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Final EIA Report (FEIAR) **14/12/16/3/3/2/1054**

FINAL EIA REPORT FOR THE PROPOSED BOLOBEDU SOLAR PARK ON BOLOBEDU 1024 LT, LIMPOPO PROVINCE

Short name: Bolobedu Solar Park

September 2018

Commissioned by: Renewable Solutionss (Pty) Ltd
Document version 2.0 – Final
Compiled by: HP Jannasch & EA Grobler

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FINAL EIA REPORT FOR THE PROPOSED BOLOBEDU SOLAR PARK ON BOLOBEDU 1024 LT, LIMPOPO PROVINCE
Short name: Bolobedu Solar Park

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PROJECT APPLICANT

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Final EIA Report:

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	Modjadji Traditional Council
	Registered Interested and Affected Parties

DOCUMENT HISTORY

Report No	Date	Version	Status
1.0	August 2018	1.0	Consultation EIA report
2.0	September 2018	2.0	Final EIA report

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LIST OF APPENDICES

1 OBJECTIVE OF THE EIA PROCESS

According to Regulation No R 326 of April 2017, of the EIA Regulations, 2014, as amended, the objective of the EIA process is to, through a process of consultation:

a. Identify the policies and legislation relevant to the study and how the study complies with the policies and legislation.
b. Motivate the need and desirability of the proposed activity including the need and desirability of the activity in the context of the preferred location
c. Identify the location of the development footprint within the preferred site, based on an impact assessment and risk ranking process which includes cumulative impacts and a ranking process of all the identified alternatives focussing on the geographical, physical, biological, social, economic and cultural aspects of the environment.
d. Determine the
    a. Nature, significance, consequence, extent, duration and probability of the impacts occurring to inform preferred alternatives; and
    b. Degree to which these impacts
        i. Can be reversed;
        ii. May cause irreplaceable loss of resources, and
        iii. can be avoided, managed or mitigated.
e. Identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment
f. Identify, assess and rank the impacts the activity will impose on th preferred location through the life of the activity
g. Identify suitable measures to avoid, manage or mitigate identified impacts and
h. Identify risks that need to be managed and monitored.

2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

Name of EAP: AGES – Engela Grobler and Hein Jannasch
Contact details of EAP:
Physical Address: 120 Marshall Street,
Polokwane, 0699
Telephone number: 015 291 1577
Fax number: 015 291 1577

Expertise of EAP: A Master's Degree in Environmental Management and 8 years of experience with the management and conducting of EIA's. A number of renewable energy projects which participated in the IPP Programme, issued 3rd August 2011 by the Department of Energy have been awarded Preferred Bidder Status. Curriculum Vitae of EAP is included in Appendix R.

4 LOCATION OF ACTIVITY

4.1 SURVEYOR GENERAL 21 DIGIT CODES OF DEVELOPMENT AREAS

Bolobedu 1024 LT - T0LT00000000010240000

4.2 PHYSICAL ADDRESS AND FARM NAME

The Farm Bolobedu 1024 LT, Limpopo Province, Greater Letaba local Municipality, Mopani District Municipality, Limpopo Province

4.3 COORDINATES OF PROPERTY BOUNDARIES

South West Corner: 23º30'13.4287"S
30º21'39.5772"E
South East Corner: 23º29'33.6210"S
30º22'51.4506"E
North West Corner: 23º29'48.2836"S
30º21'56.7562"E
North East Corner: 23º28'55.9790"S
30º22'22.3238"E

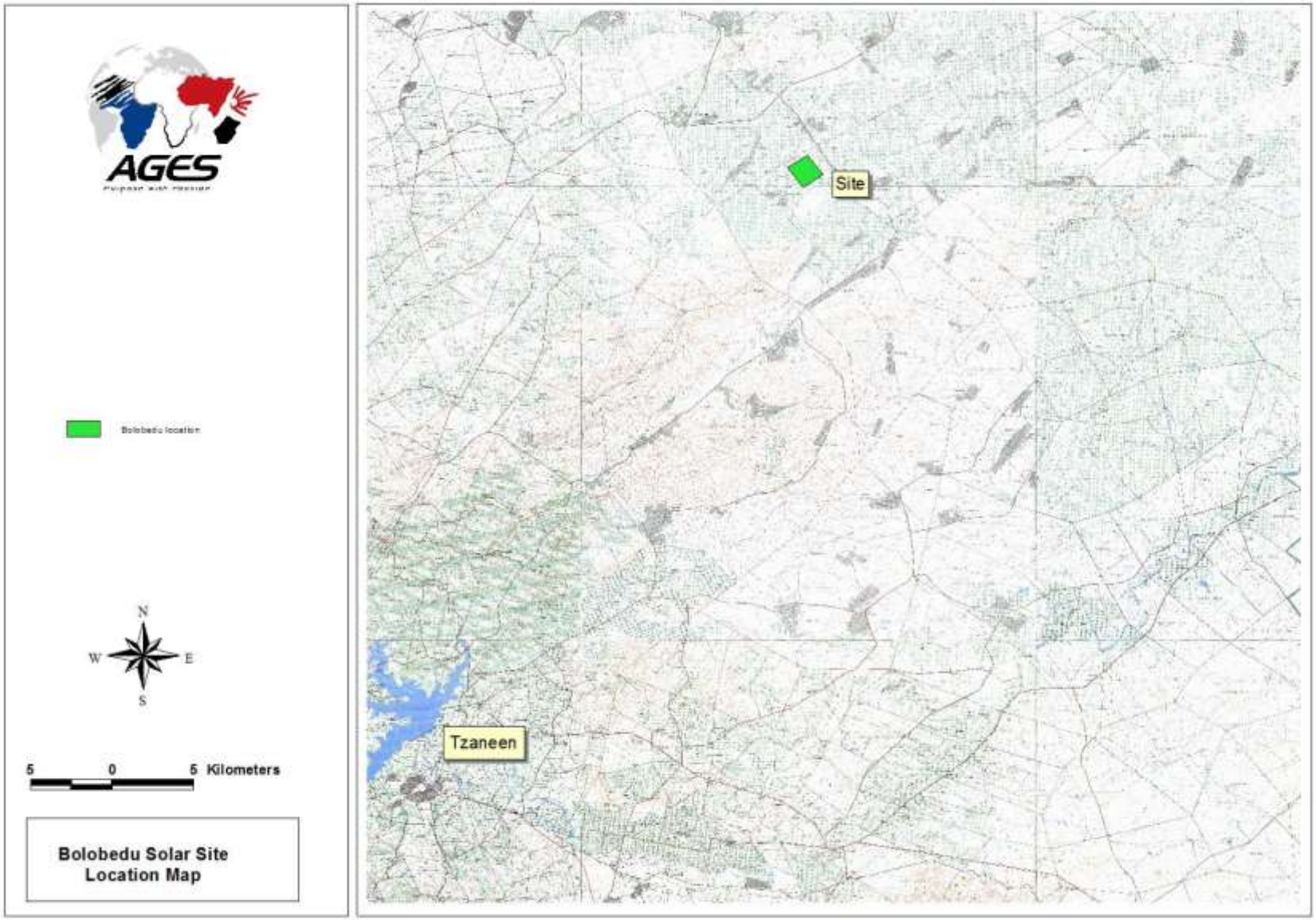
The proposed development site is located 49km south west of Giyani and 75 north-east of Tzaneen. Modjadjiskloof is 58km south west of the project site. The proposed development site is located on communal land and is surrounded by rural villages.

Please note that the farm Bolobedu 1024 LT is the result of an application for the consolidation of the Remainder of the Farm Kromrivierfontein 360 LT and the Remainder of the farm Worcerster 200 LT. This was done through a process in conjunction with the surveyor general and this area is now registered at the Deeds Office as the farm Bolobedu 1024 LT.

Some of the specialist reports still refer to the study area as the Remainder of the Farm Kromrivierfontein 360 LT and the Remainder of the farm Worcerster 200 LT. however, the farm is now officially and legally consolidated and is now called Bolobedu 1024 LT. An amended application form will be submitted to the DEA with the submission of the Final EIA Report.

5 PLAN OF THE PROPOSED ACTIVITY

Figure 1 Location of the proposed Bolobedu Solar Park



6 SCOPE OF THE PROPOSED ACTIVITY

6.1 LISTED ACTIVITIES TRIGGERED IN TERMS OF NEMA

Relevant notice	Description
GN R.327, Item 12 (ii) ***The development of -*** ***(ii) infrastructure or structures with a physical footprint of 100 square metres or more;*** ***where such development occurs -*** ***(c) within 32 m of a watercourse, measured from the edge of a watercourse;***	The PV Power Plant and connection infrastructure, including *inter alia*, drainage line crossings and access roads will impact on drainage lines. An Ecological Impact Assessment and Wetland Delineation was conducted on the property to take the drainage lines present on site, into consideration.
GN R.327, Item 19 (i) ***The infilling or depositing of any material of more than 10 m³ into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 m³ from - a watercourse;***	The PV Power Plant and connection infrastructure will interfere with drainage lines on site. The Wetland Delineation Study gave a clear indication of the locality and presence of drainage lines on site.
GN R.327 Item 24 (ii) ***The development of a road –*** ***(ii) with a reserve wider than 13,5m, or where no reserve exists where the road is wider than 8m.***	Access to Bolobedu Solar Park will be from a secondary road from R81. During the construction phase, the road reserve will be wider than 13.5 m to allow transportation of abnormal loads. Internal roads will be maximum 8.0 m wide with a road reserve maximum 12.0 m wide.
GN R.325 Item 1 ***The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 MW or more***	The project will consist of construction, operation and maintenance of a Photovoltaic (PV) Power Plant with a maximum generation capacity of 75 MW with associated infrastructure and structures and will be called Bolobedu Solar Park.
GN R.325 Item 15 ***The clearance of an area of 20 ha or more of indigenous vegetation***	The PV Power Plant with associated infrastructure and structures will be constructed and operated a footprint bigger than 20 ha and required footprint will be cleared from indigenous vegetation.

6.2 DESCRIPTION OF ASSOCIATED STRUCTURES AND INFRASTRUCTURE RELATED TO THE DEVELOPMENT

A PV power plant requires little infrastructure apart from the actual solar panels / PV arrays. There is no production of any product and there is no effluent or emissions as a result of the PV power plant. No accommodation is provided on site and security personnel and maintenance personnel will be employed in shifts and therefore, housing will not be required. The proposed development infrastructure will consist mainly of the following components and structures:

- Internal roads
- PV arrays (solar panels)
- Medium Voltage receiving stations
- Control buildings
- Warehouses (including small water treatment system)
- Access Road

Structures and infrastructure at the development site is also subject to the design and planning of the civil engineer for the abovementioned structures. A Services Report is included here in Appendix N, which discusses the civil services at the development site. Please note that the Civil Services Report cannot be regarded as absolute and final as the Modjadji Traditional Authority needs to approve the current site lay out plan. But this is needed before the engineer can do the final civil designs.

The specific activities include the construction and maintenance of a solar park with the components and structures as listed above. Associated infrastructure for the solar park will be for maintenance personnel on site needing facilities, including *inter alia* offices, workshops and ablution facilities. There will also be fire-fighting equipment on site. Internal roads will be designed to be in the most environmentally responsible locations. However, the crossing of drainage lines will not be excluded as there will have to be access to all developed areas on site and some the drainage lines cannot be avoided.

7 LEGAL AND POLICY REQUIREMENTS

The following is a broad overview of the relevant policy and legal requirements related to the environment, applicable to the proposed project: Legislation is not limited to this list.

Table 1: Review of relevant legislation

National Legislation
Constitution of the Republic of South Africa (Act no. 108 of 1996)
Fencing Act (Act no. 31 of 1963)
Conservation of Agricultural Resources Act (Act no. 43 of 1983) Regulation 15 of GN R0148
Environment Conservation Act (Act no. 73 of 1989)
National Water Act (Act no. 36 of 1998)
National Forests Act (Act no. 84 of 1998)
National Environmental Management Act (Act no. 107 of 1998) NEMA EIA Regulations 2014 (GN R. 982, 983, 984, 985 of 4 December 2014)
National Heritage Resources Act (Act no. 25 of 1999)
National Environmental Management: Biodiversity Act (Act no. 10 of 2004) GN R150: Commencement of Threatened and Protected Species GN R15: Lists of critically endangered, vulnerable and protected species GN R152: Threatened Protected Species Regulations
National Environmental Management: Air Quality Act (Act no. 39 of 2004)
National Environmental Management: Waste Management Act (Act no. 59 of 2008) GN921 of 29 November 2013-Listed activities
National Veld and Forest Fires Act, 1998 (Act 101 of 1998)
Limpopo Environmental Management Act (2004)
Occupational Health and Safety Act (Act No. 85 of 1993)

Guideline Documents
South African National Standard (SANS) 10328, Methods for environmental noise impact assessments in terms of NEMA no. 107 of 1998

8 NEED/DESIRABILITY FOR PHOTOVOLTAIC POWER GENERATION AT BOLOBEDU

Energy is essential to many human activities and is critical to the social and economic development of a country. One of the key objectives of the Department of Energy (DoE) is to ensure energy security which, is about ensuring the availability of energy resources, and access to energy services in an affordable and sustainable manner, whilst minimising adverse environmental impacts.

To ensure continued security of energy supply, it is essential that a co-ordinated and integrated approach to energy planning is undertaken. The development of a National Integrated Energy Plan (IEP) was envisaged in the White Paper on the Energy Policy of the Republic of South Africa of 1998 and, in terms of the National Energy Act, 2008 (Act No. 34 of 2008) the Minister of Energy is mandated to develop and, on an annual basis, review and publish the IEP in Government Gazette.

Solar technologies feature prominently in the energy mix, which include *inter alia*, nuclear, coal, natural gas and biogas. This should be supported by the implementation of mini-grid, off-grid and distributed generation. Solar PV technologies in urban and rural areas should continue to play a role and regulations pertaining to small-scale distributed power, to be fed back to the grid, need to be developed.

Following the promulgation of the IRP2010 the DoE initiated the IPP Procurement Programme to procure renewable energy generation from the private sector in a series of rounds (known as Bid Windows). In December 2012, Ministerial Determinations were announced for the procurement of 3 200 MW of Renewable Energy (RE) generation from IPPs. To date the DoE has procured over 4 000 MW of renewable energy across Bid Windows 1 to 3.5 under the REIPP Programme.

South Africa experiences some of the highest levels of solar radiation in the world and this renewable resource holds great potential for the country. The daily solar radiation in South Africa varies between 4.5 and 6.5 kilowatt hours per square meter (kWh/m²), compared to 3.6 kWh/m² in parts of the United States and 2.5 kWh/m² in Europe and the United Kingdom. Solar energy has the potential to contribute quite substantially to South Africa's future energy needs. This would, however, require large investments in transmission lines from the areas of high radiation to the main electricity consumer centres.

For electricity generation, the technology mix should take into consideration the roles that different technologies play in providing baseload and peaking power. Solar Energy should play a more significant role in the electricity generation mix than it has done historically and constitutes the greatest share of primary energy (in terms of total installed capacity) by 2050. Solar PV includes large scale installations for power generation which supply to the grid and individual, off-grid solar home systems and rooftop panels. Job creation and localisation potential Solar PV technologies present the greatest opportunity for localisation. To this effect several developments should be supported:

The reasons for the location of the project area include the following:

- 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 and in rural communities.

9 MOTIVATION FOR THE PREFERRED DEVELOPMENT FOOTPRINT WITHIN THE PREFERRED SITE

The current development footprint is based on the following:

- Connectivity to the Bolobedu Substation
- Recommendations from the Ecologist (Ecological Impact Assessment)
- Results from Wetland Delineation Study
- Results from Heritage Impact Assessment
- Recommendations from the Socio-Economic Impact Assessment

10 CONSIDERATION OF ALTERNATIVES

10.1 DETAILS OF ALTERNATIVES CONSIDERED

The location of the proposed site has been considered mainly due to the connectivity to the Eskom grid via the Bolobedu sub-station. The proposed property is on communal land and is surrounded by six rural villages including Ditshoseng, Ga-Femane (sometimes spelled Ga-Famane), Ga Ramaroka, Lebaka, Mohlabaneng and Xawela (sometimes spelled Shawela and sometimes Jawela). Overall, the project area falls under the jurisdiction of the Modjadji Traditional Authority and all proposals should be directed through the Modjadji Traditional Council and its prescribed procedures. This includes the involvement of the representatives of each of the villages that are adjacent to the proposed project. This is done with the aid of the Limpopo Department of Land Reform and Rural Development. The exact location of the planned development area was solely based on the possibility of a connection to the Bolobedu Sub-Station. However, the feasibility of the site, from an environmental point of view, had to be investigated.

An Ecological Impact Assessment as well as a Wetland Delineation study were conducted to get an understanding of the characteristics of the site and to aid in the identification of any fatal flaws. Based on the findings in these two reports, alternatives were investigated and proposed to the applicants. It was found that a number of tributaries from the Molototsi River bisects the proposed development site from West to East. The drainage channels are considered water courses with riparian woodland and a 30-meter buffer zone was delineated around the periphery of the riparian zones. The information received in the ecological and wetland delineation reports was used as a base to determine alternative site layouts.

Currently, the size of the study area is 347ha in total but the area to be used for the solar plant is 200 ha. However, the whole of the 347ha site will be unavailable for any other purpose than a Solar Park. Different alternatives identified during the specialist studies and assessments are briefly discussed here.

Site Alternative 1

Site Alternative 1 is considered the original site before any specialist studies were conducted and before an EIA process was initiated. It is ±200 ha in size and is directly adjacent to the Bolobedu Eskom substation to the West. On Site Alternative 1 there is a water course and dam, located to the south of the site. This is in a highly eroded state and is classified as having a Seriously Modified PES (Present Ecological State). These areas have a low Ecological Importance and Sensitivity and is not sensitive to flow and habitat modifications. They also play an insignificant role in moderating the quantity and quality of water flow in major rivers. There are also non-perennial water courses and riparian woodland in the northern section of the proposed development area.

The water courses have a Largely Natural Present Ecological State and a Moderate Ecological Importance and Sensitivity. These water courses support ecosystem functioning, especially in terms of connectivity towards the larger area.

Both these demarcated areas in the north and to the south were excluded from the development. This lead to a markedly smaller area available for the development footprint. For the project to be financially (and otherwise) viable the footprint area needed for a 75mW solar plant is at least 200 ha. With the exclusion of the demarcated wetland and drainage line areas, the area was no longer large enough to support a 75MW PV power plant and thus a second alternative had to be investigated.

Site Alternative 2

Site Alternative 2 is the original site but with another 100ha added to the development area, to the west. This area was investigated in order to get enough surface area for the development of a 75MW solar park. Apart from the drainage lines that bisect the area, the access road to the traditional village of Nganyeni would run through the development site. This access road is not a formal RAL or SANRAL road but it is an access road to a community. It would be possible to re-route the road but this option was reconsidered and it was found that by considering alternatives it would be possible to keep the access road as it is, for the sake of the local communities. After reconsideration, it was decided to exclude this access road from the development footprint in order to accommodate the local communities in this regard.

Site Alternative 3 (Preferred)

After all the information was received from all specialists and after a number of pre-resolution meetings with the local communities (Appendix C) everything was re-evaluated, and a third site alternative was considered which is now regarded the preferred alternative as this development footprint will exclude all drainage lines and wetland areas, significant heritage sites and the access road currently available to local communities.

During the heritage impact assessment another grave was found near the previously identified grave site. A decision was made to conduct a phase 2 Heritage Impact Assessment on the heritage areas with a medium sensitivity. After this assessment an application for a destruction permit will be submitted to the South African Heritage Resources Agency and once these permits are granted, these areas will be available for construction. However, construction will not be allowed to take place unless these permits have been obtained (see letters from SAHRA attached in Appendix H).

Alternative Site Lay Out 1

Alternative Site Lay Out 1 was based on the specialist studies done during the initial EIA process during 2015 and 2016 and specifically the delineation of sensitivity areas on maps. However, this is a preliminary design used only for planning purposes.

Alternative Site Lay Out 2 (Preferred)

The preferred site lay out was designed by a qualified and experienced design engineer, who specializes in the design of solar parks. He was given all the available information with particular reference to specialist studies in order to design and draw the preferred site lay out plan.

10.2 NO-GO ALTERNATIVE

If the proposed development does not take place, then the No-Go Alternative will be in place which means the *status quo* remains.

As mentioned above the current development footprint is based on the following:

- Connectivity to the Bolobedu Substation
- Recommendations from the Ecologist (Ecological Impact Assessment)
- Results from Wetland Delineation Study
- Results from Heritage Impact Assessment and
- Recommendations from the Socio-Economic Impact Assessment

- Connectivity to the Bolobedu Substation

If the project does not go ahead and a solar park is not connected to the Bolobedu Substation, the opportunity for a renewable energy project will not be in place. With the construction of the solar park, the pressure on the Eskom grid will decrease and the possibility of power not being available will also decrease.

- Recommendations from the Ecologist (Ecological Impact Assessment)

The study area is already in a degraded state due to overgrazing and subsequent erosion. If the solar park is not built the degradation and erosion will continue unchecked. With the establishment of the solar park, a proper storm water management plan will be implemented which will limit erosion and will allow for the rehabilitation of the degraded riparian vegetation. This in turn will prevent damage to the water courses and will lead to a better flow of water to downstream users.

The decrease on grazing pressure will lead to an increase in grazing material and the veld condition will improve. The opportunity for animal husbandry as part of the community and social development plan will become available.

- Results from Wetland Delineation Study

Results from the Wetland Delineation Study indicate that the area is mostly degraded as a result of overgrazing and erosion. The drainage lines will be rehabilitated, and the vegetation will recover to their natural state. With the storm water management in place it will lead to a better flow of water to down-stream users and it will limit further damage / deterioration of the vegetation and drainage lines.

- Results from Heritage Impact Assessment

The identified grave sites will be demarcated and there will be no impact on the graves. The other heritage discoveries will be, studied and documented. Information about the area can be obtained that was previously unknown. If the archaeological assessment wasn't done, the graves would not have been identified and the archaeological artefacts would not have been discovered.

- Recommendations from the Socio-Economic Impact Assessment

The socio-economic impact of a project of this magnitude on a rural area is significantly positive. There will be a high degree of investment in the area which will not be only temporary, during the construction phase.

The development in itself does not generate a high number of job opportunities as some of the functions at the solar park is specialized. However, there will be opportunities available, which will mainly include the washing of the solar panels and maintenance of the area and infrastructure.

Several possibilities exist for the development of community projects, which will enable and empower local communities.

However, thorough consultation needs to take place with the local communities in order to establish the needs and requirements of the people in the area. They must take ownership of the projects and external input should only be temporary.

If the project does not take place, there will not be any job opportunities or skills development plans during the construction period.

There will also be no investment into the area and therefore no development in the local communities. Potential job opportunities during the operational phase will be not be available.

Community projects will not be launched, and the *status quo* will remain.

10.2.1 NO-GO ALTERNATIVE - SUMMARY

In summary:

- If the development does not take place the degraded state of the vegetation will remain as such and the erosion and deterioration of the veld will continue unchecked. This will lead to a decrease in grazing material as well as a decrease in the area available for grazing and / or cultivation.
- Unmarked graves will stay unmarked and undetected. Archaeological artefacts will remain undetected and undocumented.
- Job opportunities during construction and operational phases will no longer become available.
- Investment into the area will not take place.
- Development will not occur in this area and the *status quo* will remain.
- Community projects and skills development programs will not be implemented unless the development takes place.

10.3 DETAILS OF PREVIOUS APPLICATION FOR ENVIRONMENTAL AUTHORIZATION

During 2016 an EIA process was conducted to obtain Environmental Authorization for the proposed Bolobedu Solar Park, with reference number 14/12/16/3/3/2/886.

An application form with a Draft Scoping Report was submitted 13 January 2016. The Final Scoping Report was submitted 25 February 2016 and accepted 6 April 2016. The Draft EIA Report was submitted 24 June 2016 and the Final EIA Report 26 July 2016. A letter was received from the DEA, dated 16 October 2016 in which it was indicated that the application for Environmental Authorization was refused. The reasons for the refusal include *inter alia*:

1. Landowner's consent was not in place

The applicant worked in close consultation with the Department of Rural Development and Land Reform and was only informed of one local village which had to be consulted and land owners' consent to be obtained in the form of a community resolution. This was duly done but it was discovered that other villages also, had to be contacted and community resolutions obtained from them. This turned out to be a very timeous process and one of the resolutions were only submitted after the Final EIA Report was submitted to the DEA.

2. A Traffic Impact Assessment was not done during the first application process.
3. The Heritage Report was not submitted to SAHRA for comments.
4. The No-go alternative was not identified and assessed.
5. The avifauna study wasn't adequate for informed decision-making.
6. The agricultural impact study wasn't adequate.
7. The facilities' water requirements for all phases of the development was not evaluated.
8. The EIA Report was not adequate to make an informed decision.

10.4 DETAILS OF PUBLIC PARTICIPATION PROCESS UNDERTAKEN

As described above, an EIA process was run for the proposed Bolobedu Solar Park during 2016. However, the Environmental Authorization was not granted. A second round of public participation process was initiated and ran from 27 January 2017 until 27 February 2017. This was done in anticipation of a new application. However, in the South African economic environment, it was difficult for the applicant to procure investors. Unfortunately, it took the whole of 2017 to get all the necessary paper work in order for the project to continue. No funds were available to run the new application process and a new application form was never submitted to the DEA, although a public participation process was run.

The public participation process was followed according to Chapter 6 of the New EIA Regulations (2014), as amended. Notification posters were put up on site as well as in other areas of the development site on 27 January 2017. The poster notifications were both in English and Sepedi. Advertisements were published in English and Sepedi, and the application was advertised in the 26 January 2017 edition of the Mopane Herald. The I&APs were given 30 days to register as I&APs. Background Information Documents (BIDs) were sent to the relevant Government Departments.

There also was liaison with the Modjadji Tribal Authority and the Department of Rural Development and Land Reform in order to obtain the necessary community resolutions to proceed with the project. The community resolutions, which have already been obtained, can be regarded as the landowner's consent as the land for the proposed development site is on tribal / communal land.

BID's were sent out during the second public participation process, on 27 January 2017 and all those contacted were given 30 days to register as I&APs. The public participation was conducted from 27 January 2017 until 27 February 2017.

The Consultation / Draft Scoping Report was available a year later and therefore the availability of the Consultation Scoping Report was widely advertised and included an advertisement in a local newspaper and notifications were sent to all potential I&APs regardless whether or not they have registered as such in previous processes. This was to ensure that another public participation process is initiated and will be run through-out the course of the application process.

The commenting period for the Consultation Scoping Report was from 28 January 2018 until 28 February 2018. No official comments were received from any I&APs. However, there was further consultation with the Greater Letaba Local Municipality as well as the Modjadji Traditional Authority. There has also been liaison with Mr. Mr. MSP Maake who is the Director: Trade and Investment Promotion at Limpopo Department of Economic Development, Environment and Tourism (LEDET). Meetings with Mr. Maake took place on an informal basis, but the aim is to get the Trade and Investment section of LEDET actively involved in the project.

The Consultation / Draft EIA Report was distributed to the relevant Governmental Departments, stakeholders and I&APs and was available for comments from 13 August 2018 until 13 September 2018.

No comments were received from I&APs but the Directorate: Biodiversity Conservation at the DEA sent comments, dated 12 September 2018.

10.5 SUMMARY OF ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

There are no other registered I&APs except for the local communities and it was found that their issues include the following:

- Land is no longer available for agricultural purposes including grazing and crop production.
- Job opportunities.
- Skills development program.
- Direct benefits to the local community.
- Long term benefits to the local community as opposed to short term benefits.
- Level of consultation with local community.
- Investigation into the direct impacts the proposed development will have on the local community.

It is clear from the abovementioned list that the issues in terms of the process include mostly socio-economic aspects. A socio-economic assessment was done and is included in this EIA

Report in Appendix K. However, the economist appointed to do the socio-economic assessment knows the Limpopo Province very well and is aware of the challenges in the rural areas in the Limpopo Province. There will be further consultation with a socio-economist and more negotiations will take place between the applicant and the local community.

The specific benefits to the community will be discussed with the community after it has been established what their specific needs are.

The Biodiversity Conservation Directorate of the DEA indicated that they were satisfied with the information provided in the EIA Report. However, a list of recommendations was included in their letter, which will be adhered to by the applicant. A response letter from the EAP was sent to this directorate indicating the manner in which these recommendations will be adhered to.

10.6 ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE FOOTPRINT ALTERNATIVES

A complete application process for Environmental Authorization was completed in 2015/2016 but the authorization was not granted. The appeal time has lapsed, and the applicant now wishes to apply again for the same activities in the same area. In this new application process, there are different investors involved as well as another project management team and there will be another alternative site lay out. The study area and locality of the proposed PV Solar Plant is still the same. The previous specialist assessments are now used to serve as part of determining if there are any so-called fatal flaws and / or restrictions on what the final and preferred site lay out plan must constitute.

In the previous application, two (2) alternative lay out plans were considered and based on findings from the specialists the current study area was found to be the preferred site. All the specialists were instructed to revise and update their reports and additional specialist studies were conducted. All these studies and information was used to design *Alternative* site lay out plan 2 which will be the preferred site lay out and will be considered during this EIA process. The site lay out plans will be subject to comments from the local community as well as applicable governmental departments. Based on comments received from all parties involved, the final site lay out plan will be finalised and included in the Final EIA Report.

10.6.1 BIODIVERSITY AND ECOLOGICAL ASPECTS

The **wetland and riparian area, terrestrial ecology, and avifauna** are biodiversity aspects that were assessed by Exigo3 and what follows are taken from these reports by Exigo3.

RIPARIAN AREA (Appendix G)

Wetlands have many distinguishing features, the most notable being the presence of water at or near the surface, distinctive hydromorphic soils, and the vegetation adapted to or tolerant of saturated soils. Similarly, riparian areas can be distinguished from adjacent terrestrial areas by observing the presence or absence of a few key indicators. Soils associated with wetlands can be distinguished into permanent, seasonal and temporary wetness zones. According to the Wetland report, to classify an area as a wetland it must have one or more of the following attributes:

- Hydromorphic soils that exhibit features characteristic of prolonged saturation;
- The presence of hydrophytes (even if only infrequently);
- A shallow water table that results in saturation at or near the surface, leading to the development of anaerobic conditions in the top 50cm of the soil.

Considering these characteristics only one wetland type was identified on site in the southern section of the study area namely an artificial depression (man-made dam).

The drainage channels on site are considered water courses with riparian woodland according to the National Water Act. The water courses identified on site represent tributaries of the Molototsi River. The tributaries show signs of riparian vegetation. The tributaries bisect the site from West to East, and the same direction as the water flow. A 30 m buffer zone was delineated around the wetland and water courses so that side effects of the development would be mitigated or successfully prevented. The riparian zones and wetland present in the area are presented in Figure 2. The buffer zone is essential to ensure healthy functioning and maintenance of riparian zone ecosystems while no development should be allowed in the riparian zone area. The ecologist recommended a 30m buffer zone but to mitigate further in terms of potential negative impacts on the riparian woodland and riverine vegetation (including the occurrence of protected plants in this area) the buffer was increased to 50m.

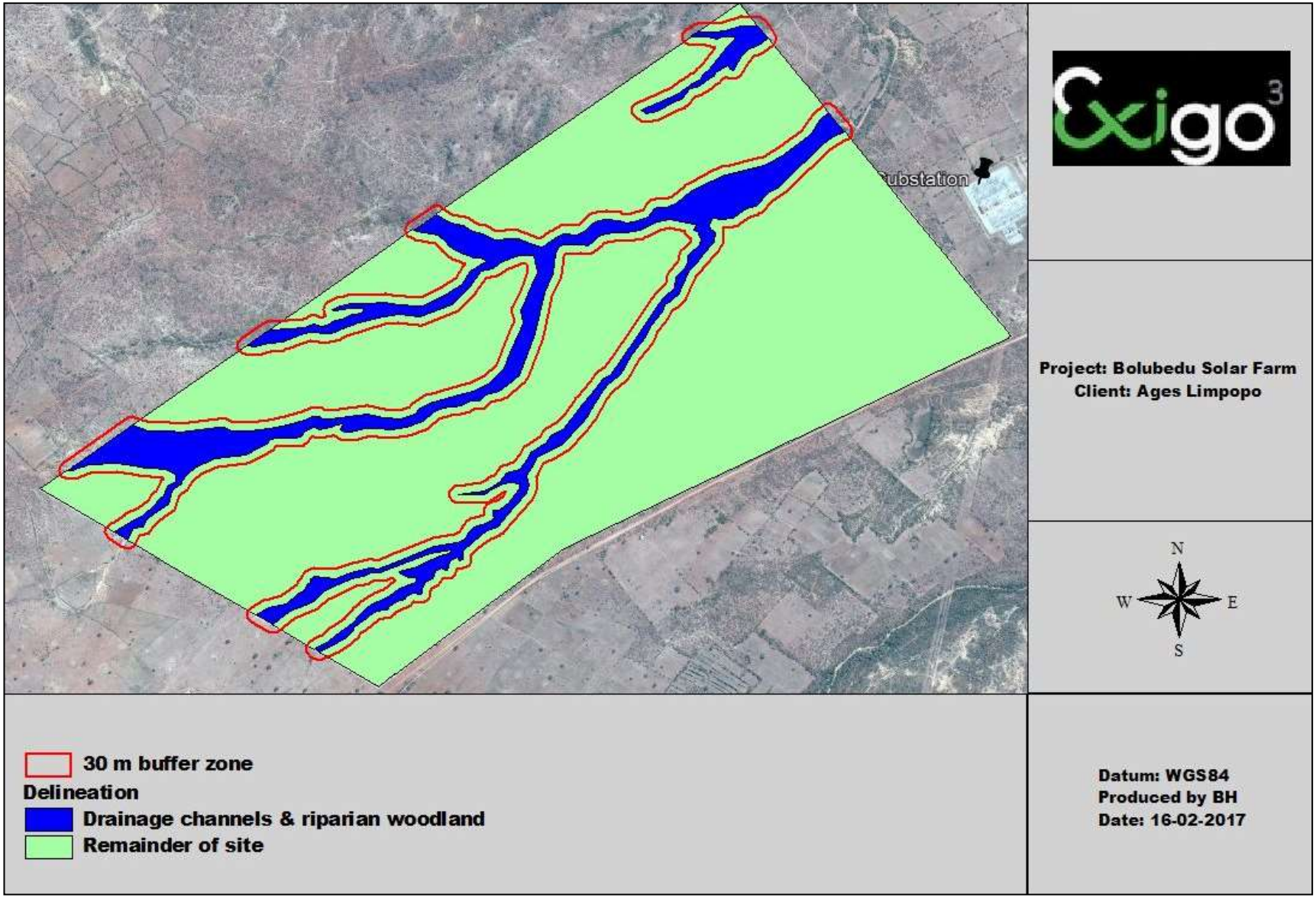


Figure 2 Wetland/water course map of the project area

The depression in the project area represents a man-made dam that form part of the modified (eroded) drainage channel. It is a landform with closed elevation contours that increases in depth from the perimeter to a central area of greatest depth, and within which water typically accumulates. The dam is classified as being in a seriously modified ecological state with a LOW ecological importance and sensitivity.

The non-perennial channels on site can be described as water courses or channels while the narrow band of trees that occurs along the channel can be classified as riparian vegetation. The rivers flow from west to east. These channels and associated vegetation are very important for connectivity with adjacent vegetation as well as a migratory route for riparian animals. The water courses in the northern section are classified as being in a largely natural ecological state with few modifications and a MODERATE ecological importance and sensitivity.

The northern water courses and riparian woodland are considered to be intact with small impacts from overgrazing and bank erosion, while large sections of the southern channels have become highly eroded due to the soil degradation caused by overgrazing. The riparian vegetation is distinctly unique in its composition and different from the adjacent land areas. The layout should not impede on the water courses, although specific mitigation measures and the 30 m buffer zone should be implemented to ensure the flow regime and functionality of the water courses are kept intact.

The impacts, mitigation measures and management measures for the wetland and water courses are described in the Wetland report by Exigo3 and in the impact section in this report.

The specialist will be requested to update his report (to include Alternative 3) from draft to final to be included in the Final EIA Report.

TERRESTRIAL ECOLOGY (Appendix D)

The development site lies within the Savanna biome which is the largest biome in Southern Africa. It is characterized by a grassy ground layer and a distinct upper layer of woody plants (trees and shrubs).

The most recent classification of the area by Mucina & Rutherford is the Granite Lowveld Bushveld vegetation type, although most of the proposed development sites have been completely modified and represent degraded bushveld or old fields. The vegetation structure of the Granite Lowveld Vegetation Type is typical tall shrubland with few trees to medium dense low woodland on the deep sandy uplands, while dense thicket to open savanna dominate occurs in the bottomlands. At seep lines where convex topography changes to concave, a dense fringe of *Terminalia sericea* occurs, with *Eragrostis gummiflua* in the undergrowth. The conservation status of the vegetation type is vulnerable with some 17% conserved in Kruger National Park, and the same percentage conserved in smaller private reserves. More than 20% of this vegetation type has been transformed, mainly by cultivation and by settlement development.

The vegetation units on the site vary according to soil characteristics, topography and land-use. Most of the site has become encroached by dense stands of sickle bush due to the overgrazing, while 2 major drainage channels bisect the site in the south and north respectively. Three distinct vegetation units according to soil types and topography can be identified on the project terrain. The units that were identified are: (Illustrated on map in Figure 3)

- **Degraded *Dichrostachys cinerea* thickets;**

Ecological management need therefore be implemented in the degraded thicket areas to address the problem of bush encroaching. The unit is classified as having a medium sensitivity due to widespread status in the Savannah biome.

- **Old fields / Croplands;**

This vegetation unit represent primary old fields and small-scale subsistence farming. The area is a vegetation entity of homogenous stands of crops and some exotic weeds and pioneer grasses. These areas represent zero sensitivity areas that is highly suitable for the development. The areas have a low sensitivity due to the modified state of the vegetation.

- **Drainage channels & riparian woodland;**

This vegetation unit includes the drainage channels and riparian woodland in the project area. The non-perennial channels on site can be described as water courses or channels. The narrow band of trees that occurs along the channel can be classified as riparian vegetation. The rivers flow from west to east.

The water courses on the site are non-perennial systems and the actual channels form a sandy riverbed. Large sections of the southern channels have become highly eroded due to the soil degradation caused by overgrazing and subsequently this area is considered to be in a highly degraded state and in need of rehabilitation.

The layout should not impede on the water courses, although specific mitigation measures and a 30-meter buffer zone should be implemented to ensure the flow regime and functionality of the water courses are kept intact. The vegetation associated with the water courses has a high sensitivity with a high conservation priority.

According to the Ecological report no red data plant species were found in this area or appear on the Red data list for this area. Three protected tree species according to the National Forest Act (Act 84 of 1998) were found on the study area namely Marula, Leadwood, and Applewood. Two protected plant species according to the Limpopo Environmental Management Act (Act no 7 of 2003) were found on the study area namely *Spirostachys Africana* (Tamboti) and *Scadoxis puniceus* (Paintbrush Lily).

Permits should be obtained from the LEDET or DAFF where protected flora is to be disturbed or relocated. A Protected plant policy must be compiled for the study area. A permit for the removal of protected trees will be submitted to DAFF. However, the protected plants under LEMA occur in the riparian woodland area, which is excluded from the development area. A conservative buffer has been implemented along the drainage lines. The Ecologist recommended a 30m buffer, but a 50m buffer is planned in order to prevent any disturbance on the riparian woodland area and therefor the protected plant species occurring in this area.

Four species of invasive alien plants and three species of encroacher plants were found on the area that needs to be controlled according to legislation. Details are included in the Ecological report. A total of 10 medicinal plant species were found in the study area.

Please note that a second Wetland Delineation Study as well as a Revised Ecological Report was obtained after the specialist visited the site again in order to assess the new proposed development site.

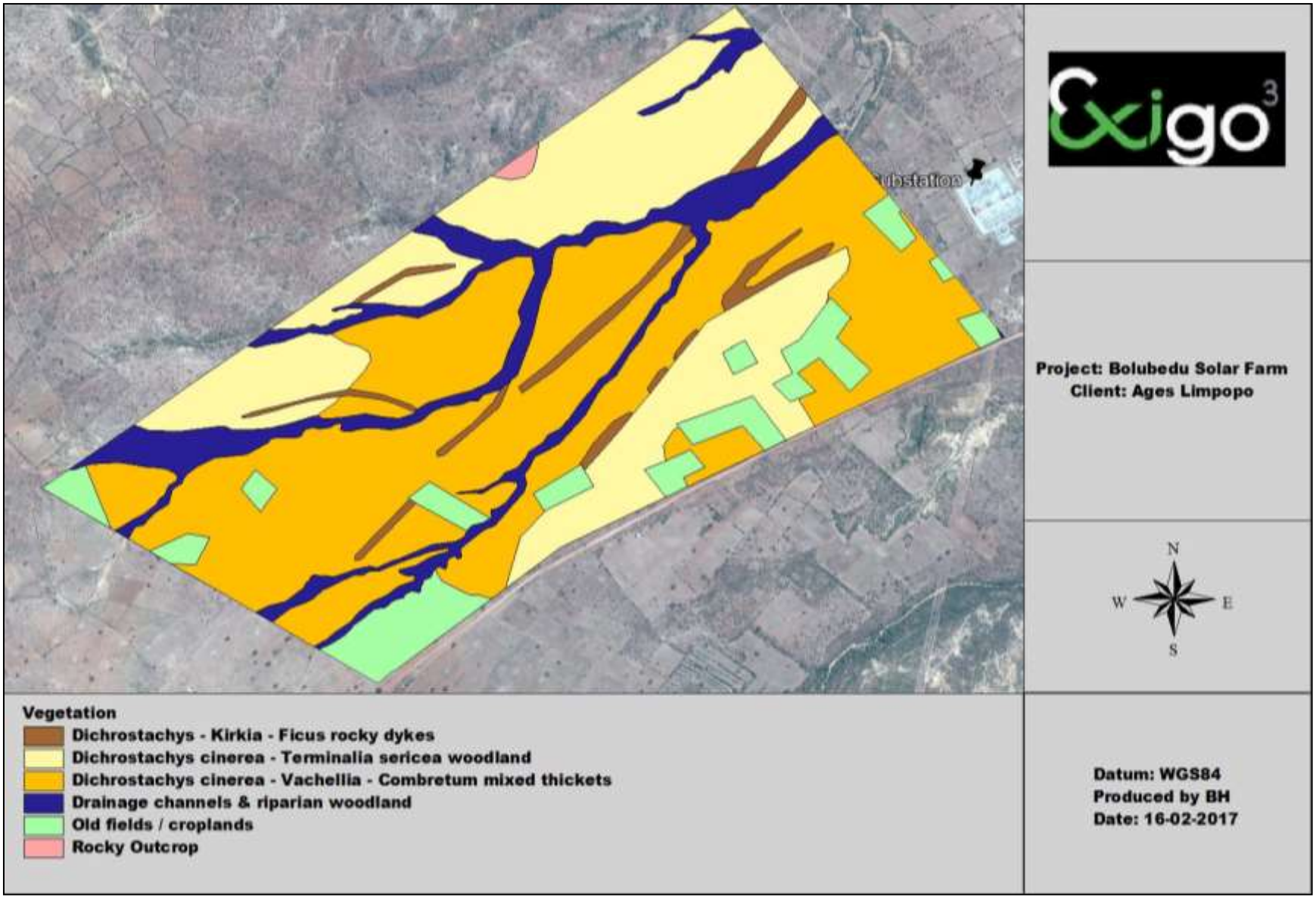


Figure 3 Vegetation units on project area (Exigo Ecological report)

During the **Faunal survey**, it was found that small antelope like duiker and steenbok will still utilise the more natural areas. Feral cats and dogs from the area will also move through the area, but the site is not well connected to the larger area as a result of developments and roads. The impact of the development on mammals will be low because of the extensive range of individual species.

REPTILES

Reptile species such as the southern rock python, the black mamba, puff adder, boomslang, vine snake, spotted bush snake and several members of the green snakes (*Philothamnus spp*.) is expected to occur in the study area., although the presence of these snakes is dependent on the presence of their prey species (rodents, frogs etc.).

Optimal habitats like riverine woodland and rocky habitats in the surrounding area of the solar plant development must be protected. Communities must be educated to discourage them from poaching.

AMPHIBIANS

Amphibians are poorly represented on the site due to the habitat not being optimal. There is thus no particular hotspot for amphibians in the area

The Ecological report contains several impact descriptions, mitigation and management actions which will be described in the impact assessment section of this report.

AREA SENSITIVITY

The ecological studies informed the classification of the area in different sensitivity classes and development zones. Different aspects like status of vegetation, soil types and composition and previous land use were used in the classification. The sensitivity map from the Ecological report from Exigo3 showing the sensitivity areas are included in Figure 4. If the high sensitivity areas and medium-high sensitivity areas are taken out of the equation, there are 220 ha of land left to construct the solar facility. These are mainly the sensitive drainage areas that are scoped out of the development area. The riparian woodland and drainage channels associated with the northern section of the site have a high sensitivity and should be preserved as important fauna and flora habitats. The degraded channel in the south of the site is highly eroded and has a Medium to high sensitivity. Rehabilitation of these areas should be done to ensure the drainage regime is minimally impacted downstream.

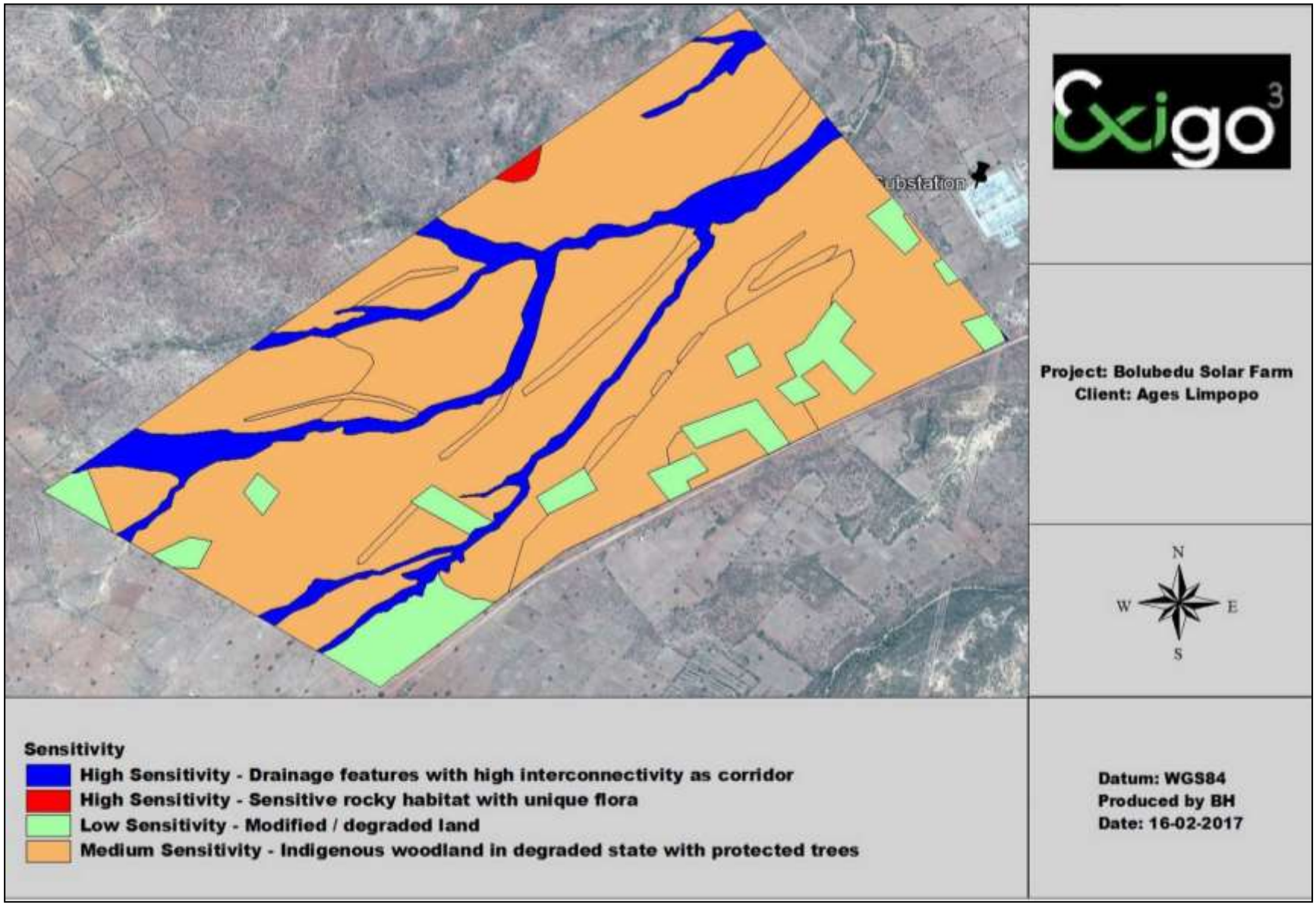


Figure 4 Sensitivity map of the proposed development site

The most suitable area for the development of the solar farm would be in the old fields, cultivated land and dense sickle bush stands.

The woodland variations associated with the red apedal soils have a medium sensitivity. Limited mitigation is needed for the preservation of some sections of this natural vegetation entity, and the eradication of any protected tree species would need a licence from DAFF. The herbaceous layer should preferably be preserved below the solar panels and managed through slashing during the entire lifetime of the project;

The old fields and cultivated land has a low sensitivity and unlimited development can be supported in these areas.

Ecological monitoring is recommended for the construction phase of the development considering the presence of protected trees and potential red data fauna on areas surrounding the site.

AVIFAUNA ASSESSMENT (Appendix E)

In the previous application process the Avifauna study was done by in a separate assessment by Exigo3. A list of red data species as well as of all birds probably occurring in the study area was included in the Avifauna report of Exigo3. However, the DEA was not convinced that this specialist was qualified to do the study. Another avifauna specialist was appointed from the University of Limpopo, Prof. Engelbrecht, who has a master's degree in Zoology and is better qualified to do the Avifauna Assessment than the previous ecologist. His report is included in Appendix E).

According to the report by Prof. Engelbrecht, the proposed site is situated in severely modified and degraded bushveld (Tzaneen Sour Lowveld and Granite Lowveld Bushveld) characterised by currently cultivated and fallow fields, coppicing trees and shrubs because of fuel wood harvesting, soil erosion because of overgrazing and severe bush encroachment, mainly by *Dichrostachys cinerea*. This is confirmed in the Ecological Report (Appendix C). Although the study comprises mainly two vegetation types, the vegetation structure is fairly homogenous, resulting in a relatively depauperate avifauna.

From an avifaunal perspective, there are three sensitive areas in relatively close proximity to the proposed site: the riparian zones of two non-perennial tributaries of the Motlatswi River in the north and central parts of the study area, and the Masakulo River south of the study area, as well as the nearby Rasekwalo Hill to the north of the study area. Many species will use the taller trees associated with the riparian zones as dispersal avenues and for foraging and nesting purposes, while the hill will provide cover and serve as a refuge for many species. However, sensitivity may change depending on the specifications of the final project design and infrastructure associated with the proposed PV power plant, e.g. evaporation ponds or powerlines.

Considering that only 56 species were recorded during the site visit which was undertaken in summer when most migrants are around, and many species are more vocal as a result of breeding activities, the site showed poor avifaunal diversity. All the species recorded are common and widespread in the region and thrive in disturbed areas or in areas where bush encroachment is evident. The absence of surface water within the study area means that many water birds and water-dependent species are not attracted to the site.

The fact that there is only a single record of a Red Data species in the QDGS since 2007, suggests that the RED Data species recorded in the QDGS during SABAP1 are no longer present in the area and occur only sporadically or are present in extremely low densities. As for the only Red Data species recorded since 2007, the Black Stork, it was recorded quite a distance away from the proposed development site, and there is no suitable breeding habitat available for the species in or near the study area.

According to the findings by Prof Engelbrecht, the proposed siting of the PV power plant suggests the proposed development pose a **negligible to low risk** to the avifauna present at or in the vicinity of the study area.

10.6.2 SOIL ASPECTS AND AGRICULTURAL POTENTIAL STUDY (APPENDIX F)

The assessment of the agricultural soil potential and land capability of the project site is detailed in a **Revised** Soil potential report from Exigo3. (Appendix F). The land type units which is used to determine the potential agricultural value of soils in an area and represented within the study area include the Ae64 and Ea70 land types. The land type, geology and associated soil type is presented in Table 2 below.

Table 2 Land types, geology and soil types of the development area.

Landtype	Soils	Geology
Ae326	Red-yellow apedal, freely drained soils; red, high base status, > 300 mm deep (no dunes)	Grey biotite gneiss and migmatite of the Goudplaats Gneiss in the north; leucocratic biotite granite of Vaalian age in the south and east; many diabase dykes.

The soils associated with the site are mostly deep red apedal on the plains, while black, alluvial soils are associated with the drainage channels. It is also classified as class 2 for moisture availability which means that the climatic conditions are conducive for rain-fed arable agriculture. The agricultural Research Institute (ARC) uses specific soil characteristics to indicate the suitability of soils for arable agriculture and according to the characteristics of the site, the soils are highly suitable for arable agriculture where the climate permits (Exigo3 soil Potential report).

According to the data base of the Department of Agriculture, the site is currently classified as LOW potential soils. The Department also gives the Land Capability of the site as "*Moderate Potential Arable Land*".

For Land capability the soils are moderately suitable for livestock and / or game grazing due to the slightly higher nutrient and organic content of the topsoil in woodland areas that support a mixture of palatable and unpalatable species. The site has a medium to low potential for grazing due to the dense stands of sickle bush. Bush encroachment takes place because of overgrazing in this area. The grazing has a low palatability due to overgrazing and there is thus a need for ecological management to address this problem.

The alluvial soils will not be used for the solar panels. These soils have a *zero agricultural potential for arable agriculture* due to wetness factors. It also has a *high land capability* for grazing due to the palatable grasses which grows through the year on these soils. Strategies to prevent overgrazing in these areas are needed. Soil impacts potentially associated with the proposed development are soil disturbance (erosion, compaction), loss of land capability, soil destruction and sterilisation and soil pollution (spillages). Measures are provided in the Exigo3 report and in this EIA report to mitigate and manage the impacts so that the development could be supported.

10.6.3 GEOHYDROLOGICAL ASPECTS AND WATER DEMAND (APPENDIX J)

The project site is located in the B81G quaternary catchment. Two primary drainage features occur in the site, one in the north and the other in the south, both draining in an eastern direction.

The study area is located in the summer rainfall region of South Africa, with precipitation generally occurring as short, intense, thundery showers. The mean annual precipitation for the area as measured in the surrounding weather stations is **675** mm/annum. Average annual precipitation for the B81G quaternary catchment calculated by DWS during the GRA II study is given as **629** mm/annum.

To ensure a conservative approach to the sustainable groundwater availability, the lower of the average rainfall figures will be used in groundwater potential calculations. An average annual rainfall of **629** mm/a will thus be used.

The most suitable targets for groundwater development are in areas where fracturing and weathering in the matrix is more extensive. Typical borehole yields of between **2.0 – 5.0 L/sec** may be expected for the region. Although the regional underlying fractured strata is deemed to offer a moderate to high groundwater potential, it is noted that localized zones of higher fracturing may offer very high yielding boreholes. Regionally groundwater represents a water source for the supply of potable water to local communities.

Based on the lack of complete groundwater level data for the study area the groundwater gradient and flow direction is based on available data and topography. The available information will be used to form a conceptual understanding of the regional groundwater flow and gradient and the assumption is made that groundwater movement is in a north easterly direction.

Due to community unrest regarding the project no field visit could be conducted in the area up to date. According to the data source available a total of eighteen (**18**) boreholes are located within a 1.5 km radius around the project area. The status of the boreholes is not confirmed as a site visit was restricted. A detailed hydro-census is scheduled when all access related issues are resolved.

However, four boreholes were evaluated in the field by **WSM Leshika (Pty) Ltd** on 23 September 2015 (during the first application process). Water samples of three boreholes were collected and analysed by a SANAS certified laboratory to test the water quality. The overall water quality of the site is deemed to be of Class II. This is marginal quality due to elevated levels of nitrate and chloride. Due to **Marginal** water quality and **high hardness**, the water from these boreholes is considered as marginal to use for the purposes of the Solar Park. Washing of the panels could result in scaling reducing panel efficiency. The water should therefore be softened before use.

None of the boreholes as described above is located on the current site and therefore, a resource development plan had to be done and this led to another Geo-hydrological investigation which was done in 2018 in order to consider the new development site as the development site is slightly different than wat was initially investigated. However, the geo-hydrologist was not given access to the site for him to conclude his investigation. With the information in the previous report and by doing a desk top study he was able to compile a desk top geo-hydrological report to determine the water availability based on the recharge as calculated by using the rainfall figures. It was found that the water demand for the proposed development is significantly lower than the recharge and what is possibly available.

Once access is granted to the site, the geo-hydrologist will be able to conduct a geo-physical survey as well as a hydro-census. Based on these results a borehole will be drilled and tested. This will be done according to the Department of Water and Sanitation's (DWS) standards and will be used in the Water Use License Application process which will be required by the DWS.

The water demand for the proposed development during construction and operational phases is set out in the next two tables:

WATER REQUIREMENT DURING THE CONSTRUCTION PHASE OF THE PROJECT		
DESCRIPTION	**UNIT**	**TOTAL**
Timeframe of the construction activities	*months*	15
Timeframe of the construction activities - calendar days	*days*	450
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**
Daily water consumption (average over 450 calendar days)	***m^3/day***	**25.5**

WATER REQUIREMENT DURING THE OPERATIONAL PHASE		
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 days)	***m^3/day***	**7.66**

A number of methods are used to calculate the potential availability of water on a site. For the proposed Bolobedu Solar Park the following was found:

- According to the Groundwater Harvest Potential, **3.12 mm/a** is deemed available for abstraction. Based on the study area, this indicates a volume of **45 576 m^3/a** (124.8 m^3/day).
- The groundwater exploitation potential based on **24 mm** recharge yields a volume of

  83 371 m^3/annum (228 m^3/day).
- Based on Average Groundwater Exploitation Potential (Dry Season), of the GRAII report, a volume of **92 103.95 m^3/a** or **252.3 m^3/day** (2.9 L/s) will be sustainable for the project area.

Taking the various data sources in to account by using a calculated average the sustainable groundwater potential for allocation is **73 620.5 m^3/annum** or **201.7 m^3/day** (2.3 L/s).

From these numbers and tables above, it is clear that the water demand is very low compared to the possible volume of water available for use at the solar park.

Please note that the numbers indicated here will be confirmed after a borehole was drilled and tested. Potential impacts on other water users will be determined by means of a Hydro-census which will be done when access is granted to the site again.

In terms of the social development plan for the area, a Resource Development Plan will be crucial for further development of the water resources in the area.

10.6.4 GEOTECHNICAL ASPECTS (APPENDIX I)

According to the Geotechnical report, the major constraints encountered on site can be summarized as:

- Localised areas subject to flooding;
- Shallow expected seasonal seepage water of less than 1.5mbngl;
- Localised areas of steep slopes mainly adjacent to drainage features;
- Moderate to high erodibility of the upper soils based on material properties and active erosion in the region and towards the south-eastern portion of the site;
- Corrosiveness potential of the soils to ferrous metals;
- Areas of expected shallow hard rock.

The materials retrieved on site and tested, classify as:

- **SM** - Silty sands, poorly graded silt-sand mixtures.
- **SC** - Clayey sands, poorly graded sand-clay mixtures.
- **CL** - Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.

Two test pits (TP02&TP40) showed a medium heave factor as a result of clays in the soil while the other test pits showed a low heave potential. Some of the soils are classified as generally slightly to moderately open structured and pin holed with a “Medium” collapse potential while other soils have a low consolidation/collapse potential. The excavatability of the upper soils is classified as “Soft excavation” with “Soft to intermediate” excavation conditions encountered at TLB termination/refusal depths.

The on-site soils are considered to have a moderate to high susceptibility to erosion once exposed and subject to concentrated water flow. The vertical sidewalls of all the shallow confined test pits excavated were stable during the short inspection period with no signs of sidewall bulging or other indications of instability at the prevailing slightly moist moisture content at time of investigation.

The on-site soils are considered to have a “Not generally corrosive” to “Extremely corrosive” rating with reference to aggressiveness of the soil and/or soil/water interface to ferrous metals. Potential earthquake damage is deemed negligible. The area is not underlain by potentially soluble dolomitic formations nor is the area undermined.

The majority of the on-site materials (sandy soils) will be suitable for soil mattress construction below foundations and platforms. The suitability of the on-site material for road construction will depend on the expected induced loads, volumes, drainage and overall pavement design. This will have to be determined in a detailed investigation. The suitability of the material for bedding, blanketing and backfill will depend on the type of pipelines considered. Construction materials assessment with testing will be recommended if any of the materials are considered for use as aggregate for concrete.

Five different foundation options for the solar panel footings are discussed in the Geotechnical report. The driven pile foundation is deemed a practical foundation for the proposed panels in this development. Additional testing and analysis will be required in order to optimise and confirm the feasibility of this piling system. Foundation specific investigations should be conducted for workshops/offices once the positions are known. The upper soils are generally expected to be collapsible and foundation modifications may be required.

10.6.5 SOCIO-ECONOMIC ASPECTS (APPENDIX M)

Six settlements are located in a radius of 5 km from the project site and education levels are low in the area. Almost 27% of people have never attended school while many people leave school before finishing their education. The local recruitment of unskilled staff would thus be not difficult. The unemployment rate in the Greater Letaba Municipality is higher than 40% and, in most communities, it is higher than 62% which is an indication of the urgent need for job creation in the area. It is therefore very important to recruit people from the adjacent communities.

The proposed project is consistent with national, provincial and municipal development policy and the important issues emerging from economic development strategies are the imperatives for alternative energy generation and for job creation. Most governments in the global community now recognise that the roll-out of renewable energy at an unprecedented scale will be needed among a number of other actions to curb global warming.

The policy case for the urgent roll-out of renewable energy in South Africa has been made at a national government level using compelling arguments that are in line with international policy trends and with financial benefits.

In the Limpopo Development Plan, it is stated that Government will commit to ensuring that the supply of energy and water is reliable and sufficient for a growing economy, and that the responsibilities of municipal maintenance of distribution systems are appropriately allocated and funded. Solar photovoltaic electricity generation is listed as one of the priority infrastructure projects in Limpopo Province and actively encourages development of solar energy projects.

The national and local economies will benefit from civil contractor work, labour and building materials that will be required on site if the proposed project goes ahead. After approval, the project will take approximately 15 months to be built and could 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 people for short spaces of time during peak periods. During the operational phase, the power plant will require a permanent staff of approximately 38 people. That impact will be positive considering of the strategic priority for employment creation in the Municipality. A significant additional economic benefit is the experience that will be gained with regard to solar electricity generation in Limpopo and in South Africa

The proposal will not have any negative implications for the tourism industry in Greater Letaba Local Municipality because of the site location adjacent to the existing Eskom Substation and the several adjacent settlements on communal land that do not compete with current tourism activities or undeveloped tourism potential in the Municipality.

The proposed site is currently being used for communal grazing, but the carrying capacity is very low at 20ha/livestock unit. This implies that grazing for 8 cows could be lost if the operational site is fenced off. It will be important to obtain approval from livestock owners by way of a community resolution that the new land-use is agreed to. Consideration could also be given to assistance towards the improvement of alternative grazing fields to compensate for the loss of 160 hectares of communal grazing land.

The intention is to distribute the economic benefits of the project beyond employees, government and business.

The fact that the site is on communal land implies that traditional community structures have to be consulted, from the local Induna to the Chief of the Modjadji Traditional Authority. A resolution from this Authority is essential as an indication of community approval.

The following socio-economic impacts may arise during the construction phase of the proposed project:

- 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 of approximately 40% of total CAPEX (investment costs) will be sourced within the country.
- Socio-economic benefits for local population due to job creation (especially in the lower skilled levels);
- Training and capacity building with enhancement of the skills of individual construction workers;
- Local procurement for building materials, goods and services (including catering and security);
- Communal land ownership does add a layer of complexity to the raising of project funding, but there are systems and procedures to deal with this matter.

During the operational phase the following impacts and issues are anticipated:

- Contribution to the generation of “green energy” which could reduce South Africa’s dependency on coal generated energy and the impact of such energy sources on the bio-physical environment;
- Positive marketing of Greater Letaba Municipality as an attractive area for renewable energy investments;
- Employment opportunities for the benefit of unemployed individuals within local communities, also in compliance with the Government’s new “green economy” growth path;
- Skills development and capacity building during the life of the facility;
- Local procurement for operational materials, goods and services (catering and security) and for maintenance work by local sub-contractors;
- The presence of permanent security personnel may be beneficial to the overall safety and security situation in the area;
- A reduction in the unit cost of electricity;
- Access to municipal services could be complicated as a result of communal land ownership and large differentials in service levels between the project and surrounding communities may cause dissatisfaction.

10.6.6 VISUAL ASPECTS (APPENDIX L)

From the analysis in the Visual Impact Assessment (VIA) it is indicates that substantial to moderate results only occur for a select group of Visually Sensitive Receivers (VSRs). The most critical concerns, with a substantial value, are the settlements at Ga-Ramaroka, which is situated adjacent to the development site to the south west, and travellers on the footpaths from Ga-Ramaroka.

Connecting roads to Ga-Ramaroka as well as subsistence farming in the area will be moderately affected.

Travellers on the secondary road running through the area will be moderately affected.

Residences at Mohlabeng will also be moderately affected.

The visual relevance of the proposed substation buildings is considerably less. The buildings would moderately affect only the travellers in the area, namely, those on the secondary road, travellers on the Ga-Ramaroka footpaths and travellers on the Ga-Ramaroka connecting roads.

Most visual concerns emanate from Ga-Ramaroka, its surrounding activities and travellers into and out of this settlement.

The photo-simulations included in the VIA illustrate the proposal set within the receiving landscape. Simulation 1 from the Secondary Road shows an exposed view where much of the site can be seen. Simulation 2 from the R81 main road is mostly obscured by local ridges, housing settlements and vegetation.

Security lighting would only be activated upon illegal entry to the site.

From the report it can be concluded that the significance of the impact from the buildings would be negative-medium for Residential and Business VSRs during construction phase.

During operational phase it would be negative medium - high for all VSRs.

No Open Space users have been identified for this project. Night time impact will be insubstantial due to the low level of operational lighting (when following the proposed mitigation measures for lighting) and the fact that security lighting would only be activated upon illegal entry of the site.

10.6.7 AIR QUALITY AND NOISE

The construction phase of the development will entail large earthmoving equipment to clear and level the area for the installation of the solar panels as well as for drilling holes for the installation of the supports for the panels. The generation of dust, exhaust emissions and noise from the equipment and vehicles will be evident in the construction period. During the operational phase of the development the development will basically be dustless and noiseless as is the nature of solar photovoltaic power generation.

10.6.8 HERITAGE RESOURCES (APPENDIX H)

A Heritage Impact Assessment was conducted by Mr. Neels Kruger of Exigo3 and during a site visit some archaeological sites were encountered. It is documented in the report included in Appendix H. The site lay out plan had to be amended to take these findings into consideration.

Two occurrences of undecorated Iron Age farmer period ceramics as well as several stone structures occur within the proposed development area. The occurrences are of low heritage significance due to the absence of diagnostic pottery and general loss of site context, as well as the relatively recent age of stone structures. Potential impact on the resources is expected to be LOW, provided that no previously undetected heritage remains of significance will be exposed during construction and development phases. This impact rating can be limited to a NEGLIBLE impact by the implementation of mitigation measures (site monitoring) for the sites, if / when required.

Probable Iron Age Farmer Period stone wall structures and specifically grain bin stands, a surface and probable subsurface occurrence of decorated and undecorated Iron Age farmer period ceramics, the remains of a probable Iron Age / early Historical Period occupation site as well as a further occurrence of grain bin stands are all of medium significance.
The sites occur within the proposed Bolobedu Solar Park development site. As such, the potential impact is expected to be MEDIUM, but this rating can be lessened to a LOW impact by the implementation of mitigation measures.

An informal cemetery of high significance is situated within the proposed development site. This potential impact on the site is expected to be HIGH but the threshold of the potential impact can be limited to a NEGLIBLE impact by the implementation of mitigation measures (avoidance, site management, monitoring, grave relocation) for the sites, if / when required. It was found that sensitive and significance heritage resources occur inside the Bolobedu Solar Park development site and the mitigation and management of some of these resources are required for the duration of the development. The proposed Bolobedu Solar Park Project may proceed from a culture resources management perspective, provided that mitigation measures are implemented.

A phase 2 assessment had to be done. The archaeologist has been to site and some work was done. Again, the local community prevented the archaeologist to conclude his work. His report details the results of a limited Phase 2 Heritage Site Assessment for the proposed Bolobedu Solar Park Project in the Limpopo Province. This further phase of assessment emanated from recommendations made in the Phase 1 AIA conducted in 2016, regarding Later Iron Age sites within the Bolobedu Solar Park footprint. All data captured for this study (maps, 2D and 3D aerial renderings, GPS tracks and photographs) will be submitted to the South African Heritage Resources Agency (SAHRA) in order to establish a permanent archive for available data on the archaeology of Bolobedu.
Upon completion of this Limited Phase 2 Assessment, it is important to note that

- The spatial extent and spatial definitions of the Bolobedu horizon has been captured and documented.
- Sub-surface sampling by means of exuviations and material culture analysis needs to be concluded in order to establish an occupation sequence, cultural context, temporality and site function for the Bolobedu sites.

Considering the localised nature of heritage remains, ongoing monitoring of the development progress at Bolobedu by an ECO or by the heritage specialist is recommended. Should any subsurface palaeontological, archaeological or historical material, or burials be exposed during construction activities, activities in the vicinity of the heritage receptor should be suspended and the archaeological specialist should be notified immediately. Since the intrinsic heritage and social value of graves and cemeteries are highly significant, these resources require special management measures. Should human remains be discovered at any stage, these should be reported to the Heritage Specialist and relevant authorities (SAHRA) and development activities should be suspended until the site has been inspected by the Specialist. The Specialist will advise on further management actions and possible relocation of human remains in accordance with the Human Tissue Act (Act 65 of 1983 as amended), the Removal of Graves and Dead Bodies Ordinance (Ordinance no. 7 of 1925), the National Heritage Resources Act (Act no. 25 of 1999) and any local and regional provisions, laws and by-laws pertaining to human remains. See reports and letters from SAHRA in Appendix H.

10.6.9 CLIMATE

The climate for the region can be described as warm-temperate. The Giyani area which is near to the project site normally receives about 421mm of rain per year, with most rainfall occurring mainly during mid-summer. The area receives the lowest rainfall (0mm) in June and the highest (93mm) in January. The monthly distribution of average daily maximum temperatures shows that the average midday temperatures for Giyani range from 23.9°C in June to 31°C in January. The region is the coldest during July when the mercury drops to 8°C on average during the night.

10.6.10 TOPOGRAPHY AND DRAINAGE

The project area is characterised by slightly undulating to flat plains with two major drainage channels bisecting the area. The topography across the site is slightly undulating with the average elevation of 580 mamsl.

The site is located within the B81G quaternary catchment and is situated in the Letaba / Levuhu Water Management Area. Drainage occurs as sheet-wash towards the major rivers.

10.7 IMPACTS AND RISKS IDENTIFIED

The environmental impacts associated with a PV Solar Park include mainly the following potential impacts:

- Visual impact
- Impact on biodiversity (including the potential loss of plant life and animals)
- Impact on soils (mainly in terms of soil erosion)
- Impact on water resources in terms of water quantity and water quality
- Impact on agricultural resources which will no longer be available.
- Potential impact on heritage resources and potential occurrences of graves as this is a rural, undeveloped area.
- Potential impacts on river systems, drainage channels and wetlands.
- Socio-economic impacts, which is probably very positive as the development site is located in an area with a high unemployment rate and very low-income households.

Potential impacts identified include:

CONSTRUCTION PHASE:

- **Visual impacts.**
  - Extent: Locally at the proposed site (adjacent Ga-Ramaroka village)
  - Duration: Duration of construction phase (8-15 Months)
  - Probability: Definite
  - *Significance: Medium-High*

- **Impacts Biodiversity;**
  - Extent: Locally at the proposed site (Bolobedu 1024 LT).
  - Duration: Duration of construction phase (8-15 Months)
  - Probability: Likely
  - *Significance: Low-Medium*

- **Geological, soil and erosion impacts;**
  - Extent: Locally at the proposed site
  - Duration: Duration of construction phase (8-15 Months)
  - Probability: Likely
  - *Significance: Low-Medium*

- **Impacts on ground water;**
  - Extent: Surrounding and adjacent land (B81G Quaternary Catchment)
  - Duration: Duration of construction phase (8-15 Months)
  - Probability: Unlikely
  - *Significance: Low*

- **Impacts on agricultural potential;**
  - Extent: Surrounding villagers being allowed to do subsistence farming.
  - Duration: Duration of construction phase (8-15 Months)
  - Probability: Definite
  - *Significance: Medium-High* (subsistence farmers will be compensated)

- **Impacts on heritage resources;**
  - Extent: Locally at the proposed site
  - Duration: Duration of construction phase (8-15 Months)
  - Probability: Unlikely
  - *Significance: Low* (with mitigation *i.e.* avoidance)

- **Impacts on drainage areas;**
  - Extent: Surrounding and adjacent land (B81G Quaternary Catchment)
  - Duration: Duration of construction phase (8-15 Months)
  - Probability: Unlikely
  - *Significance: Low* (Mitigation – avoidance)

- **Social impacts;**
  - Extent: Regional & Locally
  - Duration: Duration of construction phase (8-15 Months)
  - Probability: High
  - *Significance: High - Positive*

- **Impacts on the road system and traffic;**
  - Extent: Surrounding and adjacent land
  - Duration: Construction Phase (8-15 Months)
  - Probability: Likely
  - *Significance: Low-Medium* (temporary impact)

- **Impacts on air quality and potential emissions;**
  - Extent: Regional
  - Duration: Construction Phase (8-15 Months)
  - Probability: Unlikely
  - *Significance: Low-Medium* (temporary impact)

- **Noise impacts;**
  - Extent: Locally at the proposed site
  - Duration: Construction Phase (8-15 Months)
  - Probability: Likely
  - *Significance: Low-Medium* (temporary impact)

OPERATIONAL PHASE:

- **Visual impacts.**
  - Extent: Locally at the proposed site (adjacent Ga-Ramaroka village)
  - Duration: Life of the project (between 25 – 30 years)
  - Probability: Definite
  - *Significance: Medium-High*

- **Impacts Biodiversity;**
  - Extent: Locally at the proposed site (Bolobedu 1024 LT).
  - Duration: Life of the project (between 25 – 30 years)
  - Probability: Unlikely
  - *Significance: Low-Medium*

- **Geological, soil and erosion impacts;**
  - Extent: Locally at the proposed site
  - Duration: Life of the project (between 25 – 30 years)
  - Probability: Unlikely
  - *Significance: Low*

- **Impacts on ground water;**
  - Extent: Surrounding and adjacent land (B81G Quaternary Catchment)
  - Duration: Life of the project (between 25 – 30 years)
  - Probability: Unlikely
  - *Significance: Low*

- **Impacts on agricultural potential;**
  - Extent: Surrounding villagers being allowed to do subsistence farming.
  - Duration: Life of the project (between 25 – 30 years)
  - Probability: Definite
  - *Significance: Medium* (subsistence farmers will be compensated)

- **Impacts on heritage resources;**
  - Extent: Locally at the proposed site
  - Duration: Life of the project (between 25 – 30 years)
  - Probability: Unlikely
  - *Significance: Low* (with mitigation *i.e.* avoidance)

- **Impacts on drainage areas;**
  - Extent: Surrounding and adjacent land (B81G Quaternary Catchment)
  - Duration: Life of the project (between 25 – 30 years)
  - Probability: Unlikely
  - *Significance: Low* (Mitigation – avoidance)

- **Social impacts;**
  - Extent: Regional & Locally
  - Duration: Life of the project (between 25 – 30 years)
  - Probability: High
  - *Significance: High - Positive*

10.7.1 DEGREE TO WHICH THE IMPACTS CAN BE REVERSED

- The visual impact is resident for a long time (25-30 years). It can be reversed during decommissioning and rehabilitation of the area.
- Biodiversity impacts can be reversed at the decommissioning stage of the development. Plants can be replanted, and animals will return to the project area.
- Impacts on soil (erosion) can be reversed by careful handling of storm water on site.
- Impacts on water quality and quantity can be reversed at the decommissioning stage.
- Agricultural resources will again become available after decommissioning of the facility.
- Impacts on Heritage resources could be permanent without mitigation.
- The potential impacts on river systems, drainage channels and wetlands will be minimal. Impacts on these resources can be reversed successfully.
- Socio-economic impacts can be reversed at the decommissioning phase, though this will have a nett negative effect on the area.

10.7.2 DEGREE TO WHICH THE IMPACTS MAY CAUSE IRREPLACEBLE LOSS OF RESOURCES

The only impact which can cause an irreplaceable loss of resources is an impact on the heritage resources where heritage sources are destroyed. This should not happen as the heritage resources are well surveyed and protected from development impacts.

10.7.3 DEGREE TO WHICH THE IMPACTS CAN BE AVOIDED, MANAGED OR MITIGATED

It is not possible to completely avoid the impacts from the development on the environment. By following the mitigation and management measures detailed in the impact section in this report, most of the impacts and the effects it can have on the environment can be successfully lowered to a lower degree of significance to the environment. This is to a point where the impacts are acceptable and where the benefits of the development are greater than the detriment to the environment.

10.8 METHODOLOGY USED IN RANKING THE NATURE, SIGNIFICANCE, CONSEQUENCES, EXTENT, DURATION AND PROBABILITY OF POTENTIAL IMPACTS AND RISKS ASSOCIATED WITH THE ALTERNATIVES

To assess the impacts on the environment, the process will be divided into two main phases namely the Construction phase and the Operational phase. The activities, products and services present in these two phases will be studied to identify and predict all possible impacts.

In any process of identifying and recognising impacts, one must recognise that the determination of impact significance is inherently an anthropocentric concept. Duinker and Beanlands, (1986) in DEAT 2002. Thompson (1988), (1990) in DEAT 2002 stated that the significance of an impact is an expression of the cost or value of an impact to society.

However, the tendency is always towards a system of quantifying the significance of the impacts so that it is a true representation of the existing situation on site. This will be done by using where ever possible, legal and scientific standards which are applicable

The significance of the aspects/impacts of the process will be rated by using a matrix derived from Plomp (2004) and adapted to some extent to fit this process. These matrixes use the consequence and the likelihood of the different aspects and associated impacts to determine the significance of the impacts.

The consequence matrix uses parameters like severity, duration and extent of impact as well as compliance to standards. Values of 1-5 are assigned to the parameters that are added and averaged to determine the overall consequence. The same process is followed with the likelihood that consists of two parameters namely frequency and probability. The overall consequence and the overall likelihood are then multiplied to give values ranging from 1 to 25. These values as shown in the following table are then used to rank the significance. It must be said however that in the end, a subjective judging of an impact can still be done, but the reasons for doing so must be qualified.

Significance ratings (Plomp 2004)

Significance	Low -	Low-Medium -	Medium -	Medium-High -	High -
Overall Consequence X Overall Likelihood	1-4.9	5-9.9	10-14.9	15-19.9	20-25

Significance	Low +	Low-Medium +	Medium +	Medium-High +	High +
Overall Consequence X Overall Likelihood	1-4.9	5-9.9	10-14.9	15-19.9	20-25

Description of the parameters used in the matrixes

Severity:

Low	Low cost/high potential to mitigate. Impacts easily reversible, non-harmful insignificant change/deterioration or disturbance to natural environments
Low-medium	Low cost to mitigate Small/ potentially harmful Moderate change/deterioration or disturbance to natural environment.
Medium	Substantial cost to mitigate. Potential to mitigate and potential to reverse impact. Harmful Significant change/ deterioration or disturbance to natural environment
Medium-high	High cost to mitigate. Possible to mitigate Great/Very Harmful Very significant change/deterioration or disturbance to natural environment
High	Prohibitive cost to mitigate. Little or no mechanism to mitigate. Irreversible. Extremely Harmful Disastrous change/deterioration or disturbance to natural environment

Duration:

Low	Up to one month
Low-medium	One month to three months
Medium	Three months to one year
Medium-high	One to ten years
High	Beyond ten years

Extent:

Low	Within footprint area
Low-medium	Whole of site
Medium	Adjacent properties
Medium-high	Communities around site area
High	Greater Letaba Municipality area

Frequency:

Low	Once/more a year or once/more during operation
Low-medium	Once/more in 6 months
Medium	Once/more a month
Medium-high	Once/more a week
High	Daily

Probability:

Low	Almost never/almost impossible
Low-medium	Very seldom/highly unlikely
Medium	Infrequent/unlikely/seldom
Medium-high	Often/Regularly/Likely/Possible
High	Daily/Highly likely/definitely

Compliance:

Low	Best Practise
Low-medium	Compliance
Medium	Non-compliance/conformance to policies etc. - internal
Medium-high	Non-compliance/conformance to legislation etc. - external
High	Directive, prosecution of closure or potential for non-renewal of licences or rights

10.9 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 DEA in terms of the Environmental Impact Assessment. These criteria include:

Table 3: 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's 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 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 The likelihood of impacts occurring. Impact may occur for any length of time during the life cycle of 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 prevention plans, and there can only be relied on mitigation actions or contingency plans to contain the effect.
Determination of significance.	**No**	The impact is not substantial and does not require any

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.	**significance**	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, was adopted. The principles of the 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 social costs of developments 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.

10.10 POSITIVE AND NEGATIVE IMPACTS THAT THE PROPOSED ACTIVITY AND ALTERNATIVES WILL HAVE ON THE ENVIRONMENT AND THE COMMUNITY

- The positive impact that the development will have on the environment and community is a Socio-economic impact. It will create *temporary jobs* in the construction phase as well as up to 38 permanent jobs during the operational phase in an area with a severe shortage of employment. In this way it will help to alleviate poverty in the area.
- The *generation of electricity* with photovoltaic cells will help to reduce the pressure on the electrical system in the country with far fewer negative impacts on the natural resources of the area than in the case of power generation using other sources like coal, gas, water and nuclear energy.
- In the operational phase it will have a negative impact on the *visual environment, water quantity, water quality, soils and on the ecology and biodiversity* in the area of the solar facility.

10.11 POSSIBLE MITIGATION MEASURES AND RESIDUAL RISK

- To mitigate the visual impact, screening of the facility can be done with vegetation

- Panels must be washed with methods that can save on water use. Employees living/sleeping at the site must be educated on the saving of water.
- Water used for domestic purposes (sanitation) must be treated before release to comply with standards for effluent release.
- The storm water must be managed so that erosion is not caused on the site
- Domestic waste must be removed from the site on a regular basis not to impact on the soils or water bodies in the area.
- The least sensitive area is selected for the facility staying out of the drainage lines and having the smallest impact on the ecology

10.12 MOTIVATION FOR NOT INVESTIGATING ALTERNATIVES

Three different site lay out plans and development footprint areas were investigated, giving rise to three different alternatives.

10.13 CONCLUDING STATEMENT INDICATING THE PREFERRED ALTERNATIVE AND LOCATION OF THE ACTIVITY

The preferred alternative was selected based on the fact that it will have the smallest impact on the environment having been located on the least sensitive area, avoiding the sensitive drainage areas, potentially sensitive heritage sites and excluding an access road that's been used by the local communities for years. The negative impacts can be effectively mitigated and managed to reduce the negative effect the impacts would have on the environment, so that the development with the positive effect of the socio-economic impact will have a positive effect on the environment that would offset the negative effects of the development.

The location of the preferred alternative is based primarily on the location of the Bolobedu substation as well as an agreement with the local communities on the proposed use of the land for a solar park. The actual footprint area is based on the results obtained from the specialists.

The community resolution, which is to be signed by the communities, that has jurisdiction in the area, under the Modjadji Traditional Authority, with the assistance of the Department of Rural Development and Land Reform, will be instrumental in the final decisions to be made in terms of the final lay out plan of the Bolobedu Solar Park.

11 DESCRIPTION OF THE PROPOSED PROCESS TO IDENTIFY AND RANK THE ENVIRONMENTAL IMPACTS THAT THE ACTIVITY, ASSOCIATED STRUCTURES AND INFRASTRUCTURE WILL IMPOSE ON THE PREFERRED LOCATION THROUGH THE LIFE OF THE ACITIVITY

An environmental impact is defined as a change in the environment, be it the physical/chemical, biological, cultural and or socio-economic environment. Any impact can be related to certain aspects of human activities in this environment and this impact can be either positive or negative. It could also affect the environment directly or indirectly and the effect of it can be cumulative.

11.1 DESCRIPTION OF ENVIRONMENTAL ISSUES AND RISKS IDENTIFIED DURING THE EIA PROCESS

The potential aspects to assess during the EIA process may include:

- Soils & agricultural potential;
- Ground water aspects;
- Road system and traffic aspects;
- Air quality and potential emissions aspects;
- Geology, soils and erosion;
- Avifauna aspects;
- Vegetation aspects;
- Heritage resources aspects;
- Noise aspects;
- Socio-economic aspects;
- Visual aspects.

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;
- Social impacts;
- Visual impacts.

The following possible Key environmental impacts were identified:

ENVIRONMENTAL ISSUES	POSSIBLE CAUSE	POTENTIAL IMPACTS
Air Pollution and noise		
Dust	• Construction machines and vehicles during clearing and construction of the croplands	• Health problems • Air pollution • Public nuisance
Emissions	• During operation of construction equipment. • Spraying of insecticides and herbicides during operation • During veld fires	
Noise	• Construction noise • Farming activities during operational phase	
Water quality		
Pollution of water sources Pollution by *E.coli*	• Spillages of fuel & oil from vehicles during construction • Pollution from solid general waste if not removed regularly • By using insecticides and herbicides • Poorly planned and managed sanitation facilities	• Pollution of surface and groundwater • Health risk • Lower water quality • Soil degradation • Siltation of aquatic system
Silt deposition in surface water drainage lines	• Erosion from area during run-off (Rain)	
Water quantity		
Impact on amount of water resources available Over use of water allocation	• Use of water during construction of the PV solar facility • Water use during operation • Pumping of more water than the system can deliver	• Loss of a scarce resource • Increased pressure on water supply sources • Drop of water table
Land/Soil degradation		

ENVIRONMENTAL ISSUES	POSSIBLE CAUSE	POTENTIAL IMPACTS
Soil contamination and degradation	• Spillages of oil, chemicals from machinery and vehicles during construction • Site clearing during construction • Use of Pesticides and Fertilizers • Loss of Agricultural potential of soil • Erosion if storm water is not correctly managed	• Pollution of soil • Soil degradation • Loss of topsoil • Effect soil characteristics, ecology & groundwater • Loss of topsoil
Biodiversity		
Decline in fauna and flora diversity	• Clearing of site for construction • Loss of habitat due to construction of panels • Power lines to sub station	• Loss of biodiversity • Loss of habitat • Negative impact on biodiversity • Negative impact on rare / endangered/ endemic species and habitats • Animal deaths.
Cultural/Heritage		
Possible loss of heritage sites	• Damage during construction or operation	• Possible loss of cultural heritage sites and graves
Visual impact		
Change in the visual characteristics of the site	• Clearing of vegetation for panels • Presence of Solar facility	• Visual intrusion
Socio-economic impacts		
Job creation	• Increase in temporary and permanent work opportunities during the construction and operational phases. • Loss of land available for substance farming without fair compensation.	• Socio- economic benefit

11.3 IMPACTS & MITIGATION MEASURES OF CONSTRUCTION & OPERATIONAL PHASES

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 the responsibility of Eskom or of the developer.

11.3.1 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	Medium	Medium-high	Medium-high	Low-medium	Medium
	Vehicle movement	Air pollution: Smoke	Low	Medium-high	Low-medium	Medium-high	Medium-high	Low	Low-Medium
	Vehicle movement	Air pollution: Dust	Low	Medium-high	Low-medium	Medium-high	Medium-high	Low	Low-Medium
	Vehicle movement	Noise pollution	Low-medium	Medium-high	Low-medium	Medium-high	Medium	Low	Low-Medium
	Burning of cleared vegetation, solid waste & veld fires	Air pollution by excessive smoke	Low-medium	Medium-high	Medium	Low-Medium	Medium	Low	Low-Medium
	Cooking fires of workers	Air pollution: Smoke	Low	Medium-high	Low-medium	Low-Medium	Medium	Low	Low-Medium
Operation	Vehicle movement	Noise pollution	Low	High	Low-medium	Medium-Low	Medium-Low	Low-medium	Medium
	Fire places and veldt fires	Air pollution caused by smoke	Low-medium	High	Low-medium	Low-medium	Low-medium	Low	Low-Medium
	Burning of vegetation refuse and solid waste	Air pollution by excessive smoke	Low-medium	High	Low-medium	Low-Medium	Low-medium	Low	Low-Medium
Cumulative impacts	Pollution & Noise	Increase in release of smoke and increase in noise levels	Low	High	Low-medium	Medium	Medium	Low	Low-Medium

Mitigation measures - Construction Phase

- Vehicles must be well serviced so that it does not produce excessive smoke and noise.
- Speed of construction vehicles should be kept as low as possible to reduce generation of dust and noise.
- Construction areas must be damped/treated 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.
- 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 must be stock-piled and should be removed at regular intervals and be distributed amongst the local community members.

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 may 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 underneath the panels must be kept short
- Vegetation refuse should be composted if possible and re-used.

11.3.2 GROUNDWATER AND SURFACE WATER POLLUTION

Construction Phase

- Lack of sanitation facilities 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.
- Soil cover and vegetation is removed and storm water in the area can cause erosion and siltation of watercourses. Road construction will increase a possibility of erosion and siltation/sedimentation of surface water streams, because of increased storm water run-off.
- The drainage lines on the northern and southern sides of the site could be impacted on.

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	Low-Medium	Medium-high	Medium	Medium	Medium-high	Low	Medium
	Spillage of fuel and fuel tanks	Water Pollution	Low-Medium	Medium-high	Medium	Medium	Medium-high	Low	Medium
	Clearing of vegetation	Erosion & siltation of streams	Medium	Medium-high	Medium	Low-Medium	Medium-high	Low-medium	Medium
	Solid waste disposal freshwater resources	Pollution of freshwater resources	Low	Medium-high	Medium	Medium	Medium	Low-medium	Low-Medium
	Sanitation seepage from chemical toiletsand/or from the temporary sanitation system	Water Pollution	Medium	Medium-high	Low-medium	Low-medium	Medium	Low	Low-Medium
Operation	Spillage of fuel and lubricants from vehicles	Water Pollution	Low-Medium	High	Low-medium	Medium-high	Medium-high	Low-medium	Medium
	Solid waste disposal- freshwater resources	Water Pollution	Low	High	Low-medium	Low-Medium	Low-medium	Low	Low-Medium
	Leakage from the permanent Sanitation system	Water Pollution	Medium-high	High	Low-Medium	Low	Low-Medium	Low-medium	Medium
	Use of fertilizers, insecticides and herbicides	Pollution of streams & rivers	Low-Medium	High	Medium	Low	Medium	Low	Low-Medium
	Storm water runoff	Erosion & siltation of streams	Low-medium	High	Medium	Low-medium	Medium-high	Low	Medium
Cumulative impacts	Water pollution and increased water run-off	Increased potential for water pollution and increased water run-off	Low-Medium	High	Medium	Low-Medium	Medium	Low	Low-Medium

Mitigation measures - construction phase

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

- Clearance of vegetation should be restricted to footprint area and access road.
- Construction activities should be restricted to the proposed footprint area.
- The areas along the drainage lines must be cordoned off and avoided and the 50m buffer zone should be honoured.
- The buffer zone around the drainage lines should be considered complete no-go zones.
- Cleared areas should be rehabilitated by reintroducing a grass layer to limit soil erosion.
- Berms to limit water flow over cleared areas, to limit erosion and siltation of streams.
- 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 30 000 litres at construction camps. Diesel tanks and other harmful chemicals and oils must be within a bunded area. Any water from out of this bunding must flow through an oil/water skimmer.
- The vehicle maintenance yard and construction storage area should be placed 100m away from watercourses. The area should have bund walls and lined with impermeable material to prevent ground and surface water pollution.
- Chemical / temporary sanitation facilities at construction to be regularly serviced by appropriate companies to ensure no spills or leaks to surface and groundwater. Chemical / temporary sanitation systems should not be placed within 100m from any watercourse.
- Solid waste must be kept in adequate waste bins. Building/construction rubble and various waste products should be removed on a regular basis to a licensed landfill site.
- If all possible soil pollution is restricted and prevented, there would be no cumulative impacts as a result of the establishment of the Bolobedu Solar Park.

Mitigation measures - operational phase

- Solid waste must be kept in adequate waste bins and removed on a weekly basis to a waste disposal site.
- The use of eco-friendly products e.g. Organic Compost, herbicides and insecticides should be promoted.
- A permanent closed, sewage treatment system to treat effluent to the required standards of the DWS must be installed at the solar facility.
- The permanent sanitation system should be regularly inspected to ensure that no spills or leaks from sanitation system to groundwater take place.
- All possible pollution can be prevented and therefore there would be no cumulative impacts where water pollution is concerned.

11.3.3 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 construction. The water needed for the construction activities will be provided from a new on-site borehole.

Operational phase

Water use will be limited except for short periods when the PV modules are cleaned. The water needed for the operational phase will be provided from a new on-site borehole.

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	Low-medium	High	Low-Medium	Medium
Cumulative impacts	Water use	Increased pressure on local water resources	Medium	High	Medium-high	Low-Medium	Medium	Low-Medium	Medium

Mitigation measures – Construction Phase

- 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 for dust suppression.
- 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 is be treated through an osmotic water filtration system.

Mitigation measures - Operational Phase

- Cleaning of panels should be done only when necessary, twice per year.
- Roads should be treated with chemicals to lower the use of water for dust suppression.
- 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 staff on-site to be treated by an osmotic water filtration system.

11.3.4 LAND AND SOILS

Planning phase

The areas around the drainage lines in the north and the south of the site must remain undeveloped - in compliance with the requirements highlighted in the Wetland Delineation Study (Appendix G).

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 or tanks	Contaminate soil	Low-medium	Medium-high	Low	Medium	Medium-high	Low	Low-Medium
	Spilling of chemicals/se-wage	Contaminate soil	Low-medium	Medium-high	Low	Medium	Medium-high	Low	Low-Medium
	Solid waste disposal	Soil pollution & nuisance	Low	Medium-high	Low-medium	Medium-high	Medium-high	Low	Low-Medium
	Storm water over roads and cleared areas	Erosion	Low-medium	Medium-high	Low-medium	Low-Medium	Medium-high	Low	Low-Medium

Project Phase	Impact: Land and soils								
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
	Trenches for electric cables and water and sewerage pipes	Erosion	Low-Medium	Medium-high	Low	Low-Medium	Medium	Low	Low-Medium
	Moving of equipment over soils	Compaction of soils	Low-Medium	Medium-high	Low-Medium	High	Medium-high	Low-Medium	Medium
	Using land for solar facility	Sterilising of high potential soil	Medium	Medium-high	Low-Medium	High	Medium	Low-Medium	Medium
Operation	Solid waste	Soil pollution + nuisance	Low	High	Low-Medium	Low-Medium	Medium	Low	Low-Medium
	Storm water from paved areas and roofs	Erosion	Low-medium	High	Low-medium	Low-Medium	Medium	Low	Low-Medium
	Storm water over roads and cleared areas	Erosion	Medium	Medium-high	Low-medium	Low-Medium	Medium-high	Low	Low-Medium
	Use of fertilizers, insecticides and herbicides	Pollution	Low-Medium	High	Medium	Low-Medium	Medium	Low	Low-Medium
Cumulative impacts	Increased potential for negative impacts on soil resource	Increased potential for erosion and soil pollution	Medium	High	Low-medium	Low-Medium	Medium-high	Low	Medium

Mitigation measures - Construction Phase

- Clearance of vegetation should be restricted to the footprint area and access road.
- Construction activities should be restricted to the proposed development footprint.
- 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 30 000 litres at construction camp. Diesel tanks and other harmful chemicals and oils must be within a bunded area and water from this bunding must be channelled through an oil/water separator.
- Solid waste must be kept in containers and disposed of regularly at licensed dumping site.
- Building rubble must be removed to a licensed disposal site regularly 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.
- Soil should be handled when dry, to reduce compaction risk.
- During construction, sensitive soils with high risk of compaction (e.g. clayey soils) must be avoided by construction vehicles and equipment, wherever possible, in order to reduce potential impacts
- Institute a storm water management plan including temporary and permanent erosion control plans.
- Minimise bare areas-revegetate as soon as possible to prevent soil erosion

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 and should only be used according to the specifications
- Revegetate bare areas to minimise soil pollution during wind- and rain storms.

11.3.5 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 other archaeological, previously undetected, features of importance, which must be left and reported to the archaeological consultant for comments and actions.

Operational phase

The operational phase will not have any negative impact on the archaeological features of the site, if the recommendations of the Heritage Impact Assessment (Appendix H) are strictly 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	Medium-high
Operation	Operational activities of development	Destroy archaeological evidence and heritage and graves	Low-medium	High	Low	Low	Low-medium	Low	Medium-high
Cumulative impacts	Activities on site during construction and operational	Increase in potential to unearth archaeological evidence and graves	Low-medium	High	Low	Low	Low-medium	Low	Medium-high

Mitigation measures – Construction and operational phases

The heritage sites identified and indicated on the site lay out plan must be cordoned off and be preserved. There should be no development in these areas and there should be no access to these either.

Care must be taken during the construction process that anything else of archaeological value that is unearthed must be recorded. Please refer to the Heritage Impact Assessment (Appendix H). The archaeologist or SAHRA must be notified whenever anything of importance is discovered.

11.3.6 IMPACT OF THE DEVELOPMENT ON THE ECOLOGY (FAUNA & FLORA) OF THE AREA

Planning and construction phase

The removal of natural vegetation and destruction of habitat will have a negative effect on the biodiversity. The specific mitigation measures included in the Ecological and Avifauna Impact Assessment (Appendix D & E) should be adhered to.

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 use of herbicides to control re-growth at 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
	Functioning of 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 poisoned vermin / 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 natural movement of 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
Cumulative Impacts	Increased potential negative impacts on ecology of the area	Increase in natural vegetation to be removed.	Medium-High	High	Medium-High	Medium-High	Medium	Low	Medium-High

Mitigation measures – Construction phase

- Clearance of vegetation should be restricted to the footprint area and access road.
- Construction activities should be restricted to the proposed development footprint.
- Care must be taken that unnecessary clearance of vegetation does not take place. Where possible, natural vegetation must be retained.
- The riparian habitat along the drainage lines must be cordoned off and access to the areas should be restricted.
- An ecologist should be consulted in order to advise on crossing sites at drainage lines, in order to minimise impacts on riverine vegetation.
- The herbaceous layer should be revived after clearance of the vegetation and actively managed through slashing during the entire lifetime of the project.
- 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.
- No Fires should be allowed 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 distributed to the local communities.

- Solid waste must be kept in adequate animal proof waste bins at the construction camp and construction sites. Building rubble and various wastes should be removed on a regular basis to the closest available landfill site.
- Regular clean-up programs should be put into effect along the access road and throughout the premises to limit the impact of littering caused by construction activities.
- The stockpiled topsoil and construction material should be managed in such a way that the material is not transported by wind or rain. This can be done by restricting the height of the stockpiles, sandbagging and avoiding steep slopes.
- No animals may be killed, captured or hunted on site by construction workers. Do not feed any wild animals on site.
- Where trenches pose a risk to animal safety, they should be adequately cordoned off to prevent animals falling in and being trapped and/or injured. This could be prevented by the constant excavating and backfilling of trenches during construction process.
- Existing game on the developed area will be relocated when the proposed solar park is developed. The relocation of the game will be executed according to the relevant legislation.
- Cumulative impacts on the ecology of the area can be significant. However, with the mitigation measures in place, the potential is very low for significant negative impacts on the ecology of the area.
- The EMPr will have to be adhered to both during the construction as well as operational phases and regular monitoring should be done to ensure that there is sound environmental practice at the Bolobedu Solar Park.

Mitigation measures – Operational phase

- The herbaceous layer should be revived after clearance of the vegetation and actively managed through slashing during the entire lifetime of the project.
- 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.
- The impact on the flying invertebrates will be minimized through the use of sodium vapour (yellow) lights as outside lighting.
- The use of eco-friendly products e.g. Organic Compost and/or Effective Microorganisms (EM), which reduces the frequency of application of conventional fertilizers, herbicides and insecticides, should be promoted.
- The EMPr must be adhered to both during the construction and operational phases and regular monitoring should be done to ensure there is sound environmental practice at the Bolobedu Solar Park.

11.3.7 VISUAL IMPACTS

Construction phase

The natural aesthetic character of the site will be changed. However, the local communities will be informed of the development stages and impacts on them during the construction phase.

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	Medium-High
	Lights	Nuisance	Low	High	Low-medium	Medium-High	High	Low-Medium	Medium
	Electrical lines	Visual	Low	High	Low	High	High	Low-Medium	Low-Medium
Cumulative Impacts	Increased visibility of yet another solar park in the area	Increased visual intrusion and nuisance	Medium-High	Medium	Medium	Low-Medium	High	Low-Medium	Low-Medium

Mitigation measures

- Only the footprint and a small "construction buffer zone" around the proposed components are exposed and the natural occurring vegetation, should be retained.
- Install light fixtures that provide precisely directed illumination to reduce light "spillage" beyond the immediate surrounds of the project site.
- Minimise number of light fixtures to the bare minimum and connecting these lights to motion sensors in order to limit light pollution.
- A video-surveillance system using infrared or microwave video cameras, which do not need a switched-on lighting system, is recommended.
- Cumulative impacts will be low as it was possible to mitigate the visual impact at Bolobedu Solar Park successfully as a result of the natural characteristics of the area.

11.3.8 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 increased fire risk.

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
Cumulative Impacts	Higher number of people in the area increases safety risks	Potential for an increase in criminal activity	High	Medium	Medium -High	Low	Low	Low	Medium

Mitigation measures

- The Contractor shall conform to the 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 or safety netting.
- 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 fire-fighting equipment must be available.
- A fence should be constructed along the boundary of the development.
- The cumulative impacts of this impact can be successfully mitigated if managed properly.

11.3.9 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.
The local communities were identified for the purpose of entering into a partnership for the Project, as required by the rules of the REIPP 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 +
Cumulative impacts	Increased potential for job creation.	Increased potential for local Community development	High +	High +	high +	High +	High +	N/A	High +

Mitigation measures

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

11.4 ASSESSMENT OF POTENTIALLY SIGNIFICANT IMPACTS AND RISKS

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. Damage as a result of storm water
ii. Water consumption and depletion during construction phase.
iii. Loss of heritage resources including a grave site.

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

11.4.1 CUMULATIVE IMPACTS

i. The effect of storm water that is not managed can be severe and can lead to soil erosion and a loss of topsoil.
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. There will not be a cumulative effect unless the site is extended and more significant heritage sites are identified.

11.4.2 NATURE OF IMPACT

i. This can lead to losses of natural resources.
ii. This is a negative impact that affects water quantity available for use in the area.
iii. Damage to archaeological sites and graveyard.

11.4.3 EXTENT AND DURATION OF IMPACT

i. The extent will be within the farm of the proposed development but could also lead to damages further downstream.
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 only on the development area and duration is for the life of the development.

11.4.4 PROBABILITY OF OCCURRENCE

i. The probability is unlikely.
ii. The probability is possible.
iii. The probability is possible.

11.4.5 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. This impact will be irreversible if not managed and preserved.

11.4.6 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, there will be severe soil erosion and loss of topsoil.
ii. The recovery of the water resource is linked to rainfall and will recover accordingly. The negative impact is during the construction period.
iii. If this impact is allowed to occur, it will lead to an irreplaceable loss of a resource including archaeological resources as well as a grave site.

11.4.7 DEGREE TO WHICH IMPACT CAN BE MITIGATED

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

12 SUMMARY AND FINDINGS AND RECOMMENDATIONS OF SPECIALIST REPORTS AND HOW THESE FINDINGS HAVE BEEN INCLUDED IN THE FINAL ASSESSMENT REPORT

The main issues identified as a result of the specialist studies include the following:

- Archaeological significant sites
- Protected trees and plants on site
- Drainage features
- Agricultural land availability

- Archaeological significant sites

The archaeological significant sites were identified and demarcated. Sufficient buffer zones were included and was included in the site lay out plan. These areas are to be avoided completely both during the construction and operational phases and are regarded as no-go zones.

- Protected trees and plants on site

Protected trees were found and identified on the development site. Permit applications will be submitted to the Department of Agriculture, Forestry and Fisheries for the removal of these trees. In a solar park there is no possibility of the occurrence of trees as there should be no shade in/at a solar park.

The protected plants that were identified in terms of LEMA must be protected. These occur within the riparian veld and in the buffer zone along the drainage lines. Therefore, these protected plants must not be removed and/or disturbed.

- Drainage features

All drainage features have been identified and although the ecologist recommended a 30m buffer a 50m buffer was drawn along the drainage lines. This will ensure that there is an even lower impact on these areas. The drainage lines and areas are considered to be no-go areas and is indicated as such on the site lay out plan.

- Agricultural land availability

There is currently substance farming in the area conducted by members of the local communities. As part of the resolution process and social consultation process there will be compensation structure in place, which will be managed and administered by the Modjadji Traditional Council

13 ENVIRONMENTAL IMPACT STATEMENT

13.1 SUMMARY KEY FINDINGS OF THE EIA

It can be concluded that there will be environmental impacts as a result of the proposed development of the Bolobedu Solar Park. However, all the impacts can be mitigated to some extent. Most of the impacts can be avoided and potential impacted areas will be demarcated as no-go areas, therefore limiting the possible negative environmental impacts.

Included in Appendix A are maps indicating all the applicable environmental features and subsequent no-go areas.

14 FINAL PROPOSED ALTERNATIVES RESPONDING TO THE IMPACT MANAGEMENT MEASURES, AVOIDANCE AND MITIGATION MEASURES IDENTIFIED IN THE ASSESSMENT

The preferred alternative (3) was identified after all possible negative impacts were mapped and demarcated as no-go zones.

In order to minimize negative environmental impacts, there are areas that is not available for future developments of any kind. In order to mitigate for most of the negative impacts, avoidance seemed to be the best option.

In terms of the main issues, including:

- Archaeological significant sites - avoidance
- Protected trees and plants on site – permit applications and avoidance
- Drainage features – avoidance
- Agricultural land availability – social consultation with traditional authorities and applicable government department.

16 ASPECTS WHICH WERE CONDITIONAL TO THE FINDINGS OF THE ASSESSMENT BY THE EAP OR SPECIALISTS WHICH ARE TO BE INCLUDE AS CONDITIONS OF AUTHORISATION

- Archaeological significant sites – must be demarcated and avoided.
  An archaeologist should be appointed to assist before construction commences.
- An excavation permit must be obtained from SAHRA before construction commences
- Protected trees and plants on site – permit applications and avoidance
  An ecologist should be appointed to assist with permit applications as well as assistance on site before construction commences.
- Drainage features – should be excluded from the development and be avoided
  A wetland specialist should be appointed to assist on site in demarcating the exact buffer zones.
- Agricultural land availability – social consultation should be followed with traditional authorities and applicable government department departments.

17 ASSUMPTIONS UNCERTAINTIES AND GAPS IN KNOWLEDGE

Community Resolutions have been obtained from all the communities around the proposed development site. This was done with the assistance from the Department of Rural Development and Land Reform. The Modjadji Traditional Authority has been actively involved in discussions, regarding this project. There are now some individuals who are making claims regarding this project and this issue needs to be addressed and an agreement must be reached between the Modjadji Traditional Authority, Renewable Solutions and the small number of individuals who is disrupting this project.

18 UNDERTAKING UNDER OATH OR AFFIRMATION BY THE EAP

I, Engela Grobler, appointed EAP for the proposed Bolobedu Solar Park application for Environmental Authorization, hereby confirm:

- Correctness of the information provided in this report
- All comments and inputs and responses from stakeholders and I&APs are included here.
- All inputs and recommendations from the specialist reports where relevant, are included.

Signed:…… Date…….

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