE PROVINCE AND SITE LOCATION

Anjutone 2 Solar Park will be located in the Northern Cape Province. The Northern Cape Province has been identified by Anjutone (Pty) Ltd 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 2106.1 kWh/m^2/year;
- there are several green projects currently under development in the Northern Cape, because of the high solar resources and the availability of desolate lands with low ecological and agricultural value;
- The Northern Cape Province, Local Municipalities and Communities are eager to continue 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 Northern Cape Province, the site of the Anjutone 2 Solar Park was chosen by Anjutone (Pty) Ltd on the grounds of several considerations, in particular:

- The availability of an easy connection solution, due to the presence of Eskom 132 kV power line, called "ULCO-GANSPAN 1" which cross the eastern boundary of the project site;
- the flatness of the proposed project site;
- the low ecological sensitivity and agricultural value of the footprint of the proposed project site.

Furthermore, in the light of the IPP procurement Programme requirements, the **Anjutone 2 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 maximum 15 months and the PV plant will be able of beginning commercial operation before the end of 2020 (pursuant to the Revised RFP issued in May 2014).

With specific reference to Anjutone 2 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 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 IPP 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, pursuant to the Revised RFP issued in May 2014.

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.

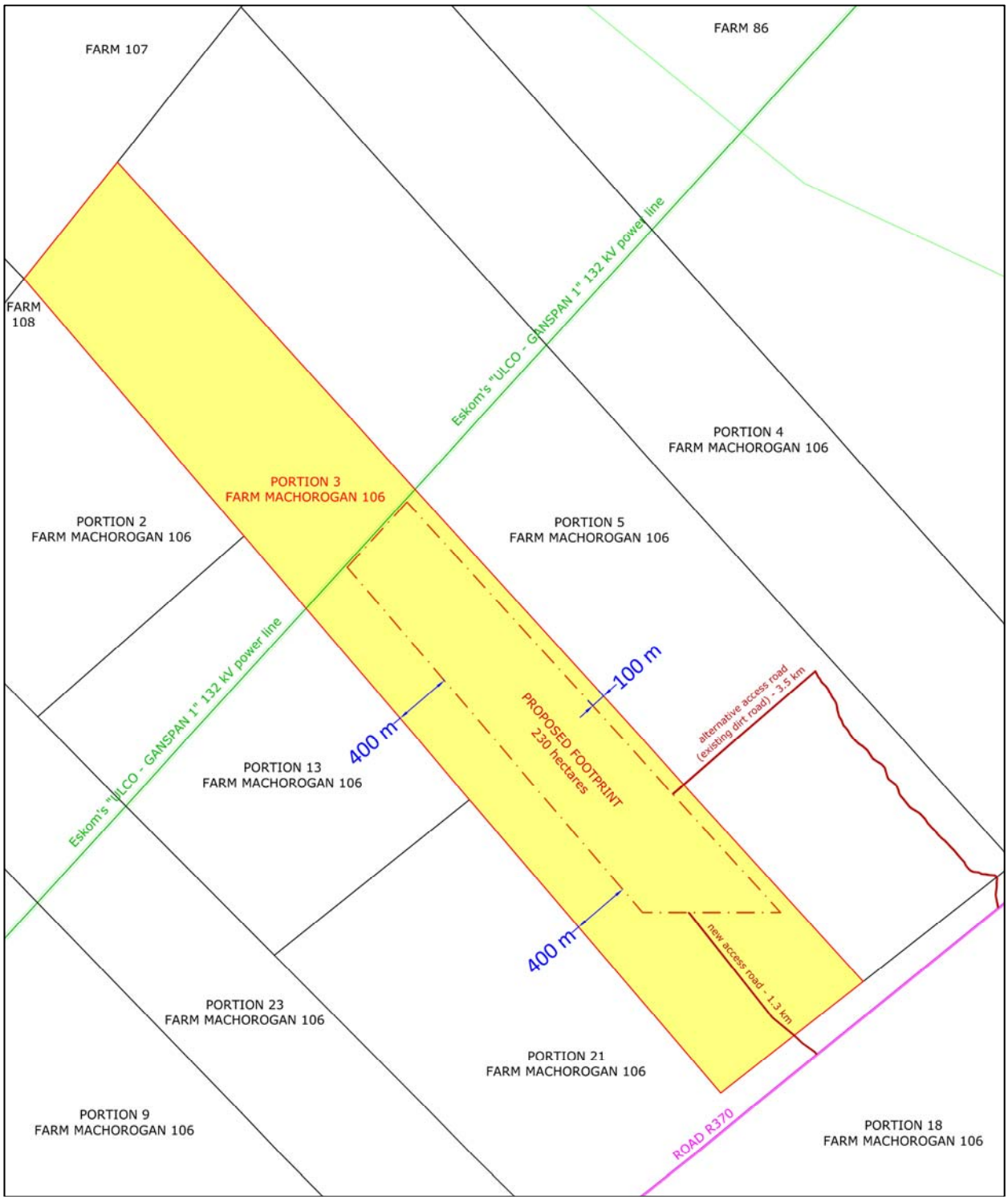
The purpose of the Anjutone 2 Solar Park is to add new capacity for the generation of renewable electric energy to the national electricity supply in compliance with the IPP Procurement Programme and in order to meet the "sustainable growth" of the Northern Cape Province.

The use of solar radiation for power generation is considered as 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 reasons for the location of the project in the selected area are as follows:

- low requirement for municipal services;
- compliance with national and provincial energy policies and strategies;
- no impact on people health and wellbeing;
- no waste and noise;
- no impact on air quality;
- compatibility with the ecosystem and the surrounding landscape;
- likelihood of social and economic development of marginalized, rural communities; and
- attraction of environmentally aware (green) tourists to the area.

Figure 1 Locality map of the project site



PROJECT SITE
Portion 3 of the Farm MACHOROGAN 106, BARKLY WEST RD
Dikgatlong Local Municipality
Frances Baard District Municipality
Northern Cape province
Extent: 857.1512 hectares
28° 10.8' S ; 24° 22.2' E

Road R370

Proposed and alternative access to the 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 *Northern Cape Department of Environment & Nature Conservation* and this 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.

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 Northern Cape 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 *Dikgatlong Local Municipality,* which is part of the *Frances Baard 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.

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)
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

Northern Cape Nature Conservation Act (Act No. 9 of 2009)	• Indigenous flora protected under this act • No hunting to take place without a permit
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 IPP Procurement Programme(3 August 2011)	• The IPP Procurement Progamme, 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, pursuant to the revised RFP issued in May 2014**.
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 (or *potentially* 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 project will consist of construction, operation and maintenance of a Photovoltaic (PV) Power Plant with a generating capacity up to 75 MW with associated infrastructure and structures. The Anjutone 2 Solar Park will be established on Portion 3 of the Farm Machorogan 106, Barkly West RD, \measuring 857.1512 hectares in size. The project will participate in the IPP Procurement Programme, issued by the Department of Energy on 3 August 2011.The facility will comprise several arrays (strings) of PV modules mounted on frames; the associated infrastructure and structures will consist of: (i) internal and external access roads and a small parking area; (ii) fencing of the plant and video security control systems; (iii) foundations / minipiles for the mounted Photovoltaic arrays; (iv) electricity access point for the construction phase, operation phase (if necessary) and UPS (Uninterruptible Power Supply) devices; (v) water access point and/or water extraction on-site from borehole(s), water supply pipelines, water treatment; (vi) sewage system and stormwater collection system; (vii) workshop & warehouse; (viii) offices & administrative areas; (ix) cabling linking Photovoltaic strings and other internal cabling; (x) medium voltage stations designed to host DC/AC inverters and medium voltage power transformers; (xi) medium voltage receiving station(s); (xii) one small on-site high voltage loop-in loop-out substation with one or more high-voltage power transformer(s) stepping up the voltage to the voltage of the Eskom grid, a high-voltage busbar with protection an metering devices ("switching station") and a control building; (xiii) two new small sections of 132 kV power line allowing the Eskom's "ULCO-GANSPAN 1 132 kV power line - crossing the project site - to loop in and out of the 132 kV busbar of the new on-site loop-in loop-out substation. 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: (i) water access point and water extraction on-site borehole(s) point, water supply pipelines, water treatment facilities, chemical toilets; (ii) pre-fabricated buildings; to be removed at the end of construction.
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 footprint of 230 hectares within a farm portion measuring 857.1512 ha.
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: or* 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 loop-in loop-out substation with one or more high-voltage power transformer(s) stepping up the voltage to the voltage of the Eskom grid (132 kV), a 132 kV busbar with protection an metering devices ("switching station") and a control building; (ii) two new small sections of 132 kV power line allowing the Eskom's "ULCO-GANSPAN 1"132 kV power line - crossing the project site - to loop in and out of the 132 kV busbar of the new on-site loop-in loop-out substation. 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 first section (±300m) of the access road will be built in the proximity of a wetland / drainage channel which affects the southern side of the project site. The wetland area has been taken into account in the road route plan and will be avoided, but this activity is applied for due to the short distance between the first section of the proposed road and the wetland area.
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 first section (±300m) of the access road will be built in the proximity of a wetland / drainage channel which affects the southern side of the project site. The wetland area has been taken into account in the road route plan and will be avoided, but this activity is applied for due to the short distance between the first section of the proposed road and the wetland area.
R.544, 18 June 2010	22	*The construction of a road, outside urban areas,* *(i) with a reserve wider than 13,5 metres or,* *(ii) where no reserve exists where the road is wider than 8 metres, or* An access road 8 meters wide will be constructed. Some sections of the internal roads may be wider than 8 meters.
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 Northern Cape,: All areas outside urban areas.* The Photovoltaic Power Plant with associated infrastructure and structures will be constructed and operated on a footprint of 230 hectares within a farm portion measuring 857.1512 ha. The required footprint should be cleared from the existing trees.

As indicated in the Ecological Impact Assessment and Wetland Delineation Study, a wetland area was identified in the southern section of the project site and was classified as channel wetland including a riparian zone. The proposed development area is located more than 500 m away from the wetland area, but the access road from R370 will run in the proximity of the riparian zone.
Although the proposed route of the first section (±300 m) of the access road from R370 has been planned in such a way to avoid the wetland area, activities 11 and 18 of GNR 544 has been applied for, due to the proximity of the first section of such road to the wetland area. However, no infilling or depositing of any material or the dredging, excavation, removal or moving of soil will take place in the wetland area. An ECO will be appointed to do the monitoring of construction activities.

A Water Use Licence application is being drafted and will be submitted to the Department of Water Affairs by Anjutone (Pty) Ltd in respect of the first section of the new access road.

The current EIA procedure of the Anjutone 2 Solar Park **includes the connection to the Eskom grid, which has been already confirmed by Eskom.** Furthermore, a part of the connection infrastructure (the 132 kV busbar of the on-site substation and the two new sections of 132 kV power line) may be executed, owned and operated by Eskom.

Final layout and site plans drafted by Anjutone (Pty) Ltd have been finalized following the inputs received via public participation. All information acquired was 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 Local and District Municipal areas.

4. PROJECT DESCRIPTION AND FUNCTIONING

The project envisages the establishment of a solar power plant with a **maximum generation capacity at the delivery point of up to 75 MW.**
The construction timeframe is estimated in maximum 15 months, whereas the commissioning date will depend on the IPP Procurement Programme timeframe.

The preferred technical solutions envisage:

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

The estimated annual energy production is calculated to be 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 Anjutone 2 Solar Park will generate:

- **160.1 GWh per year** in the case of PV modules mounted on fixed mounting 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 (1950 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 2,097.8 kWh/m^2/year (NASA-SSE satellite data, 1983-1993, release 6).

The energy generated by the Anjutone 2 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 Anjutone 2 Solar Park.
The quantity of the avoided CO_2 is calculated as follows: the energy produced by the Anjutone 2 Solar Park (up to 160.1 GWh/yor 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*).

In the case of the Anjutone 2 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.

Furthermore, 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 Anjutone 2 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.

The 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 / under drafting 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 proposed layout are:

- to maximize the energy production and the reliability of the PV plant, by choosing proven solar technologies: thin-film or mono/polycrystalline solar modules mounted on horizontal 1-axis trackers or on fixed mounting systems;
- to develop the PV power plant on the central part of Portion 3 of the Farm Machorogan 106 (857.1512 ha), which is flat and has a *medium – low* ecological sensitivity with low agricultural potential;
- to avoid the high-sensitivity areas affecting the project site: the riparian woodland (wetlands) - close to the southern boundary, and the sensitive rocky woodland - on the northern part of the property;
- to avoid the heritage artefacts "MGS01" located on the eastern side of the proposed footprint, providing a 30 m buffer around it;
- to locate the proposed 230 ha footprint at a minimum distance of 100 m from the eastern side of the project site and of 400 m from the western side, so that the existing vegetation will be able to screen the solar park from the adjacent farm portions. The clearance of vegetation will be restricted to the proposed 230 ha footprint.

The **footprint (fenced area)** of the solar park will be **up to 230 hectares**. The preferred location for the proposed development is the central part of the property, which has a low ecological sensitivity.

The proposed layout plan (attached as Annexure A and also shown in Figure 2 below) was drawn using PV modules mounted on trackers; in the case of PV modules mounted on fixed mounting systems, the layout plans do not change, except for the orientation of the PV arrays: east-west instead of north-south.
The required **footprint** - corresponding on the fenced area - **will not exceed 230 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 remain exactly the same.

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

- AJ2SP_01_DE_Rev.03/EIA Layout of the PV power plant
- AJ2SP_03_DE_Rev.00/EIA Mounting System – Alternative option 1: fixed mounting systems
- AJ2SP_04_DE_Rev.00/EIA Mounting System – Alternative option 2: horizontal single-axis trackers (SAT)
- AJ2SP_05_DE_Rev.00/EIA Medium-voltage stations
- AJ2SP_06_DE_Rev.00/EIA Control building and medium-voltage receiving station
- AJ2SP_07_DE_Rev.00/EIA High-voltage loop-in loop-out substation
- AJ2SP_08_DE_Rev.00/EIA Warehouse

Figure 2 Layout plan of the Anjutone 2 Solar Park (to be continued)

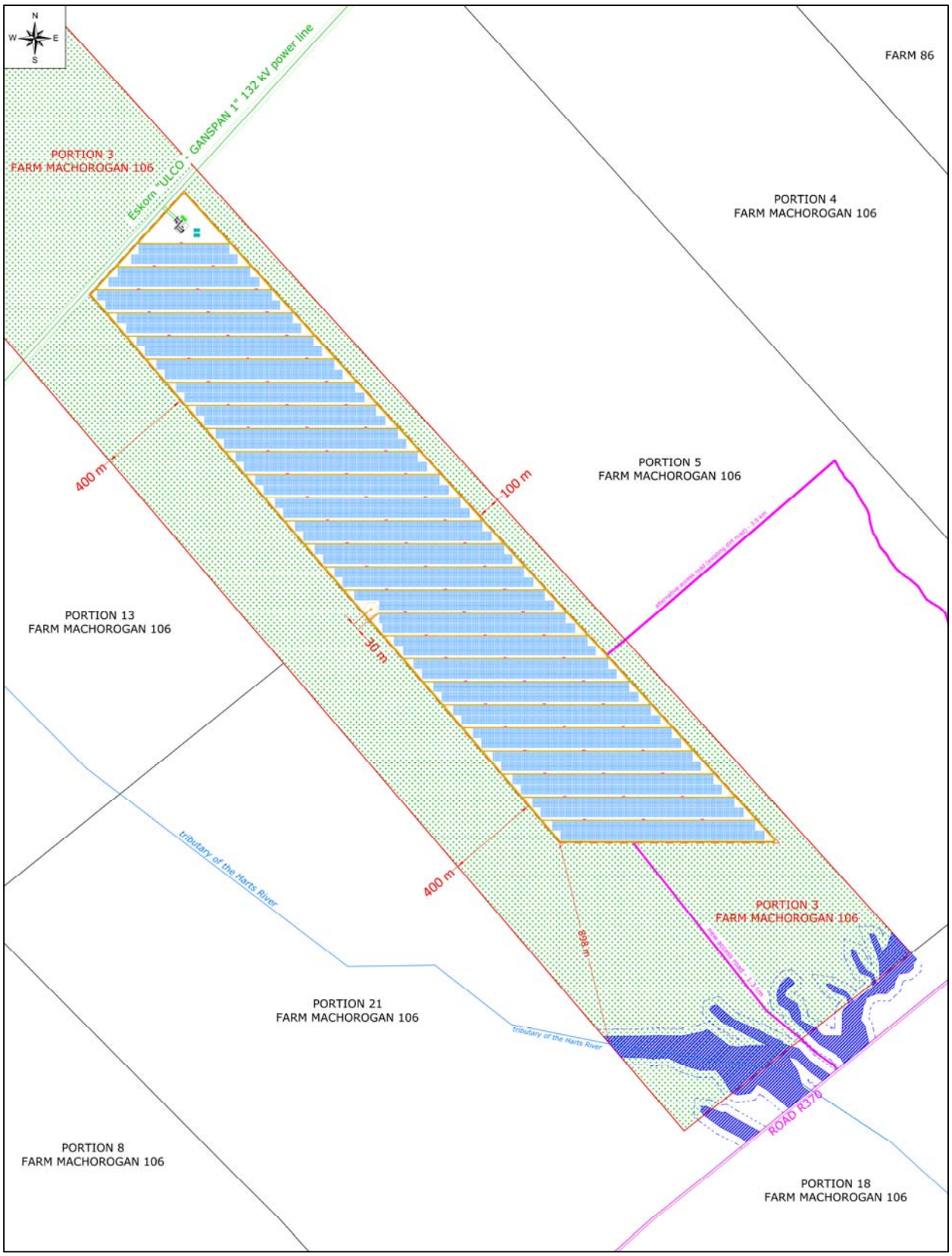
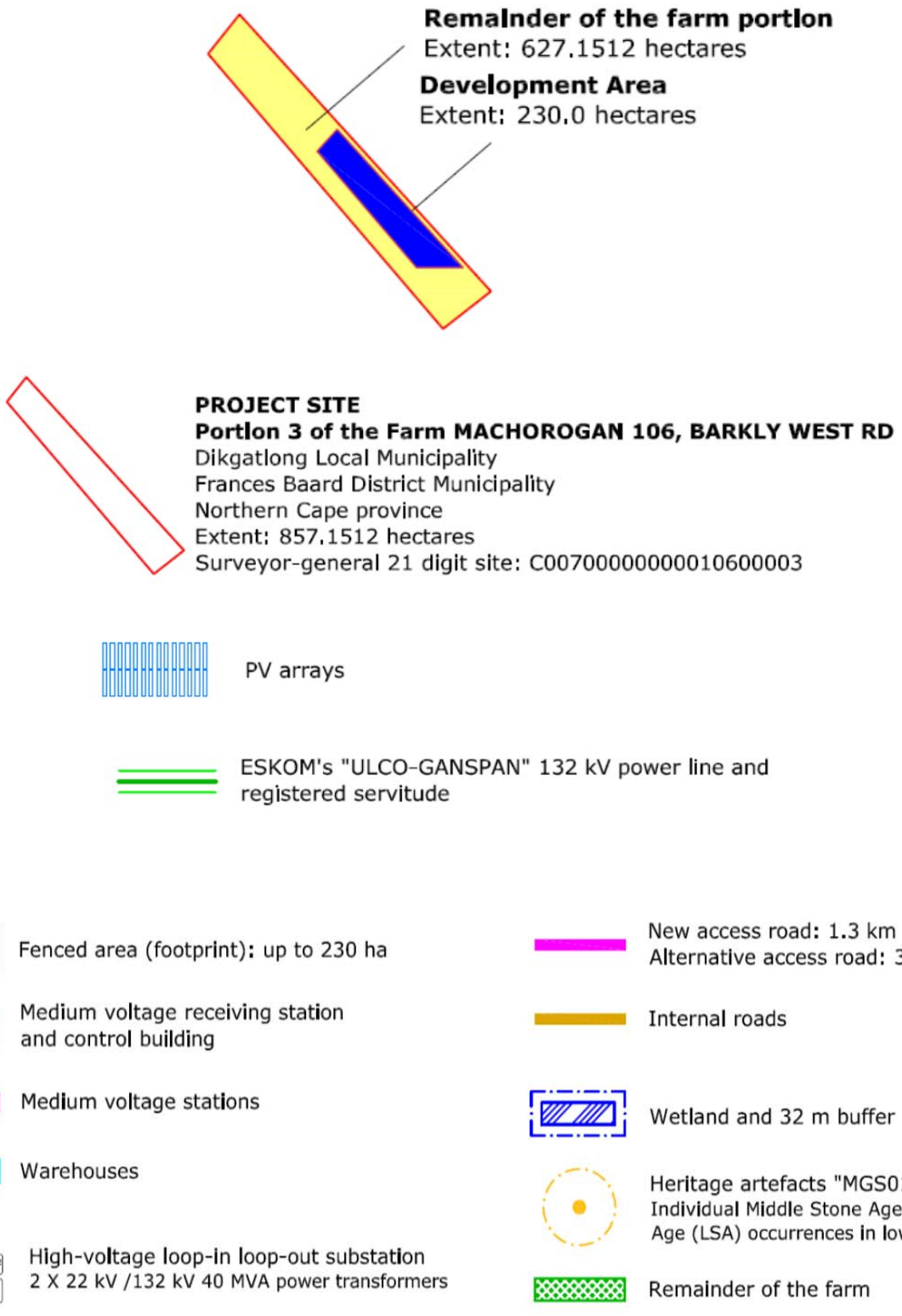


Figure 2 Layout plan of the Anjutone 2 Solar Park - legend (continued)



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
- Mounting systems (fixed or trackers) for the PV arrays
- Internal cabling and string boxes
- Medium voltage stations hosting DC/AC inverters and LV/MV power transformers
- Medium voltage receiving station & Control building, with offices and a small parking area
- Workshop & warehouse
- One small on-site high-voltage loop-in loop-out substation with high-voltage power transformers, stepping up the voltage to the voltage of the Eskom's grid, and one high-voltage busbar with metering and protection devices (also called "switching station")
- two new small sections of high-voltage power line allowing the **Eskom "ULCO-GANSPAN 1" 132 kV power line** to loop in and out of the 132kV busbar of the new on-site substation (*preferred connection solution*)
- Electrical system and UPS (Uninterruptible Power Supply) devices
- Lighting system
- Grounding system
- Access road and 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 (*Ballam Waterslot* system).

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 horizontal 1-axis trackers,

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

The PV technology is in constant and rapid evolution, this means that the final choice of the type of solar modules (thin-film, monocrystalline 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 footprint - corresponding on the fenced area - will not exceed 230 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 is referred to the examples of "thin-film PV modules on fixed mounting systems" and of "polycrystalline modules on trackers", but the combinations "thin-film PV modules on trackers" and "polycrystalline PV modules on fixed mounting systems" are also possible and feasible.

The required **footprint** (including internal roads) will not exceed **230 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

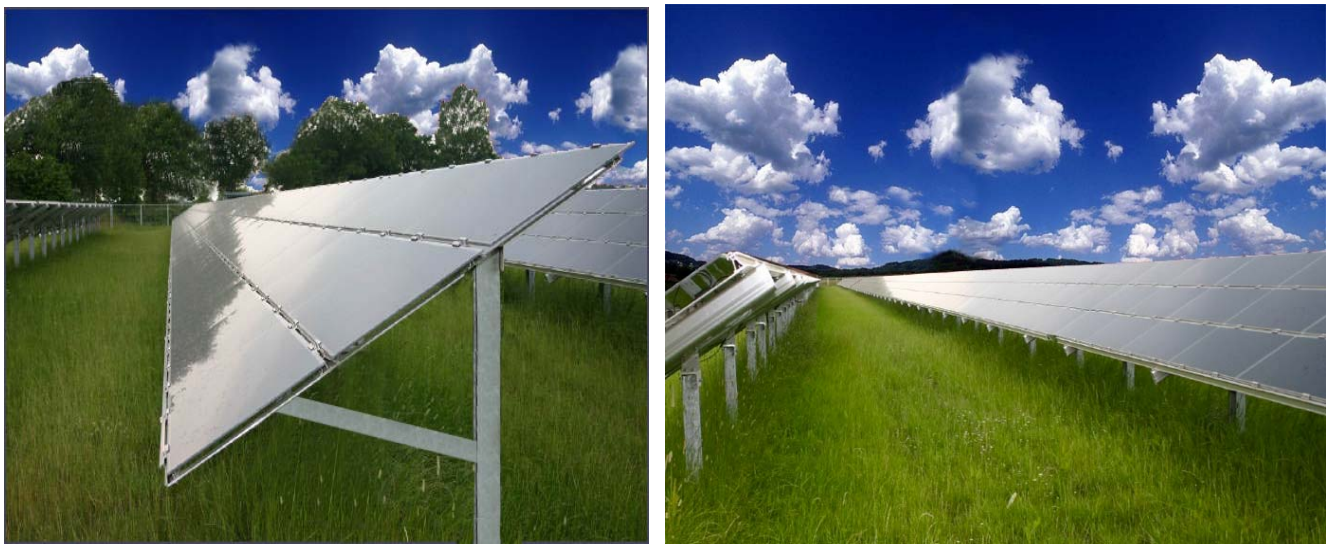


Figure 4 Frontal view of PV arrays mounted on fixed mounting systems

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

- AJ2SP_03_DE_Rev.00/EIA *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 an horizontal axis, driven by a motor. The horizontal axis allows the rotation of the PV arrays toward the West and East direction, in order to follow the daily sun path.

The maximum mounting structure height will be **up to 3.1 meters above ground level**.

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

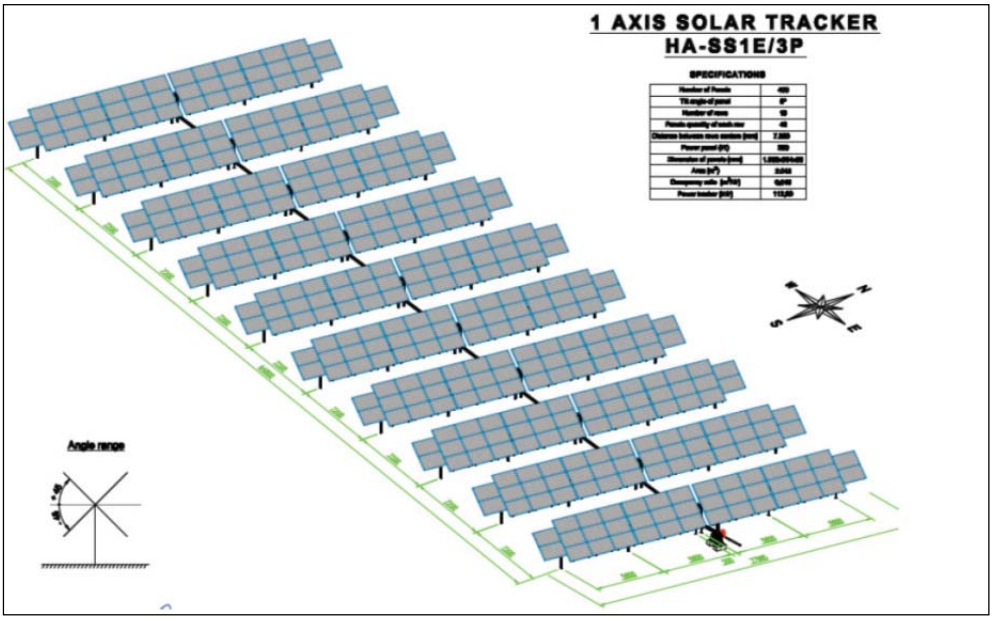


Figure 6 Frontal views of the PV arrays mounted on horizontal 1-axis tracker

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

- AJ2SP_04_DE_Rev.00/EIA *Mounting System – Alternative option 2: horizontal single-axis trackers with polycrystalline modules*

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 (16 parallel sub-fields), and one **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:

- AJ2SP_05_DE_Rev.00/EIA *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.132 kV). The power transformers will be connected to an on-site 132 kV busbar (the so called "***switching station***"), to be equipped with protection and metering devices, according to the Eskom requirements.

The Anjutone 2 Solar Park will deliver the electrical energy to the **Eskom "ULCO-GANSPAN 1" 132 kV power line**, which crosses project site. The Eskom's 132 kV power line will loop in and out of the 132 kV busbar of the new on-site substation, via two new sections of 132 kV line approximately 100 m long.

The new on-site HV loop-in loop-out 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**.**

Two **metering devices and related kiosks** are incorporated in the layout: one for Eskom, close to the busbar, and one for Anjutone (Pty) Ltd, 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 on-site HV loop-in loop-out substation composed of the power transformers, the control building, the 132 kV busbar with protection and metering devices and the kiosk will have a **footprint covering approximately 4,000 m^2**.

The new power line and the busbar (*switching station*) of the on-site HV loop-in loop-out substation will 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 Anjutone 2's side are detailed in the drawings included in Annexure A:

- AJ2SP_06_DE_Rev.00/EIA *Control building and medium-voltage receiving station*
- AJ2SP_07_DE_Rev.00/EIA *High-voltage loop-in loop-out substation*

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

4.2.2. Access road and internal roads

Access to the Anjutone 2 Solar Park will be from the R370. However, this road is not adjacent to the property, therefore a **new section of road from the R370 - approximately 200 m long - may be built over the Portion 21 of the Farm Machorogan 106, Barkly West RD.**
The overall distance of the new access road - from the R370 up to the proposed footprint - is **1.3 km.**

As alternative access, the development area may be reached from an existing dirt road starting from the R370 and leading to the project site via Portion 5 of the farm Machorogan 106, Barkly West RD, owned by the same landowner of the project site. **This alternative access is not**

preferred due to the long distance from the planned development area and it's not envisaged anymore.

Please refer to the drawing of the Annexure A:

- AJ2SP_00_DE_Rev.02/EIA Locality Map and access roads

As indicated in the Ecological Impact Assessment and Wetland Delineation Study, a wetland area was identified in the southern section of the project site and was classified as channel wetland including a riparian zone. The proposed development area is located more than 500 m away from the wetland area, but the access road from R370 will run in the proximity of the riparian zone.
Although the proposed route of the first section (±300 m) of the access road from R370 has been planned in such a way to avoid the wetland area, activities 11 and 18 of GNR 544 has been applied for, due to the proximity of the first section of road to the wetland area. However, no infilling or depositing of any material or the dredging, excavation, removal or moving of soil will take place in the wetland area. An ECO will be appointed to do the monitoring of construction activities.

The satellite view of the new access road, as well as of the wetland zone and the 32 m buffer, is depicted in the Figure 7 below.

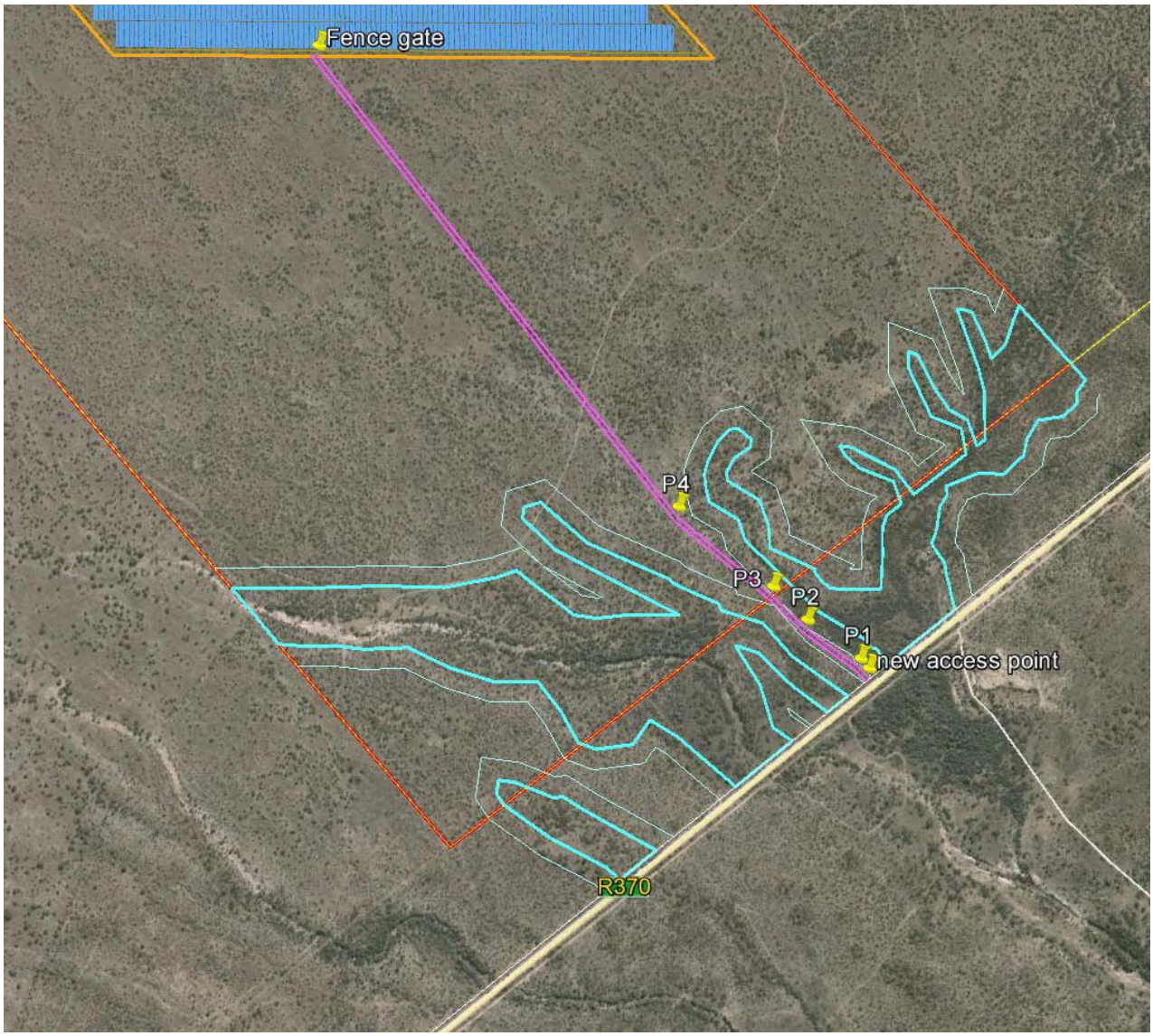
Table 3 Geographical co-ordinates of the access road

Geographical co-ordinates of the access road		
Point	**Latitude**	**Longitude**
access point from R370	28° 12' 31.7" S	24° 23' 56.6" E
turning point 1	28° 12' 31.2" S	24° 23' 56.1" E
turning point 2	28° 12' 29.2" S	24° 23' 53.0" E
turning point 3	28° 12' 27.5" S	24° 23' 51.0" E
turning point 4	28° 12' 23.4" S	24° 23' 45.5" E
final point (up to the PV plant security fence):	28° 11' 59.8" S	24° 23' 24.6" E

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.

Figure 7 Satellite view of the new access road from R370



4.2.3. Lighting system

The lighting system will consist of the following equipment:

- Floodlight-towers: maximum 10 meters high, with 6x400W directional lamps, installed around the HV loop-in loop-out substation. Normal lighting: 15 lux; up to 40 lux in case of emergency.
- Street lighting along internal roads, for the stretch from the access point up to the HV substation inside the property: 1 streetlamp, maximum 5.5 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 of the on-site HV substation will be on only in case of intrusion/emergency or necessity to reach the MV stations / HV substation during the night.

During the night, the video-surveillance system will use infra-red (or micro-wave) video-cameras, which do not need a lighting system (which could reduce the functioning). Only streetlamps along internal roads, for the stretch from the main access up to the HV substation inside the property, may be switched on at night.

4.2.4. Stormwater collection system

Given the low rainfall, flat topography and low flow speed of run-off, **no formal storm water structures are required** as the proposed gravel roads will be developed at ground level so as not to disturb the natural flow of storm water. This means that run-off will not be concentrated and 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 phase will last maximum **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 137,000 m^2.
- 50 litres 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 150 for short periods of time during peak periods. This number can be higher in the case Anjutone (Pty) Ltd - once being selected as Preferred Bidder by the Department of Energy and having finalized the Connection Agreement with Eskom, where in particular it is agreed the envisaged connection timeline – intends to build the Anjutone 2 Solar Park in a timeframe shorter than 15 months (i.e. 330 working days). For example, in the case the construction works are planned to last only **6 months** (*i.e* 132 working days) the average number of workers required on site during construction is **250**.
- Each worker needs 50 litres / 8 working hours for sanitary use.
- Water consumption will be:
    - 100 people x 50 l/person x 330 working days = 1650 m^3 over 15 months, or:
    - 250 people x 50 l/person x 132 working days = 1650 m^3 over 6 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 15,000 m^3
- 200 litres of water are needed for 1 cubic meter of concrete.

D) Vehicle cleaning

As mitigation measure, the cleaning of vehicles like excavators, mechanical diggers and pile rammers will be done once or twice per month and no during working days, also in order to not increase the water requirement during the construction activities.
Furthermore, in order not to waste a large amount of water, high pressure cleaners will be used. On the whole, the water requirement for cleaning activity is very low.

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

Table 4 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*	up to 15
Overall water consumption for internal roads	m^3	6,850
Overall water consumption for sanitary use	m^3	1,650
Overall water consumption for concrete production	m^3	3,000
Overall water consumption	***m^3***	**11,500**

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 Anjutone 2Solar 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 **150 litres / day / person** per **20 people** (14 people daytime and 6 people at night),The daily water consumption will be approximately **3,000 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 litres per m^2 of PV panel surface will be needed.
Therefore, the amount of water for cleaning is up to **850 m^3 per cleaning cycle and 1,700 m^3per year**.

PV modules cleaning activity can last less than 1 month. If the cleaning activity lasts approximately 2 weeks (12 working days), the daily water consumption will be approximately **71,000 litres/day**, **over 12 days**.

Conclusion

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

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

It is further proposed that **90,000 l** of water will be stored in **storage tanks** for fire, emergency and washing of panels twice a year.
The overall and average water consumption during operation is detailed in the table below.

Table 5 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*	3,000
Average daily water consumption during cleaning activity (*)	*l/day*	74,000
Average monthly water consumption for sanitary use (over 30 days)	*l/month*	90,000
Annual water consumption for sanitary use	***m^3/year***	**1,095**
Annual water consumption for PV modules cleaning activities (twice/year)	***m^3/year***	**1,700**
ANNUAL WATER CONSUMPTION DURING OPERATION	***m^3/year***	**2,795**
DAILY WATER CONSUMPTION DURING OPERATION (average over 365 day)	***m^3/day***	**7.66**

(*) over 12 working days, twice per year

4.2.5.3. Water provision during construction and operation

The site is located within the **C33C Quaternary Catchment**, where **75 m³/ha/annum** of ground water abstraction is allowed for under the DWA General Authorization. The proposed development site falls within the **Lower Vaal Water Management Area (WMA).**

The estimated annual groundwater recharge (12.08 mm/m2 per annum) from an average annual precipitation of 397 mm falling on the property (857 ha) will result in **103,525 m^3 of water available**.

Being the maximum annual water requirements 2795 m^3 / year during operation, the scale of abstraction relative to recharge is **2.7%** (Category A).

As indicated in the Geo-technical and Geo-hydrological Report (Annexure I), there are no boreholes present on the farm portion under consideration.
A borehole equipped with a mono-pump and a second borehole close by (10 m away) equipped with a windpump are located on **Portion 4 of the Farm Machorogan 106, Barkly West RD**, 2 km East from the project site and owned by the same landowner of the project site.

The pump yield was tested during the site visit and the borehole yield resulted of 1.0 l/s. The borehole is 15 m deep. At the time the owner used the borehole as a source of water for 137 head of cattle.

The sustainable abstraction of **43,200 l/day** is assumed for the aquifer: 12 hours of pumping at 1 l/s. Before construction of the solar park commence, pump testing should be conducted to verify the aquifer and borehole yields.

The water sample collected from the wind pump conforms to the SANS 241 drinking water standards, except for turbidity: 1.9 NTU (SANS 241: 1.0 NTU) and magnesium: 78.7 mg/l (SANS 241: 70 mg/l). Neither of these specification have adverse health effects.

The Geo-technical and geo-hydrological Study concluded that the water needs of the project during both the construction and operational phases can be provided, either:

- by the existing borehole equipped with a mono-pump located on Portion 4 of the Farm Machorogan 106, Barkly West RD, 2 km East from the project site and owned by the same landowner of the project site, or
- by a new borehole to be drilled within the project site.

A Water Use Licence application is being drafted and will be submitted to the Department of Water Affairs by Anjutone (Pty) Ltd.

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 *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 Anjutone (Pty) Ltd.

4.2.7. Refuse removal

Anjutone (Pty) Ltd will enter into an agreement with the Dikgatlong 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 10ha) will be located on the south-eastern corner of the planned footprint - covering the area where the last 4MWp 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;
- *Ballam Waterslot* or similar sewer treatment system. The treated water will 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

Earthworks will be required during the construction of internal roads. 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 137,000 m^2, the amount of cut or fill is estimated to be approximately 41,100 m^3.

Further items of earthworks would be required where temporary storage areas will be prepared for the storage of the photovoltaic modules and other equipment during construction of the solar park. Small earthworks will be required for the installation of the PV modules and 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.

Concrete necessary for the basements of the medium-voltage stations, the high-voltage substation, the control building and the warehouse and will be manufactured using aggregate and sand from commercial sources in the vicinity of the development (in Jan Kempdorp, Delportshoop, Barkly West or Kimberley), or from a borrow pit to be exploited on the site.

Gravel necessary for the construction of internal roads may be provided from the commercial sources in the vicinity of the development (in Jan Kempdorp, Delportshoop, Barkly West or Kimberley).

4.4. TRAFFIC IMPACT OF THE PROPOSED DEVELOPMENT

4.4.1. Traffic impact – construction phase

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. This number can be higher in the case Anjutone (Pty) Ltd - once being selected as Preferred Bidder by the Department of Energy and having finalized the Connection Agreement with Eskom, where in particular it is agreed the envisaged connection timeline - evaluates to build the Anjutone 2 Solar Park in a timeframe shorter than 15 months (i.e. 330 working days). For example, in the case the construction works are planned to last only 6 months (i.e 132 working days), the average number of workers required on site during construction is 250/300.

A small accommodation area with few prefabricated buildings inside the work site may be foreseen, if accommodation facilities in Jan Kempdorp, Deportshoop, Barkly Westor Kimberley 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 6 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 substation components	trips/month	0	0	8	8	8	0	0	0
cables	trips/month	0	0	0	0	0	0	0	16
Average trips 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 substation components	trips/month	0	0	0	0	0	0	0	**24**
cables	trips/month	16	0	0	0	0	0	0	**32**
Average trips 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 Anjutone 2 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:

- 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 200ha)
- Current land use
- Low environmental impact (low biodiversity)
- Low agricultural potential
- High solar radiance
- Socio-economic issues (land cost and local community unemployment)

The macro area between Vryburg and Kimberley towns–West of the N18/N12- was investigated, due to the high value of solar radiation and the presence of an Eskom 132 kV power line (i.e. the Eskom's "ULCO-GANSPAN 1" 132 kV power line).

Several sites crossed by the Eskom "ULCO-GANSPAN 1" 132 kV power line were investigated during the feasibility assessment, such as:

a) Portion 3 of the Farm Machorogan 106–Dikgatlong Local Municipality, Frances Baard District Municipality
b) Portion 5 of the Farm Machorogan 106 - Dikgatlong Local Municipality, Frances Baard District Municipality
c) Portion 13 of the Farm Machorogan 106 - Dikgatlong Local Municipality, Frances Baard District Municipality
d) Farm 86 - Dikgatlong Local Municipality, Frances Baard District Municipality
e) Other farm portions crossed by Eskom's "ULCO-GANSPAN 1" 132 kV power line.

a) **Portion 3 of the Farm Machorogan 106,** 857 ha in extent, were found to be available; the most part of this farm portion is highly suitable for a solar park, being flat and with a medium / low ecological sensitivity with low agricultural potential.

b) **Portion 5 of the Farm Machorogan 106**, approximately 1039 ha in extent, even if almost suitable for a solar park, resulted to be not ideal for the proposed development, due to the presence of drainage / wetland areas which are found on the southern portion of the site.

c) **Portion 13 of the Farm Brakfontein 897**, approximately 423, 7 ha in extent, even if suitable for a solar park, was not selected being a small portion without access from R370.

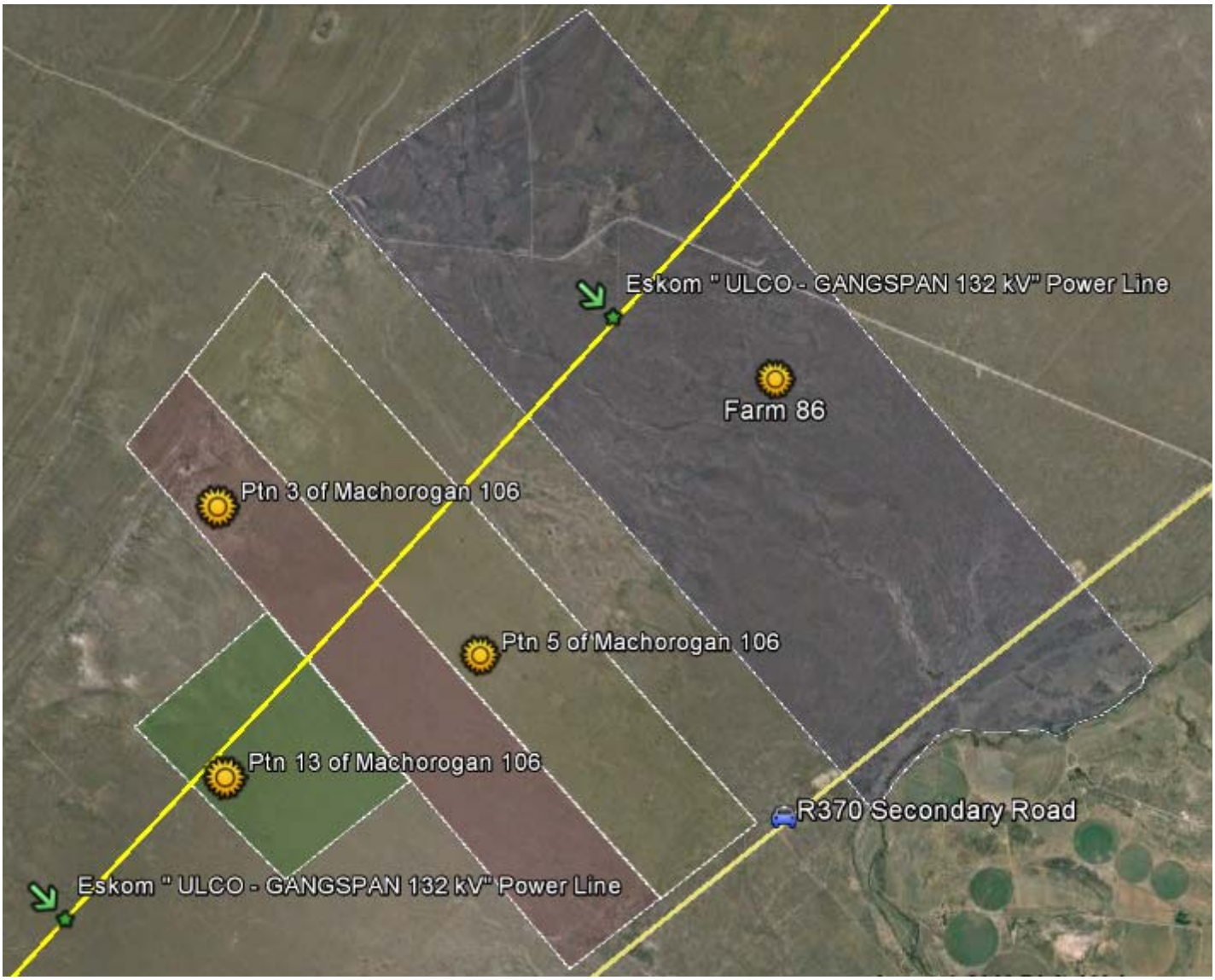
d) **Farm 86**, approximately 3022 ha in extent, resulted to be not suitable for a solar park. Indeed this specific site contains various natural runoff and drainage channels which make it environmentally sensitive.

e) Other farm portions crossed by Eskom's "ULCO-GANSPAN 1" 132 kV power line resulted to be not available or not suitable for an ecological point of view, due to the presence of several wetlands / drainage areas, which reduce the suitable areas to less than the required minimum footprint (200 hectares).

Therefore, **Portion 3 of the Farm Machorogan 106**is the *preferred site*, being the most suitable and available alternative.

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

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 envisages a photovoltaic power plant with a generating capacity up to 75 MW, on a footprint up to 230 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 (14-16%), if compared to the thin-film PV modules (9-13%). 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 %/°C instead of 0.45 %/°C in the case of mono/polycrystalline modules.

However, 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.

Furthermore, it should be kept into account 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 footprint (approximately 300ha).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 the 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 **horizontal single-axis trackers**(*alternative option 2*).

The tracking solution is the best performing in terms of efficiency, because its energy production is approximately 15% more 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.

As previously mentioned, 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 nor the necessity of specific or different mitigation measures. The development will not exceed the currently planned footprint (230 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 hydro-geology. 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 ANDLOCATION ALTERNATIVES

The site chosen for the establishing of the proposed Anjutone 2Solar Park is **the Portion 3 of the Farm Machorogan 106, Barkly West RD,** 857.1512 ha in extent.
The PV power plant will have a generating capacity of **up to 75 MW**, on a **footprint (fenced area) up to 230 ha**.

The preferred location for the proposed development is the central area of farm, which has a low to medium ecological sensitivity.

As mentioned in the paragraph 4.1 - *Project layout*, the main drives of the proposed layout are:

- to maximize the energy production and the reliability of the PV plant, by choosing proven solar technologies: thin-film or mono/polycrystalline solar modules mounted on horizontal 1-axis trackers or on fixed mounting systems;
- to develop the PV power plant on the central part of Portion 3 of the Farm Machorogan 106, which is flat and has a *medium – low* ecological sensitivity with low agricultural potential;
- to avoid the high-sensitivity areas affecting the project site: the riparian woodland (wetlands) - close to the southern boundary, and the sensitive rocky woodland - on the northern part of the property;
- to avoid the heritage artefacts "MGS01" located in the middle of the proposed footprint, providing a 30 m buffer around it;
- to locate the proposed 230 ha footprint at a minimum distance of 100 m from the eastern side of the project site and of 400 m from the western side, so that the existing vegetation will be able to screen the solar park from the adjacent farm portions. The clearance of vegetation will be restricted to the proposed 230 ha footprint.

The proposed layout plan (attached as Annexure A and also shown in Figure 2 above) was drawn using PV modules mounted on trackers; in the case of PV modules mounted on fixed mounting systems, the layout plans do not change, except for the orientation of the PV arrays: east-west instead of north-south.
The required **footprint** - corresponding on the fenced area - **will not exceed 230 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 remain exactly the same.

The project layout is detailed in the drawing:

- AJ2SP_01_DE_Rev.03/EIA Layout of the PV power plant

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 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.

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 (up to 230 ha) of Portion 3 of the Farm Machorogan 106, Barkly West R.D.

Portion 3 of the Farm Machorogan 106 (Barkly West R.D.)

Surveyor-general 21 digit site	C00700000000010600003
Local Municipality	Dikgatlong
District Municipality	Frances Baard
Province	Northern Cape
Extent	857.1512ha
Land Owner	COOKE CATHRINA WILEHLMINA
Diagram deed number	T20402/1930
Title deed number	T3761/2003
Registration date	20031030
Current land use	livestock farm
Geo-graphical Co-ordinates	28° 10.8' S; 24° 22.2' E

The site is located 70 km north west from the town of Kimberley, 80km west from Christiana and 46km west from Warrenton.

As aforementioned, Portion 3 of the Farm Machorogan 106 is already affected by energetic infrastructure, such as the **Eskom "ULCO-GANSPAN 1" 132 kV power line**.

Farm portions close to the project site are mainly used for farming purpose.

6.2. OTHER RENEWABLE ENERGY PROJECTS IN THE PROXIMITY OF THE PROPOSED ANJUTONE 2 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 Anjutone 2 Solar Park are:

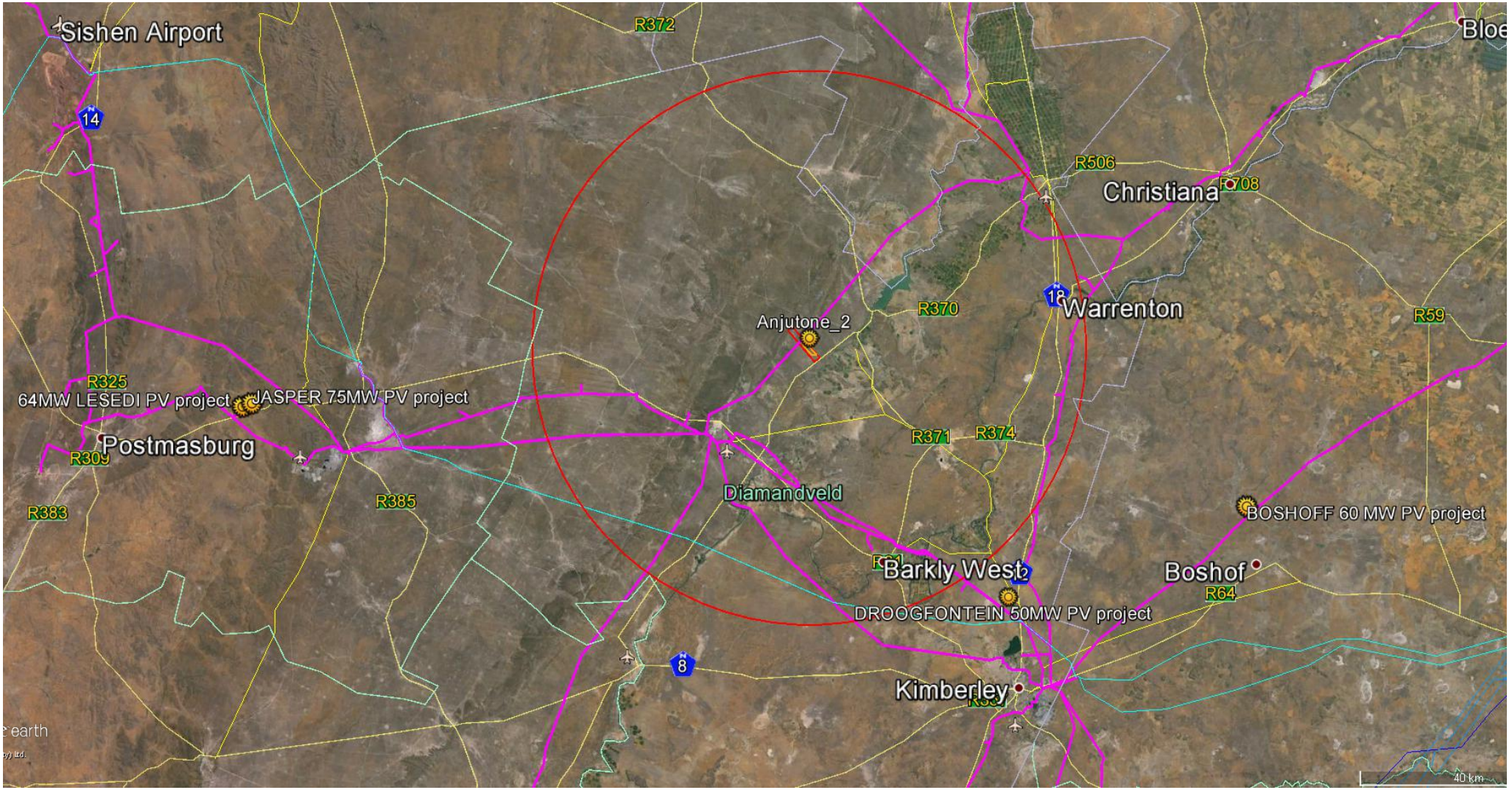
- **Sa Mainstream Droogfontein 48 MW PV project**, selected by the DoE under the Window 1 of the REIPPPP and currently under construction near Kimberley and Barky West, **60 km** South-East of the proposed Anjutone 2 Solar Park;
- **Boshoff 60 MW PV project**, selected by the DoE under the Window 3 of the REIPPPP and currently under construction near Boshof, **85 km** South-East of the proposed Anjutone 2 Solar Park;
- **Jasper 75 MW PV project**, selected by the DoE under the Window 2 of the REIPPPP and currently under construction 17 km North-West of Limes Acres, more than **100 km** West of the proposed Anjutone 2 Solar Park;
- **Lesedi 64 MW PV project**, selected by the DoE under the Window 1 of the REIPPPP and currently under construction 17 km North-West of Limes Acres, more than **100 km** West of the proposed Anjutone 2 Solar Park.

Please refer to the Figure 9 below, which shows the projects under construction and / or already selected by the DoE (with a yellow placemark). The existing Eskom power lines are depicted in magenta (132 KV) and ciano (275 kV). The red circle has a radius of 50 km.

Due to the distance **(>60 km)** of the projects under construction from the proposed Anjutone 2 Solar Park, **the cumulative impact is 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 and impossible in the case of the proposed Anjutone 2 Solar Park, considering that **they would be in competition also in terms of "grid availability". Indeed the Anjutone 2 Solar Park is going to be connected to the Eskom " ULCO-GANSPAN" 132 kV power line which crosses the project site, which is available only for one project (75 MW).** There are no other high-voltage power lines close to the project site available for connection.

Figure 9 Other renewable energy projects in the proximity of the proposed Anjutone 2 Solar Park



6.3. ENVIRONMENTAL FEATURES

6.3.1. Climate

The study area is situated within the summer and autumn rainfall region with very dry winters occurring. The mean annual precipitation varies between 200 and 400 mm. The mean monthly maximum and minimum temperatures for the area are 36.3°C and -7.5°C, for January and July, respectively. Frost occurs frequently to very frequently during the dry winter months

6.3.2. Topography

The proposed development area is underlain by a valley floor land facet with a gentle slope of 1.5% from northwest to southeast across the site. The average elevation is 1075 m amsl with the lowest point 1069 m amsl and the highest point 1093 m amsl.
Drainage occurs as sheet-wash in south-westerly direction toward the drainage channels occurring in the southern portion of the farm.

6.3.3. Soils and geology

A Geo-technical and Geo-hydrological Report is attached as Annexure I. The site visit was conducted on 23 November 2013, when 8 trial pits were excavated across the property.

The site is underlain by quaternary calcrete (Qc). The calcrete occur as rubble boulders on surface with some transported aeolian sand. Interpretation of the geology map suggests that andesitic lava occur below the hardpan calcrete. The land owner indicated that the hardpan calcrete is extensive and at least 3 m thick as they drill percussion boreholes to plant corner posts for to erect fences.

The proposed solar park development area is underlain by a single soil profile. The profiles encountered in the trial pits were consistent across the site, consisting of topsoil with broken calcrete and topsoil grading into hardpan calcrete. The soil profile underlain by a dry, pale grey brown, loose to medium sense, slightly cutanic, silty sand with angular platy calcrete concretions, overlaying dry, grey -white, strong, fractured hardpan calcrete.

No problem soils were encountered across the area investigated. The shallow bedrock conditions however necessitate special foundations.

Bored cast in-situ mini piles is recommended for the PV modules mounting system.
For the other conventional structures on site, either normal strip foot foundations cast on competent calcrete and limestone is recommended. Alternatively the soil overburden can be scraped away and slab on the ground foundations can be used.

For the pilled foundations, the strength of the bedrock is adequate to resist the bearing load of the structures, but sufficient shear resistance should be generated to counteract the uplift forces generated by wind action. The recommended installation will be to drill 165 mm holes with a truck mounted percussion drilling, rig to the specified depth. Steel H beams is then inserted and centered before the cavity is filled with concrete.

Using the COLTO Standard, **excavatability** is classified as **hard** (boulders larger than 0.1 m^3, blasting or pneumatic and Mechanical rock breaking tools required) **below 300 mm depth**.

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 1.5 m to comply with minimum safety regulations.

Due to the shallow bedrock conditions across the site the study area is classified as **developable with precautions**.

No shallow groundwater conditions were encountered in any of the trial pits on site.

No mining activities past or present are present on the property or will impact the property.

The Geo-technical and Geo-hydrological Study concluded that - from a geo-technical perspective - the project site is suitable for the proposed development.

6.3.4. Geo-hydrology

As indicated in the Geo-technical and Geo-hydrological Report (Annexure I):

The site is located within the **C33C Quaternary Catchment**, where **75 m³/ha/annum** of ground water abstraction is allowed for under the DWA General Authorization. The proposed development site falls within the **Lower Vaal Water Management Area (WMA).**

The recorded mean annual precipitation is 397 mm per annum, with an annual run-off of 6 mm. The groundwater recharge is 12.08 mm per year and the groundwater level of the area is 15 m below surface. The Eco status is category C. The total groundwater use in the quaternary is 1.02 Mm3 per year.

The estimated annual groundwater recharge (12.08 mm/m2 per annum) from an average annual precipitation of 397 mm falling on the property (857 ha) will result in **103,525 m^3 of water available**.

Being the maximum annual water requirements 2795 m^3 / year during operation, the scale of abstraction relative to recharge is 2.7% (Category A).

6.3.4.1. Boreholes, groundwater availability and quality on the project site

There are no boreholes present on the farm portion under consideration.
A borehole equipped with a mono-pump and a second borehole close by (10 m away) equipped with a windpump are located on Portion 4 of the Farm Machorogan 106, Barkly West RD, 2 km East from the project site and owned by the same landowner of the project site.

The pump yield was tested during the site visit and the borehole yield resulted of 1.0 l/s. The borehole is 15 m deep. At the present time the landowner uses the borehole as a source of water for 137 head of cattle.

The sustainable abstraction of **43,200 l/day** is assumed for the aquifer: 12 hours of pumping at 1 l/s. Before construction of the solar park commence, pump testing should be conducted to verify the aquifer and borehole yields.

The water sample collected from the wind pump conforms to the SANS 241 drinking water standards, except for turbidity: 1.9 NTU (SANS 241: 1.0 NTU) and magnesium: 78.7 mg/l (SANS 241: 70 mg/l). Neither of these specification have adverse health effects.

The Geo-technical and geo-hydrological Study concluded that the water needs of the project during both the construction (11,500 m^3 over max. 15 months) and operational (2,795 m^3/year) phases can be provided, either:

- by the existing borehole equipped with a mono-pump located on Portion 4 of the Farm Machorogan 106, Barkly West RD, 2 km East from the project site and owned by the same landowner of the project site, or
- by a new borehole to be drilled within the project site.

6.3.5. Ecology (fauna and 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 2013 to verify the ecological sensitivity and ecological components of the site at ground level.

6.3.5.1. Vegetation types

The proposed development is planned on a landscape that varies from flat to slightly undulating 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 farm is currently managed as a livestock farm. The vegetation units on the site vary according to soil characteristics, topography and land-use. Most of the site is characterized by mixed woodland or shrubveld that varies in density and species composition, while a tributary of the Harts River bisect the south-western section of the site.
Vegetation units were identified and can be divided into 4 distinct vegetation units according to soil types and topography. One of the vegetation units can be divided into three variations according to species dominance and vegetation structure. The rocky ridge in the northern section of the site was not surveyed due to the fact that it does not form part of the development footprint.
.
The vegetation communities identified on the proposed development site are classified as physiographic physiognomic units, where physiognomic refers to the outer appearance of the vegetation, and physiographic refers to the position of the plant communities in the landscape. The physiographic-physiognomic units will be referred to as vegetation units in the following sections. These vegetation units are divided in terms of the land-use, plant species composition, topographical and soil differences that had the most definitive influence on the vegetation units. Each unit is described in terms of its characteristics and detailed descriptions of vegetation units are included in the following section. A species list for the site is included in Appendix A of the Ecological Impact Assessment. The following vegetation units were identified during the survey.

- Open Acacia mellifera – Acacia tortilis woodland on calcareous soils;
- Mixed Acacia mellifera woodland;
    - Acacia mellifera – Grewiaflava woodland;
    - Acacia mellifera mosaic woodland;
    - Dense Acacia mellifera – Grewiaflava – Tarchonanthus camphorates shrubveld;
- Searsia lancea – Olea europaea riparian woodland;
- Rocky ridge.

6.3.5.2. Fauna

A survey was conducted during May 2013 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 mixed woodland (both micro-phyllous and broadleaf component), rocky ridge woodland and riparian woodland components with a diverse vegetation structure and height class. Detailed fauna species list for the area is included in Appendix B (birds), C (mammals) and D (herpeto fauna) 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.

The recommendations and mitigating measures highlighted in the Ecological Impact Assessment (Annexure E) should be implemented to ensure the survival of these species other fauna habitats and feeding grounds.

6.3.5.3. Summary and results of the Ecological Impact Assessment

Detailed ecological (fauna habitat & flora) surveys were conducted during May 2013 to verify the ecological sensitivity and ecological components of the site at ground level.

Considering the results from the field surveys, mitigation needs to be implemented to prevent any negative impacts on the ecosystem, since most of the site is in a natural state. 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 most suitable area for the development of the project would be throughout most parts of the site, even though the most parts of the site represents natural Savannah vegetation types. The woodland variations of the site have a medium sensitivity. Limited mitigation is needed for the preservation of some sections of this natural vegetation entity, while the eradication of invasive species such as *Opuntia ficus-indica* should be considered a high priority. The herbaceous layer should be revived after clearance of the vegetation and actively managed through slashing during the entire lifetime of the project;
- The rocky ridge area has a *high sensitivity* due to its high percentage rockiness, slope, plant species composition and potential habitat for red and endemic plant species. This area should preferably be preserved and therefore the development footprint was placed further south onto the plains and woodland areas;
- The riparian woodland and in-channel vegetation represent channel wetlands as classified by Sanbi (2009). These areas are seasonally wet and have a high sensitivity. No development can occur in these areas and a buffer zone of 30 meters should be implemented around these areas. Please also refer to the Wetland Delineation Study (Annexure G).

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.

The plant species *Olea europaea* (wild olive), protected under the NCNCA, were found in the riparian vegetation in the southern section of the farm. Should any other individuals be found on the site during construction, the trees should not be eradicated but a licence application should be submitted to Northern Cape DENC, although after the survey it can be anticipated that no further impact will occur on the species.

The protected tree species *Boscia albitrunca* (shepherd's tree) were found across the project site. No protected trees should be removed without authorisation from DAFF.

Some potential rare fauna may also occur in the area, and specific mitigation measures need to be implemented to ensure that the impact of the development on the species' habitat. Mitigation measures are provided that would reduce these impacts from a higher to a lower significance. Provided that al mitigation measures and recommendations in the Ecological Impact Assessment are strictly adhered to, the proposed development won't significantly influence the potential rare habitats for flora and fauna on the site.

6.3.6. 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.

A number of potential impacts were individuated and assessed:

- Direct habitat destruction
- Habitat fragmentation
- Electrocutions
- Collision
- Disturbance of human activities and noise.

A series of specific mitigation measures were individuated in respect of all the aforementioned potential impacts in the Avifauna Impact Assessment.
The Avifauna Impact Assessment concluded that the proposed development of the Photovoltaic Power Plant would not impact significantly over any avian habitats of high conservation value.
Considering the layout and design of the proposed development as well as the impact assessment, the extent of the habitat that will be affected will be minimal.

The Avifauna Impact Assessment concluded that, provided that the suggested mitigation measures and recommendations are adhered to, it is unlikely that the proposed development will have a long-term, significant negative impact on the local avifauna.

6.3.7. Visual

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

Vegetation plays a major role in screening the proposed intervention from adjacent and nearby sensitive viewers.
The clearance of vegetation should be restricted to the proposed 230 ha footprint, so that the existing vegetation will be able to screen the solar park from close observation points.

The effect of the lighting at night will be low, considering that at night only streetlamps from the access point up to the loop-in loop-out substation on the property will be switched on. This is because video-surveillance system will use infra-red (or micro-wave) video-cameras, which do not need a lighting system, which could reduce its functioning.

The Visual Impact Assessment concluded that the proposed project will exert a **LOW TO MODERATE** negative impact on the visual and aesthetic environment when compared against the baseline primarily, due to the scale, size and form of the project facilities.

Mitigation is however feasible and can maintain the impact at **LOW TO MODERATE**, assuming that management measures are implemented effectively and managed in the long term.

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 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, 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 150 for short spaces of time during peak periods. This number can be higher in the case Anjutone (Pty) Ltd - once being selected as Preferred Bidder by the Department of Energy and having finalized the Connection Agreement with Eskom, where in particular it is agreed the envisaged connection timeline - evaluates to build the Anjutone 2 Solar Park in a timeframe shorter than 15 months. For example, in the case the construction works are planned to last only **6 months**, the average number of workers required on site during construction is **250/300**.
- During operational phase, the 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).
- 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, Anjutone (Pty) Ltd is required to identify a **Local Community** for the purpose of entering into a partnership for the Project.

6.5. AGRICULTURAL POTENTIAL

An Agricultural Potential Impact Assessment on soils potential is attached as Annexure F; the site surveys were conducted during May 2013.

The current land-use of the proposed development site is grazing by livestock. Neighbouring farms are being used for livestock grazing.

The proposed development site shows some variations in terms of soil characteristics and soil types identified during the survey.

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

- Shallow, calcareous soils of the Glenrosa or Mispah soil form;
- Shallow calcareous soils of the Augrabies / Glenrosa soil form (sodic areas);
- Alluvial soils (Oakleaf soil form) associated with drainage channels;
- Shallow red-yellow apedal soils of the Hutton soil form;
- Shallow rocky soils of the Mispah soil form associated with the rocky ridge.

According to the Agricultural Report, the property can be classified as having **low potential arable soils** due to the shallow nature of the soil (clay content varies between 5 and 15% with depth less than 300 mm) and arid climate (MAP below 500 mm), making the potential to cultivate crops under arable conditions basically impossible, especially considering that the shallow soils would not allow ploughing of the topsoil. Therefore, the site should be classified as not suitable for arable agriculture due to its physical characteristics.

The current vegetation at the proposed site of development consists mainly of shrubland with a well-developed grass layer. According to databases (ARC), the **potential grazing capacity** of the area for livestock is estimated to be **9 to 13 ha/LSU** (***low to moderate***). 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 540 and 780 ha.

It should be noted that **the landowner currently owns Portion 3 (857.1512 ha), Portion 4 (857.5634 ha) and Portion 5 (1027.8442 ha) of the Farm Machorogan 106. The size of these farm portions combined is 2741.5 ha and therefore constitutes an economically viable piece of land that can support between 210 and 304 LSU's**.

The proposed development (footprint: 230 ha) would entail a reduction of its grazing potential for **only 17 to 25 *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 193 and 279 LSU's with the development in place.**

The *low* agricultural potential of the soils and the *low to moderate* grazing capacity is further confirmed by the Agricultural Maps below (Figures 12, 13, 14, 15):

- **Agricultural Potential Map** - indicating that the project site (Portion 3of the Farm Machorogan 106) is classified as *Low Agricultural Potential*
- **Land Capability Map** - site is classified as *Non-arable – low potential grazing land*
- **Potential Grazing Capacity Map** (1993) - indicating that the project site has a potential grazing capacity of 9 -13 ha / LSU's. As indicated in the previous map, this grazing potential is *low to moderate*, if compared to the maximum value indicated in the legend: less 3 ha / LSU's.
- **Potential Grazing Capacity Map** (2007) - indicating that the project site has a potential grazing capacity of 11 -15 ha / LSU's. This map (2007) is not official yet and should be further confirmed by the Department of Agricultural, therefore in the calculation above 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 H) was conducted by AGES to ascertain whether there are any remains of significance in the area that will be affected by the proposed development.

Individual Middle Stone Age (MSA) and Later Stone Age (LSA) occurrences in low densities were observed in association with a small water pan in a central portion of the study area (**Site MGS01**, at 28.190713° S, 24.378665° E).

The artefacts are mostly constituted out of debris flakes but single formals stone tools such as side scrapers, produced on fine grained specularite and jaspilite were recorded. Some of the tools display secondary retouch. Similar Stone Age scatters occur frequently in this area towards the Ghaap Plateau and around water pans and drainage lines. The location of this Stone Age occurrence thus corresponds with a general regional Stone Age site distribution pattern where archaeological sites in the landscape occur near water sources close to local sources of rare raw materials in lithic manufacture. The deposition pattern and stratigraphy as observed at this site and elsewhere in erosion gullies and around pans imply that the lithic scatters in this landscape occur mainly as a single horizon within a shallow superficial limestone formation. Typologically, the artefacts can tentatively attribute to the Middle and Later Stone Ages when compared to similar recorded assemblages in the area and the larger landscape (e.g. Beaumont & Morris 1990). The site is of limited significance due to the general loss of artefact context and the low density of formal tools.

The Heritage Specialist suggested that the sites be monitored to ensure that heritage resources are not impacted on. If further impact occurs, or is envisaged at any stage of development and operation, the following will be required:

- Documentation of sites.
- Further desktop study and community consultation to more accurately ascertain context of sites.
- Relevant Permitting from Heritage Resources Authority where applicable.

The impact on the site by the proposed activity is considered to be direct and permanent, where in essence the impact might result the loss of archaeological material. However, the site is of limited scientific value due to the low density of artefacts and the general loss of context for the artefacts.

The significance of the impact on the resource is therefore considered to be ***LOW***, but the threshold of the impact can be limited to a ***NEGLIBLE*** impact by the implementation of mitigation measures (monitoring) for the sites, if / when required.

The Heritage Impact Assessment concluded that the proposed development of the Anjutone 2 Solar Park in the indicated areas can continue from a heritage point of view if the recommendations suggested in the report are adhered to.

Figure 10 Vegetation Map of the project site

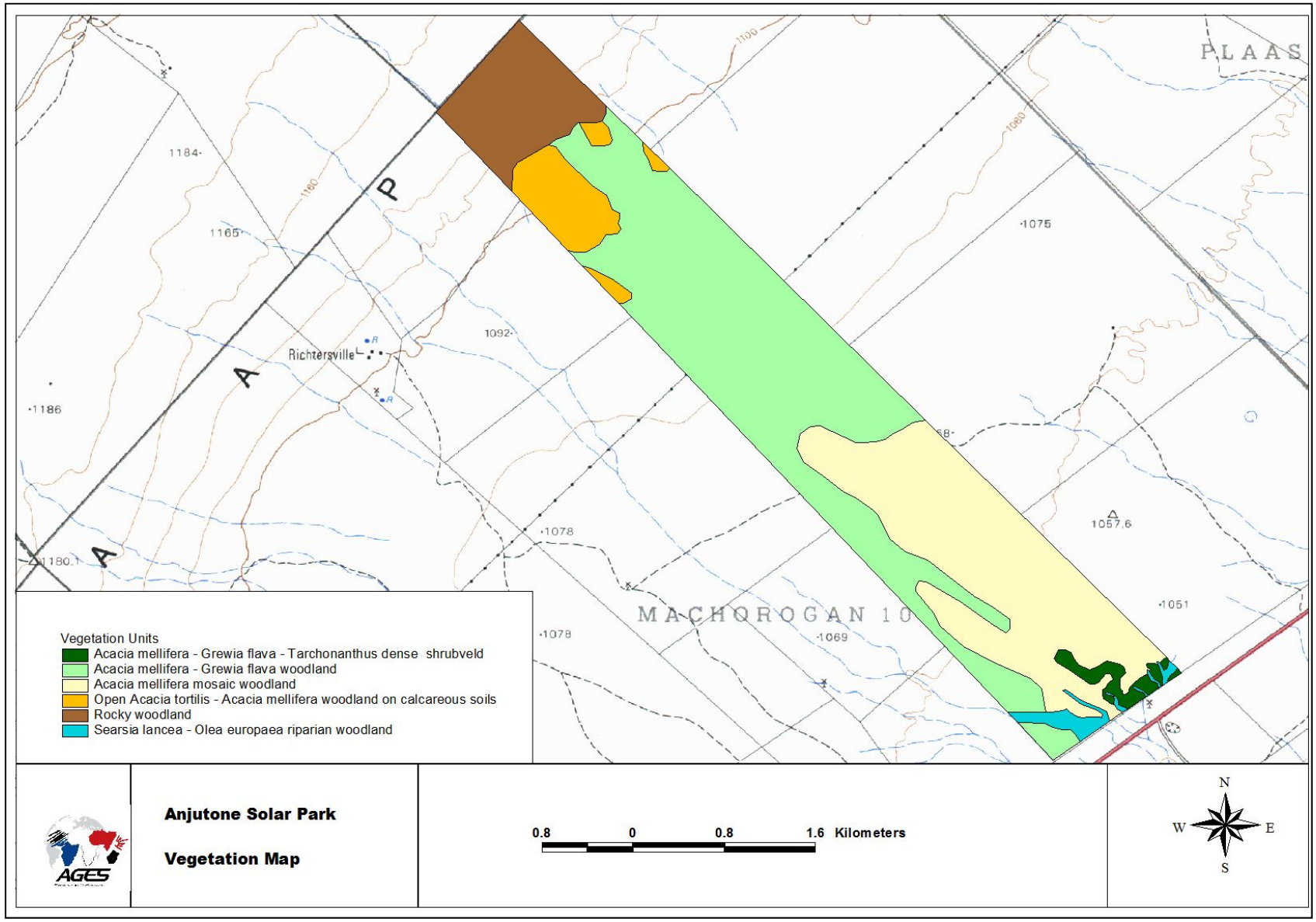


Figure 11 Sensitivity Map of the project site

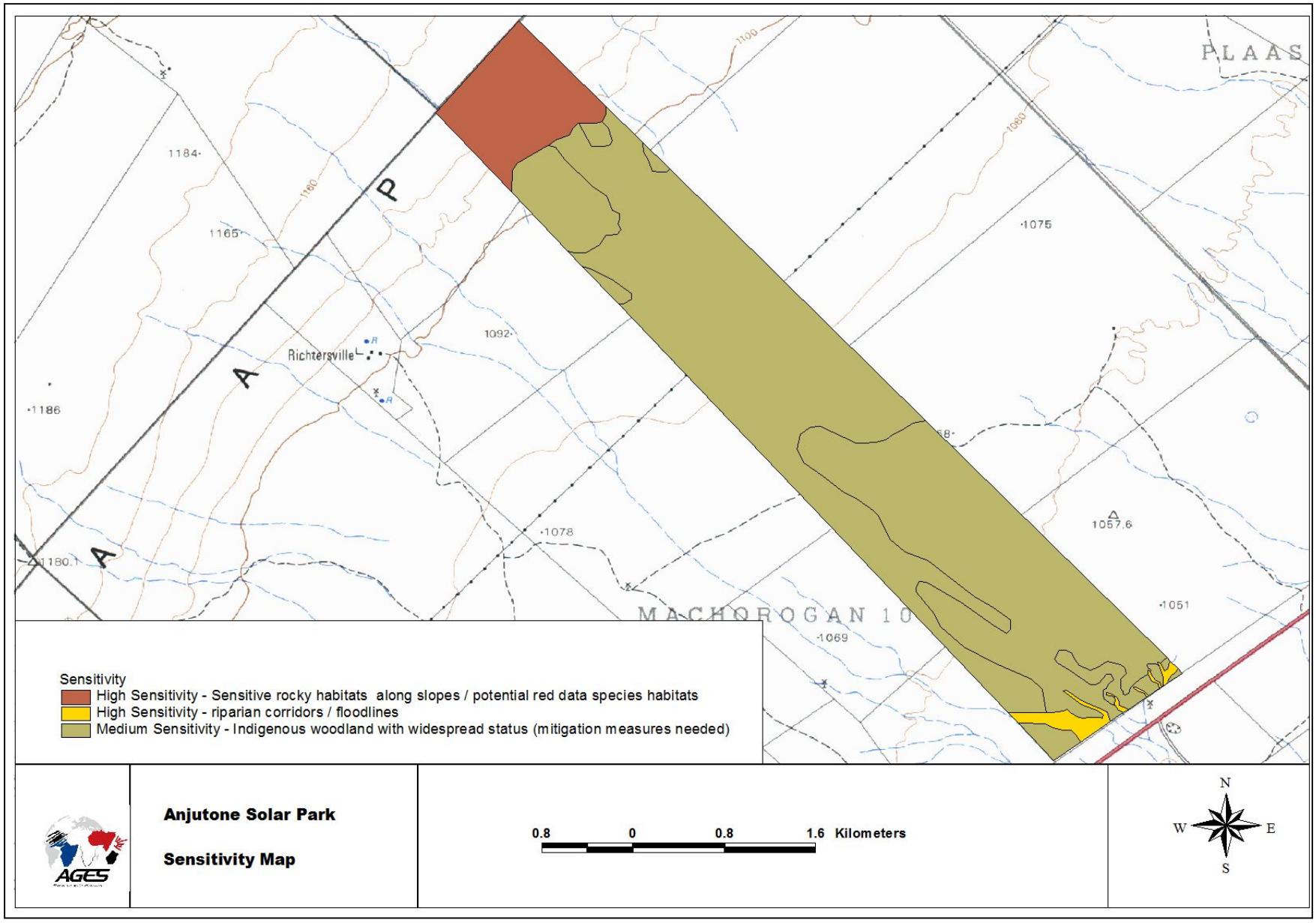


Figure 12 Agricultural Potential Map of the project site

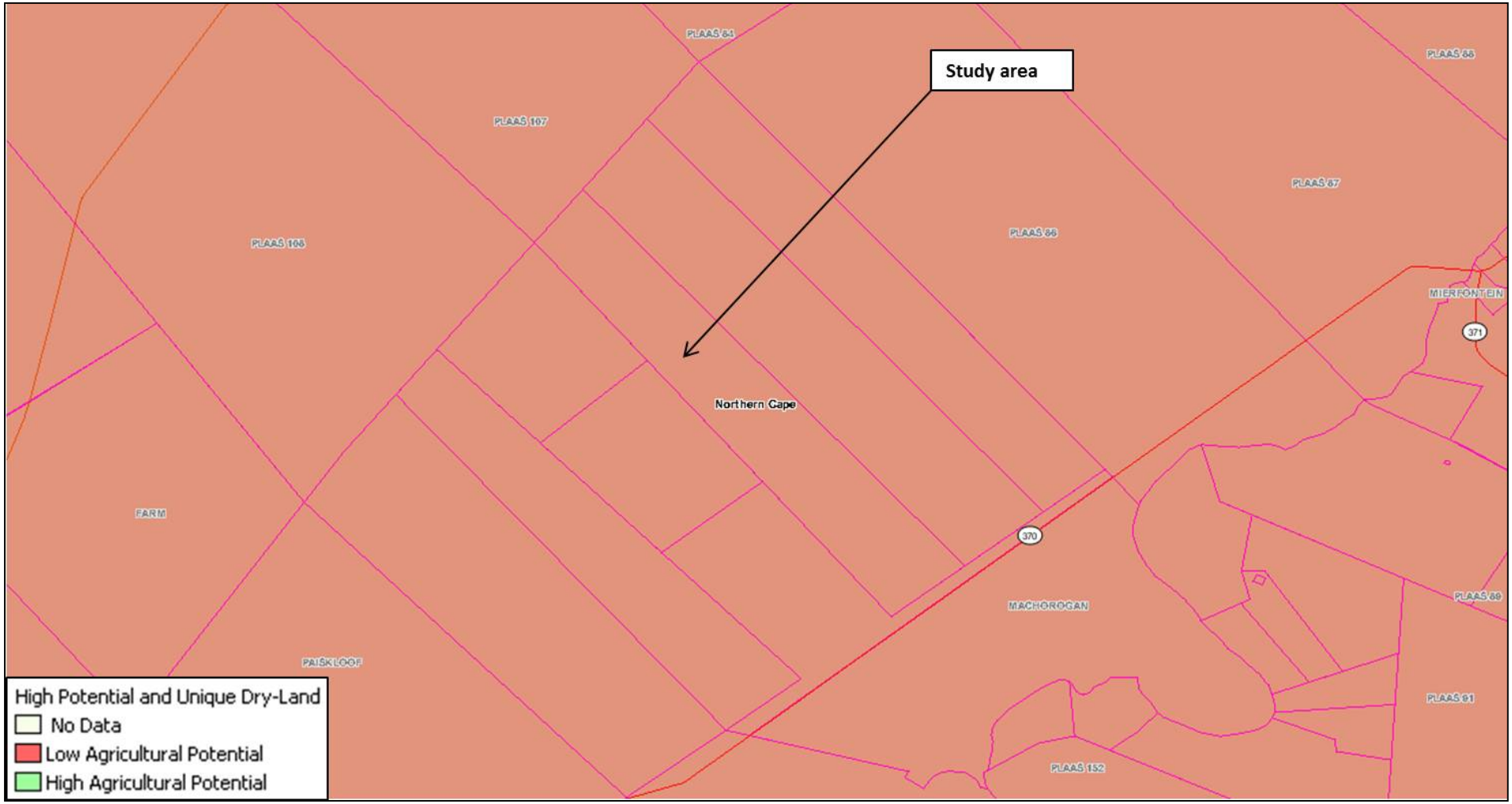


Figure 13 Land Capability Map of the project site

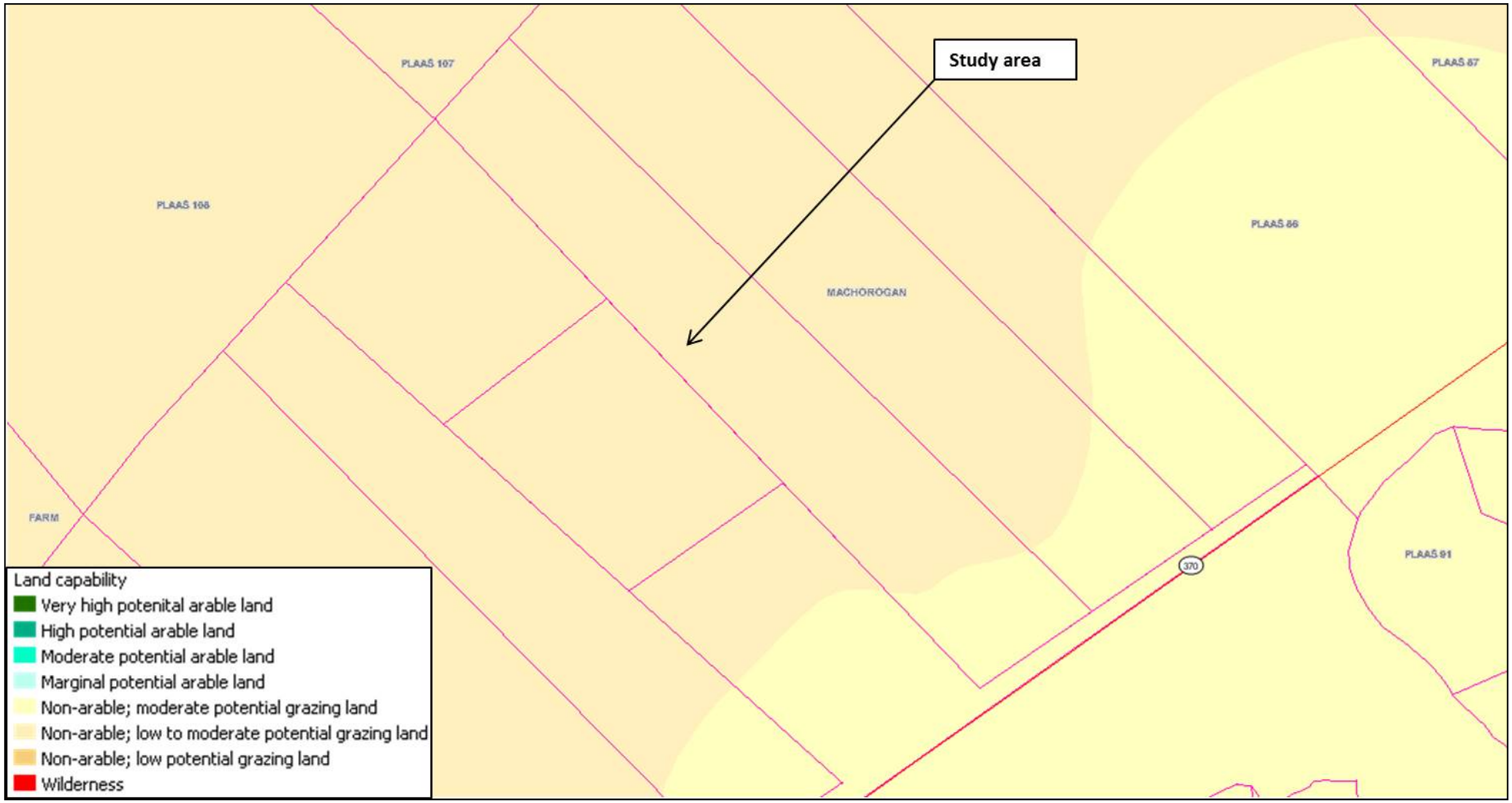
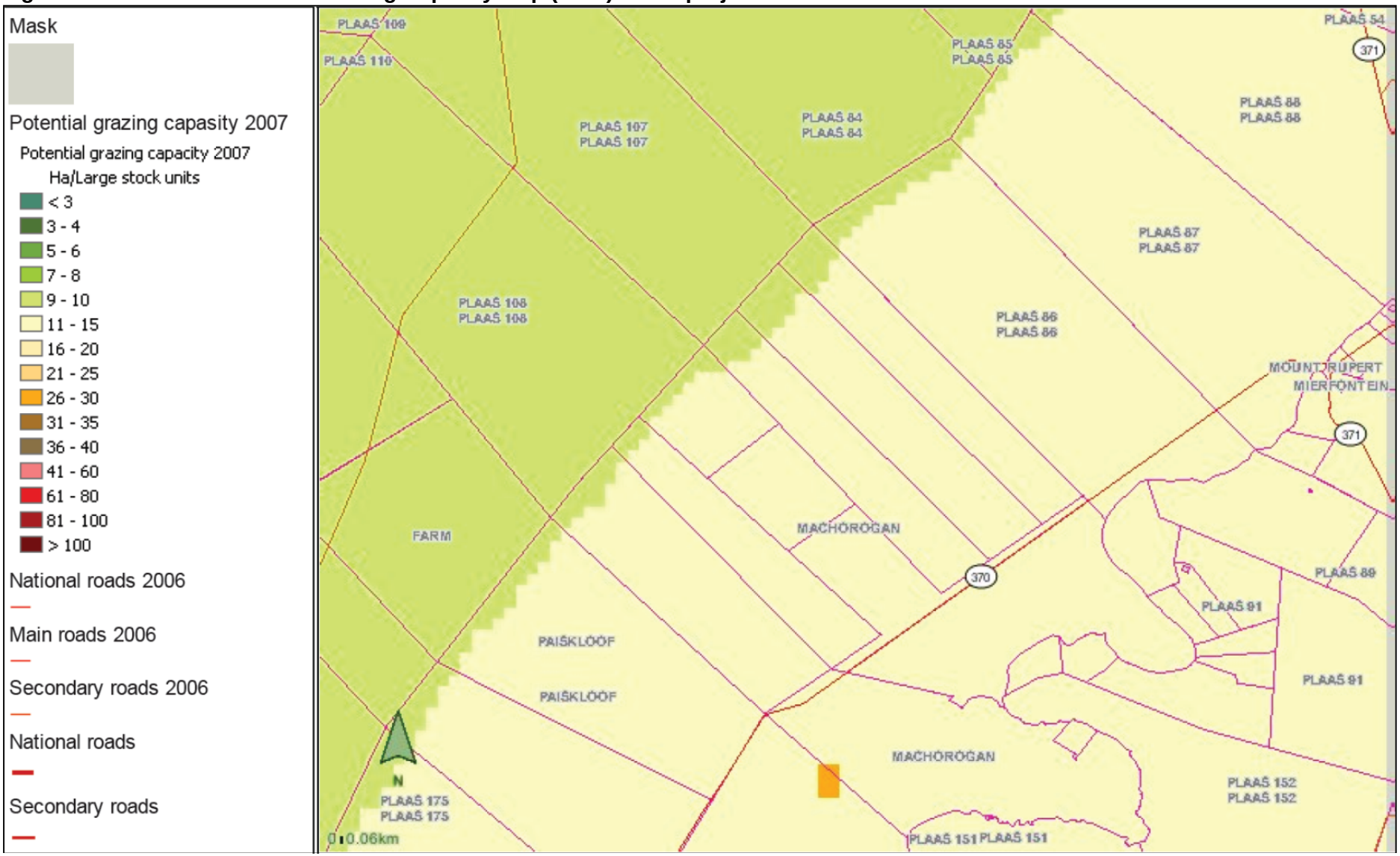


Figure 14 Potential Grazing Capacity Map (1993) of the project site

Figure 15 Potential Grazing Capacity Map (2007) of the project site



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 Programme (EMPr)

The scope of the EIA procedure is to provide an assessment of all impacts related to the proposed project in compliance with the EIA Regulations 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 Public Participation Process. The PPP has the aim to identify concerns and issues by the interested and affected parties (I&AP’s).
Issues and concerns raised by the I&AP’s and key stakeholders during the Public Participation Process have been collected, processed and addressed in the Comments and Response document which forms 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 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 was 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 should provide 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 also 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 Draft Environmental Impact Assessment Report is made available for review. Comments from the stakeholders and I&AP’s on the Draft EIR and the Draft EMP have been incorporated into the Final EIAR.
The stakeholders and I&AP’s will 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 and involved in 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 is made available to I&AP's for their evaluation and review;
- reasonable opportunity is given to I&AP's to comment and to submit queries related to the proposed project;
- comments and queries by the I&AP's to the Draft Scoping and to the EIA Reports are submitted and evaluated in a reasonable timeframe and in predetermined terms.

The initial informative stage of the public participation was done from 9 May 2013 until 10 June 2013.

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

In the enclosed Annexure C there is the list of all components of the public participation process.

The public was informed of the project by means of:

- Site notices;
- Background Information Documents (BID) sent to all adjacent land owners;
- Notices in a local newspaper; and
- Sending of BID to other possible interested and affected parties/stakeholders.

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 on the fence surrounding the proposed development area on 9 May 2013.

After a Deed Search was done on the surrounding properties Background Information Documents were sent to adjacent landowners. Proof of this is attached in Annexure C. A number of these documents were also distributed to the relevant governmental departments including *inter alia* Department of Water Affairs, Agriculture Land Reform & Rural Development *etc*. Other identified interested and/or affected parties/stakeholders include Eskom, the Local Municipality, District Municipality *etc*.
Proof of all correspondence is included in Annexure C.

A newspaper advertisement was published in the 15 May 2013 edition of the Noord Kaap, which is a local daily newspaper as well as in the national daily newspaper.

A number of registrations were received and include two governmental departments and a number of I&APs. There are no formal objections, only enquiries and general registrations of I&APs.

Hard copies of the Draft EIA report were sent to the Local Municipality office as well as all applicable governmental organizations. There was a commenting period of 40 days.

The Final EIA Report was submitted on 19 March 2014 and rejected by the DEA on 26 May 2014. For this reason, this Amended Final EIA Report has been drafted and submitted (please refer to the Background section).

The Northern Cape Department of Environment and Nature Conservation sent substantial comments and these were addressed in the Final EIA Report and Draft EMPr and in this Amended Final EIA Report. Detailed responses to these comments have been included in the Background section of this Amended Final EIA Report, which will be sent to the DENC with all the Annexures.

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:

- After submission of this Amended Final EIA Report to DEA, notifications will be sent out to inform all I&APs and governmental organizations that the Amended Final EIA Report was submitted and is again available for a commenting period of 30 days.
- All I&APs and governmental organizations will be notified about the final decision of the DEA (Environmental Authorisation granted or not).

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 7 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 Anjutone 2 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 loop-in loop-out substation, construction of the two new sections of power line - approx. 100 m long - which will deliver the energy to the Eskom's "ULCO-GANSPAN 1" 132 kV power line.

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. 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 Draft and Final EIA Report and to this Amended Final EIA Report are the following:

- Services Report
- Ecological Impact Assessment
- Avifauna Impact Assessment
- Agricultural Potential Assessment
- Wetland Delineation Study
- Geo-technical and Geo-hydrological Report
- Visual Impact Assessment
- Socio-economic Impact Assessment
- Heritage Impact Assessment

9.3. IMPACTS & MITIGATION MEASURES

9.3.1. 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.

9.3.1.1. 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.

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

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.

9.3.1.2. 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

Project Phase	Impact: Groundwater and Surface water Pollution								
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
	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

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 230 ha footprint and to the new access road.
- Construction activities should be restricted to the proposed 230 footprint.
- 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.

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.

9.3.1.3. Water use / water quantity

Construction phase

During this phase, water consumption will be the highest because it will be utilized for gravel roads and building constructions. The water needed for the construction activities will be provided either:
- by the existing borehole equipped with a mono-pump located on Portion 4 of the Farm Machorogan 106, Barkly West RD, 2 km East from the project site and owned by the same landowner of the project site, or
- by a new borehole to be drilled within the project site.

Operational phase

Water use will be limited except for short periods (twice per year) when the PV modules are cleaned. The water needed for the construction activities will be provided either:
- by the existing borehole equipped with a mono-pump located on Portion 4 of the Farm Machorogan 106, Barkly West RD, 2 km East from the project site and owned by the same landowner of the project site, or
- by a new borehole to be drilled within the project site.

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

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.

9.3.1.4. Land and soils

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.

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

Project Phase	Impact: Land and soils								
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
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

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.

9.3.1.5. 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. The heritage artefacts “MGS01” located in the middle of the proposed footprint should be preserved, providing a 30 m buffer around this heritage site.

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 H) to be undertaken will be adhered to.

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

Mitigation measures – Construction and operational phases

Care must be taken during the construction process that anything of archaeological value that is unearthed must be recorded. See Phase 1 - Heritage Impact Assessment, Annexure H. The archaeologist or SAHRA must be notified whenever anything of importance is discovered.

The heritage artefacts "MGS01" located in the middle of the proposed footprint should be preserved, providing a 30 m buffer around this heritage site. The site "MGS01" should be monitored to ensure that heritage resources are not impacted on. If further impact occurs, or is envisaged at any stage of development and operation, the following will be required:

- Documentation of sites.
- Further desktop study and community consultation to more accurately ascertain context of sites.
- Relevant Permitting from Heritage Resources Authority where applicable.

9.3.1.6. 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 230 ha footprint 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 southern side 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). Should any section of the access road be closer to 32 m to the wetland zone, a Water Licence Application should be submitted to the DWA in this respect.

The sensitive rocky woodland on the northern part of the property should be preserved undeveloped.

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.

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
	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

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 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
	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

Mitigation measures – Construction phase

- 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 230 ha footprint and to the new access road.
- Construction activities should be restricted to the proposed 230 footprint.
- Protected trees can only be removed once the necessary permits have been obtained.
- The plant species *Olea europaea* (wild olive), protected under the NCNCA, were found in the riparian vegetation in the southern section of the farm. Should any other individuals be found on the site during construction, the trees should not be eradicated but a licence application should be submitted to Northern Cape DENC.
- The protected tree species *Boscia albitrunca* (shepherd's tree) were found across the project site. No protected trees should be removed without authorisation from DAFF.
- Should any section of the access road be closer to 32 m to the wetland zone, a Water Licence Application should be submitted to the DWA in this respect.
- The following general measures will have to be adhered to in order to mitigate impacts of the access road to wetlands:
  - 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 washdown 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.

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.

9.3.1.7. Visual impacts

Construction phase

The natural aesthetic character of the site will be changed. The the Eskom's "ULCO - GANSPAN 1" 132 kV power line crossing the project site, 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.*

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

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 230 ha footprint 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.

9.3.1.8. 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.

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

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.

9.3.1.9. 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.
Anjutone (Pty) Ltd 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.

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 +

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.

9.4. 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.

9.4.1. 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.

9.4.2. 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.

9.4.3. 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.

9.4.4. Probability of occurrence

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

9.4.5. 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.

9.4.6. 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.

9.4.7. 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 Amended Final EIA Report describes the activities undertaken for the development of the Anjutone 2 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.

It is the professional opinion of AGES that the proposed development 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.