PROPOSED DEVELOPMENT OF A PHOTO-VOLTAIC SOLAR POWER GENERATION PLANT ON PORTION 6 OF THE FARM KONKOONSIES 91 NEAR POFADDER IN THE NORTHERN CAPE

For:

BioTherm Energy (Pty) Ltd

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

NEAS Reference: DEA/EIA/0000529/2011
DEA EIA reference number: 12/12/20/2443

MAY 2013

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT:
PROPOSED DEVELOPMENT OF A PHOTO-VOLTAIC SOLAR POWER GENERATION PLANT ON PORTION 6 OF THE FARM KONKOONSIES 91 NEAR POFADDER IN THE NORTHERN CAPE

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DEA & LEGAL REQUIREMENTS FOR SOLAR ENERGY FACILITIES: INFORMATION LIST FOR EIA PROJECTS:

1. General Site Information		
No.	**Information**	**Reference/Provided**
1.1	Description of all affected farm portions	Section 2.5, 2.6 & 7.1
1.2	21 Digit Surveyor General Codes of all affected farm portions	Section 2.5
1.3	Copies of deeds of all affected farm portions	Appendix 4
1.4	Photos of areas that give a visual perspective of all parts of the site	Appendix 6 & 7.3
1.5	Photographs from sensitive visual receptors (Tourism routes, tourism facilities, etc.)	Section 7.13 & Appendix 6 & 7.3
1.6	Solar plant design specifications including: • Type of technology • Structure height • Surface area to be covered (including associated infrastructure such as roads. • Structure orientation • Laydown area dimensions (Construction period and thereafter) Generation capacity of the facility as a whole at delivery points	Section 3 & Appendix 3
2. Site maps and GIS information		
No.	**Information**	**Reference/Provided**
2.1	All maps/information layers must also be provided in ESRI Shapefile format	Contained in the CD version of this report
2.2	All affected farm portions must be indicated	Section 2.5 & 7.1
2.3	The exact site of the application must be indicated (The areas that will be occupied by the application)	Figure 10-1 & Appendix 4 (A3)
2.4	A status quo map/layer must be provided that includes the following: Current use of the land on site including:	
	2.4.1 Building and other structures	Figure 7-1 & Figure 7-2
	2.4.2 Agricultural fields	N/A: None
	2.4.3 Grazing areas	Figure 7-1 & Figure 7-2
	2.4.4 Natural vegetation areas (Natural veld not cultivated for the preceding 10 years) with an indication of the vegetation quality as well as fine scale mapping in respect of critical Biodiversity Areas and Ecological Support areas.	Section 7.7, 9.3.2& Appendix 7.1
	2.4.5 Critically endangered and endangered vegetation areas that occur on the site	N/A; None; please refer to section 7.7, 9.3.2 & Appendix 7.1
	2.4.6 Bare Areas which may be susceptible to soil erosion	Section 7.6, 9.3.2, 9.3.6 and Appendix 7.1 & 7.4
	2.4.7 Cultural historical sites and elements	Section 7.15, 9.3.5 and Appendix 7.4

	2.4.8 Rivers, streams and water courses	Section 7.9.2 & 9.3.4
	2.4.9 Ridgeline and 20m continuous contours with height references in the GIS database	See Figure 7-8
	2.4.10 Fountains, boreholes, dams (in-stream as well as off- stream) and reservoirs	Section 7.9.2, 7.11 & 9.3.4
	2.4.11 High potential agricultural areas as defined by the Department of Agriculture, Forestry & Fisheries	N/A the site does not fall within an area which has high agricultural potential as defined by DAFF. Located in a very arid region of southern Africa, refer to Section 7.6 and Appendix 7.5
	2.4.12 Buffer zones (also where it is dictated by elements outside the site): • 500m from any irrigated agricultural land • 1km from residential areas • Indicate isolated residential, tourism facilities on or within 1km of the site	No irrigated agricultural land occurs within 500m of the site, there are no tourism facilities within close proximity to the facility. The closest residential inhabitants reside in the farm house 210 meters south of the study area.
	2.4.13 A slope analysis map/layer that include the following slope ranges: • Less than 8% slope • Between 8% and 12 % slope • Between 12% and 14% slope • Steeper than 18% slope	See section 7.4, Figure 7-6 & Figure 7-7
	2.4.14 A map/layer that indicates locations of birds and bats including roosting and foraging areas	N/A this was not identified as being a significant issue, and due to the nature of PV technology this is not considered to be of concern in this specific project. Please refer to section 7.9.3 & 9.3.2.
2.5	A site development proposal map(s)/layer(s) that indicate:	Sections 10, Figure 10-1 & Appendix 1.
	2.5.1 Position of solar facility	
	2.5.2 Foundation footprint	
	2.5.3 Permanent laydown area footprint	
	2.5.4 Construction period laydown footprint	
	2.5.5 Internal road indicating width (construction period width and operation period width) and with numbered sections between the other site elements which they serve	
	2.5.6 River, stream and water crossing of roads and cables indicating the type of bridging structures that will be used	
	2.5.7 Substation(s) and/transformer(s) sites including their entire footprint	

	2.5.8 Cable routs and trench dimensions (where they are not along the internal roads)	
	2.5.10 Connection routes to the distribution/transmission network	
	2.5.11 Cut and fill areas along roads and at substation/ transformer sites indicating the expected volume of each cut and fill	
	2.5.12 Borrow pits	
	2.5.13 Spoil heaps (Temporary for topsoil & subsoil and permanently for excess material)	
	2.5.14 Building including accommodation	

3. Regional map and GIS information

No.	Information	Reference/Provided
3.1	All maps/information layers must also be provided in ESRI Shape file format	Contained in the CD version of this report
3.2	The map/layer must cover an area of 20 km around the site	Figure 7-1 & Figure 7-2.
3.3	Indicate the following: • Roads including their types (tarred or gravel) • Railway lines and stations • Industrial areas • Harbours and airports • Electricity transmission and distribution lines and substations • Pipelines • Water sources to be utilized during construction and operational phases • Critical Biodiversity areas and Ecological Support area • Critical Endangered and endangered vegetation areas\Agricultural fields • Irrigated areas • An indication of new road or changes and upgrades that must be done to existing roads in order to get equipment onto the site including cut and fill areas and crossings of rivers and streams	Figure 7-1 to Figure 7-18, this should be read in conjunction with Section 7 and Appendices 7.1 – 7.4.

The following amendments and additional information are required for the EIR (DEA FSR Acceptance Letter – 25 January 2013):

No.	Information	Reference/Provided
a)	Details of the future plans for the site and infrastructure after decommissioning in 20-30 years and the possibility of upgrading the proposed infrastructure to more advanced technologies.	Section 3.2.3 as well Appendix 8 (EMPR)
b)	The total footprint of the proposed development should be indicated. Exact locations of the solar energy facility, and associated infrastructure should be mapped at an appropriate scale.	Section 10, Figure 10-1 and Appendix 1

	Should a Water Use License be required, proof of application for a license needs to be submitted.	Please refer to section 3.2.4 & Appendix 3. Please note that it has been determined that there is no requirement for the submission of a WULA from the DWA or DoE for solar PV projects in the bidding phase of the IPP bidding process. The project will mainly source water from the local municipality.
c)	Possible impacts and effects of the development on the agricultural potential of the area	Section 9.3.6
d)	The EIR should include information on the following: • Environmental costs vs. benefits of the solar facility; • Financial implications to tourism in the area; and • Economic viability of the facility to the surrounding area and how the local community would benefit.	Section 7.17, 9.3.7 & 9.3.9. Appendix 11
e)	A copy of the final site layout plan. All available biodiversity information must be used in the finalisation of the layout plan. Existing infrastructure must be used as far as possible (e.g. roads). The layout plan must indicate the following: • PV positions and its associated infrastructure; • Foundation footprint; • Internal roads indicating width (construction period width and operation period width) and with numbered sections between the other site elements which they serve (to make commenting on sections possible); • Wetlands, drainage lines, rivers, streams and water crossing of roads and cables indicating the type of bridging structures that will be used; • The location of heritage sites that will be affected by the facility and associated infrastructure; • Sub-stations and/or transformer sites including their entire footprint; • Connection routes (including pylon positions) to the distribution/transmission network; • All existing infrastructure on the site, especially roads; • Environmental sensitive features and buffer areas. • Buildings, including accommodation; and • All "no-go" areas.	Appendix 1 & 3, Section 10 and Figure 10-1
f)	An environmental sensitivity map indicating environmental sensitive areas and features	Figure 9-2

	identified during the EIA process.	
g)	A map combining the final layout plan superimposed (overlain) on the environmental sensitivity map.	Figure 10-1 & Appendix 1

1. EXECUTIVE SUMMARY

BioTherm Energy (Pty) Ltd is proposing to develop a commercial photo-voltaic (PV) solar power facility on Portion 6 of the farm Konkoonsies 91 approximately 36 km's north- west of the town of Pofadder in the Northern Cape Province. The proposed development will be referred to as the Konkoonsies II PV Solar Energy Facility. The Konkoonsies I solar facility is located within the area assessed as part of the environmental assessment and has recently reached financial close (DEA Ref: 12/12/20/2098/1) and will begin construction so as to reach commercial operations by the end of December 2013.

The proposed project would entail the development of a Photo-voltaic (PV) solar power plant up to 267 hectares in extent with a generation capacity of approximately 133 MW, covering the entire feasible area. The final capacity would be dependent on the continuing development of photovoltaic technologies, as more efficient modules may become available by the time that the project would begin construction. The development footprint can however not exceed 267 hectares; however the generation capacity may vary based on the availability of more efficient PV panels. The IPP Procurement programme currently allows for a maximum export capacity of 75 MW per individual solar PV project that is bid into the Department of Energy's REIPP programme. The available generation capacity allocation issued by Eskom will determine if the site can ultimately be developed in multiple phases.

Maximum Export Capacity (MEC) is by definition the contracted maximum export value (in MW) of an entire generation station in accordance with the generator's connection agreement. On the other hand generation capacity by definition is the maximum output (MW) that generating equipment can supply to system load.

The proposed project would include several, Listed Activities, which may not commence prior to obtaining an Environmental Authorisation in terms of Section 24 of the National Environmental Management Act, 1998 (Act No. 107 of 1998)[NEMA]. An application for Environmental Authorisation, in terms of NEMA, for activities listed in Government Notices R.544 R.545 and R546 of 18 June 2010, was submitted to the CA (DEA), on 17 November 2011, which this authority acknowledged on 23 November 2011(Appendix 2). The reference number 12/12/20/2443 has been issued by DEA for this project.

The EIA was commissioned to determine the available area for construction of the PV facility, taking all environmental aspects into consideration. A site layout plan, integrating all the relative specialists' assessment's was developed (Appendix 1). The plan identifies areas on the site that are considered to be "no go" areas, and where no development should occur.

The Environmental Impact Report presented a comprehensive assessment of the anticipated environmental impacts over the full life-cycle of the proposed Konkoonsies II PV facility on Portion 6 of the farm Konkoonsies 19. Table 1-1 contains a summary of the environmental impact assessment significance rating. The project could potentially result in direct and indirect negative and positive impacts of significance in the absence of appropriate environmental management solutions. The environmental assessment practitioner (EAP) however, believes that appropriate/feasible mitigation is readily available to the proponent that would effectively reduce the significance of potentially negative impacts to within acceptable levels. These impacts and mitigation measures that are assessed as part of this detailed Environmental assessment report (EIR) have been

incorporated into the draft EMPr (Appendix 8). The draft EMPr, once approved by the DEA, will be the Konkoonsies II PV Solar Energy Facility's formal plan to manage the development and associated environment in an appropriate and responsible manner.

Renewable power generation has various social and environmental advantages such as:

- Clean form of energy compared to conventional coal firing methods. PV power generation does not emit any harmful pollutants to the atmosphere.
- The project has global significance as it reduces carbon dioxide released into the atmosphere
- Local communities' skills development, employment creation as well as capacity building benefits gets created by the proposed development in an area of South Africa with limited economic development opportunities

Table 1-1: Tabular Summary of Impact Assessment

Aspect	Impact Significance (No mitigation)	Impact Significance (mitigation)
Construction & Operation		
Fauna & Flora	Moderate (-)	Low (-)
Waste Generation	Low (-)	Low (-)
Ground/Surface water		
• Ground and Surface Water Quality	Moderate (-)	Low (-)
• Surface Water Runoff (During construction & Operation	Low (-)	Negligible (-)
Heritage	Low (-)	Negligible (-)
Soil & Agricultural Potential		
• Impacts on current land capability/land-use	Negligible (-)	Negligible (-)
• impacts in respect of potential for alternative land-use	Negligible (-)	Negligible (-)
Visual	Moderate (-)	Moderate (-)
Traffic	Negligible (-)	Negligible (-)
Socio Economic		
• Negative impacts on Socio Economics (mainly during Construction)	Moderate (-)	Low (-)
• **Positive** Impact on Socio Economics	**Moderate (+)**	**Moderate (+)**

It is the EAP's opinion that the EIA process to date has been undertaken correctly and within the bounds of the applicable regulatory environment. It is, therefore, recommended that the EIA Report be accepted by the Department of Environmental Affairs (DEA). Furthermore, it is the EAP's opinion that the respective applications be viewed favourably by the Competent Authority, provided that the proposed mitigation and conditions put forward in the EIA and associated EMPr are adhered to and made legally binding to the Proponent (i.e. the Project Company to be set up by Biotherm Energy); where the positive project impacts are deemed significant and negative project impacts can be mitigated to the extent that no significant, or residual, environmental damage will result through project approval(s).

The draft Environmental Impact Assessment Report (EIR) has been made available to registered Interested and Affected Parties and other stakeholders for a 40 day review and comment period from 8 April to 20 May 2013. An amendment to the application form is also required and all IAPs will be given an opportunity to comment on this. The availability of the draft EIR will also be advertised in a local newspaper (Refer to Section 6).

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ABBREVIATIONS

AAA: Astronomy Advantage Area
AIA: Archaeological Impact Assessment
AM: After Mitigation
BAT: Best Available Technique
BEP: Best Environmental Practice
BID: Background Information Document
BM: Before Mitigation
BPEO: Best Practicable Environmental Option
BTE: BioTherm Energy
CARA: Conservation of Agricultural Resources Act
CER: Certified Emission Reduction
CO_2: Carbon dioxide
DAFF: Department of Agriculture, Forestry and Fisheries
DEA: Department of Environmental Affairs
DMR: Department of Mineral Resources
DoE: Department of Energy
DWA: Department of Water Affairs
ECO: Environmental Control Officer
DWA: Department of Water Affairs
EAP: Environmental Assessment Practitioner
ECO: Environmental Control Officer
EIA: Environmental Impact Assessment
EIR: Environmental Impact Report
EMPr: Environmental Management Programme report
HIA: Heritage Impact Assessment
IAPs: Interested and Affected Parties
IPP: Independent Power Producer
LED: Local Economic Development
LIA: Late Iron Age
LSA: Late Stone Age
MPRDA: Minerals and Petroleum Resources Development Act
NCDENC: Northern Cape Department of Environment and Nature Conservation
NEMA: National Environmental Management Act, No. 107 of 1998
NEMA EIA Regulations: Regulations GN R.453, R.454, 455 and R.456 (18 June 2010), as amended. Promulgated in terms of Section 24(5) read with Section 44, and Sections 24 and 24D of the National Environmental Management Act, 1998
NHRA: National Heritage Resources Act
NWA: National Water Act (Act No. 36 of 1998)
OES: Ostrich Egg Shell
PES: Present Ecological State
PoSEIA: Plan of Study for EIA
PPP: Public Participation Process
RDL: Red Data Listed
SANBI: South African National Biodiversity Institute
SKA: Square Kilometre Array

SMME: Small, Micro and Macro Enterprise
SR: Scoping Report
TOPS: Threatened Or Protected Species
VIA: Visual Impact Assessment

2. INTRODUCTION

2.1. BACKGROUND

BioTherm Energy (Pty) Ltd is proposing to develop a commercial photo-voltaic (PV) solar power facility on Portion 6 of the farm Konkoonsies 91 approximately 36 km's north- west of the town of Pofadder in the Northern Cape Province. The proposed development will be referred to as the Konkoonsies II PV Solar Energy Facility. The Konkoonsies I solar facility is located within the area assessed as part of the environmental assessment and has recently reached financial close (DEA Ref: 12/12/20/2098/1) and will begin construction so as to reach commercial operations by the end of December 2013.

As one can see from the national solar radiation map (Figure 2-1), the levels of solar radiation in the north-western extent of the Northern Cape are very high (>8001 MJ/m^2/annum). This potential for electricity generation via renewable energy source is significant. The site is located in an area of South Africa very suitable for PV solar power generation.

The proposed project would entail the development of a Photo-voltaic (PV) solar power plant up to 267 hectares in extent with a generation capacity of approximately 133 MW, covering the entire feasible area. The final capacity would be dependent on the continuing development of photovoltaic technologies, as more efficient modules may become available by the time that the project would begin construction. The development footprint can however not exceed 267 hectares; however the generation capacity may vary based on the availability of more efficient PV panels. The IPP Procurement programme currently allows for a maximum export capacity of 75 MW per individual solar PV project that is bid into the Department of Energy's REIPP programme. The available generation capacity allocation issued by Eskom will determine if the site can ultimately be developed in multiple phases.

Maximum Export Capacity (MEC) is by definition the contracted maximum export value (in MW) of an entire generation station in accordance with the generator's connection agreement. On the other hand generation capacity by definition is the maximum output (MW) that generating equipment can supply to system load

The Environmental Impact Assessment (EIA) is considered one of the early steps in evaluating the feasibility of a project of this scale. EScience Associates (ESA) has been appointed by BioTherm Energy (Pty) Ltd as the independent Environmental Assessment Practitioner (EAP) to conduct the scientific investigations of the EIA, and to facilitate the associated legal and administrative processes on their behalf. The main aim of the EIA is to assess the significance of potential environmental and socio-economic impacts, and to provide this information to the public and relevant Government Authorities who are responsible for making decisions on the environmental approvals that the project would require before it may commence. The key Competent Authority (CA) responsible is the National Department of Environmental Affairs (DEA).

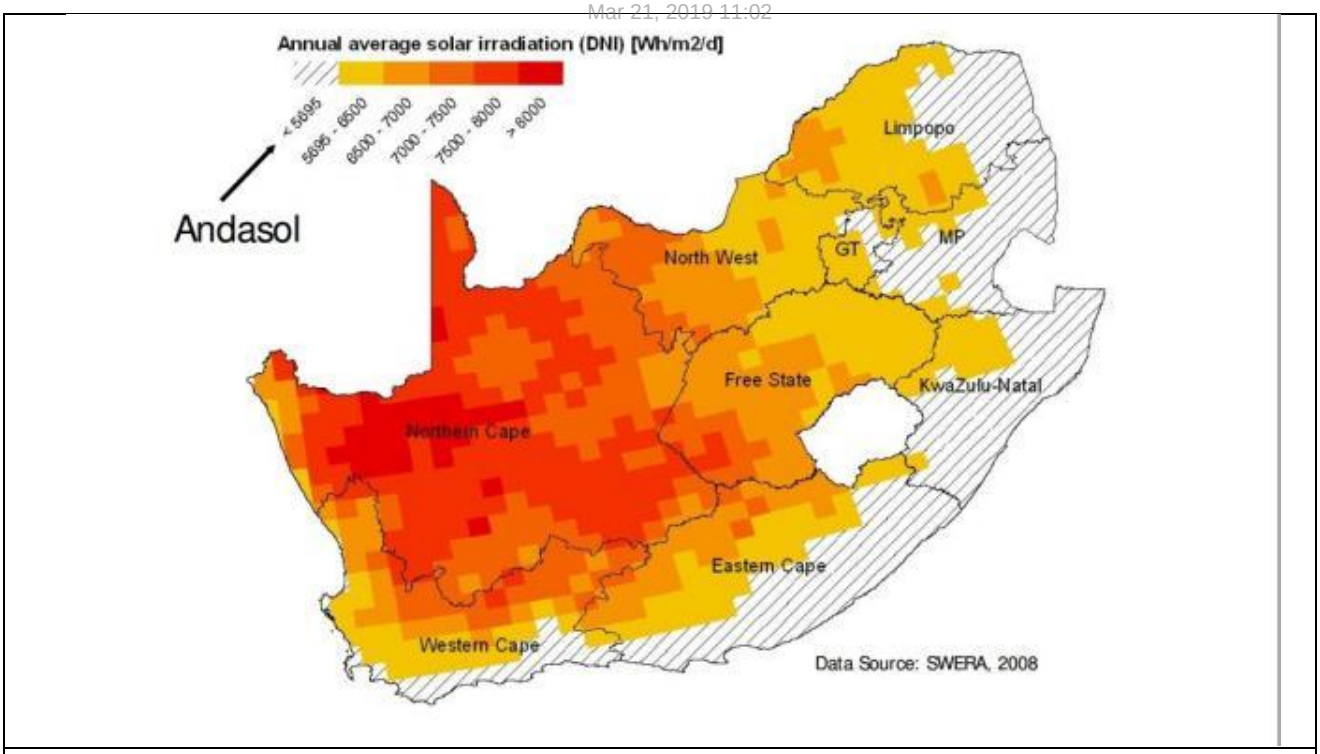


Figure 2-1: Annual Solar Radiation map (Source: SWERA, 2008)

The proposed project would include several Listed Activities, which may not commence prior to obtaining an Environmental Authorisation in terms of Section 24 of the National Environmental Management Act, 1998 (Act No. 107 of 1998)[NEMA]. An application for Environmental Authorisation, in terms of NEMA, for activities listed in Government Notices R.544 R.545 and R546 of 18 June 2010, was submitted to the CA (DEA), on 17 November 2011, which this authority acknowledged on 23 November 2011(Appendix 2). The reference number 12/12/20/2443 has been issued by DEA for this project.

Due to the nature and/or scale of some of the activities that would be associated with the proposed project, NEMA requires that the potential environmental impacts must be considered, investigated, assessed and reported on to the CA through a Scoping and detailed Environmental Impact Assessment process, described in Regulations 26–35 of Government Notice R.543 (the so-called NEMA EIA 2010 amendment Regulations), promulgated in terms of Section 24(5) of NEMA. The nature and extent of the solar facility as well the significance of potential environmental impacts associated with the proposed development (Construction, Operation and Decommissioning Phases) are reported in the Environmental Impact Report (EIR).

The site investigated for the proposed PV power plant has been selected for, amongst other reasons, its proximity to an existing electrical substation, its location in terms of annual average direct irradiation and its topography. Figure 2-2 below shows (in shaded black) the ideal position of solar power plants in the Northern Cape, taking into consideration annual average direct normal irradiation > 7.0 kWh/m^2/d, slope < 1%, distance to high-voltage transmission lines < 20 km, and absence of environmentally sensitive areas. The proposed site is indicated by the red dot on the map.

Although the map below indicates potential suitability for the installation of large concentrating solar thermal power plants (a different type of solar power generation technology than the proposed PV technology, the information can be applied to PV Power Plants, and the site for the proposed photovoltaic solar power plant is accordingly considered to be in an ideal position to take advantage of the required environmental

conditions for sustainable renewable electricity generation. The EIA-process does however recognize the site specific nature of environmental aspects, and following on from the regional scale information as indicated in the map, a site-specific EIA was conducted.

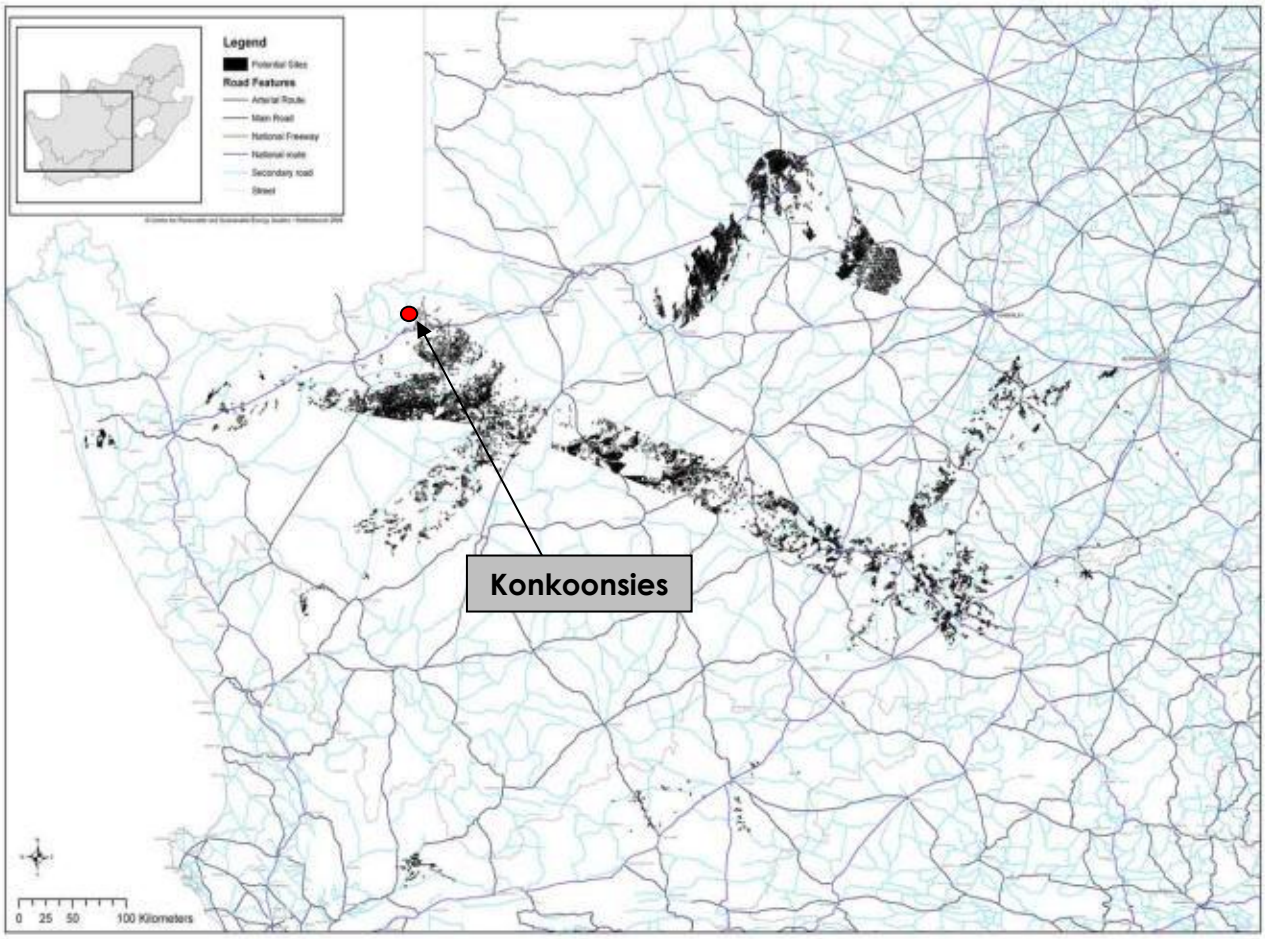


Figure 2-2: Map of South Africa indicating areas which are suitable for the installation of large concentrating solar thermal power plants (criteria: annual average direct normal irradiation > 7.0 kWh/m^2/d, slope < 1%, distance to high-voltage transmission lines < 20 km, no environmentally sensitive areas). Source: http://www.crses.sun.ac.za/html/solar.htm

2.2. WHAT IS AN EIA?

An Environmental Impact Assessment (EIA) is a methodical and systematic process to identify potential positive and negative impacts on the bio-physical, socio-economic and /or cultural environment that may result from an activity (i.e. establishment and operation of a PV solar power generation facility). The minimum requirements for EIA practice in South Africa are largely prescribed in Regulations (GN. R. 543 of 18 June 2010) under the National Environmental Management Act (Act N0. 107 of 1998)[NEMA]. The 2010 NEMA EIA Regulations lay out clear enviro-legal administrative requirements for EIA process, public participation (stakeholder engagement) and reporting alike.

An EIA in South Africa is predominantly undertaken in response to, and within the bounds of, a well-defined and robust legal environmental framework (Aucamp, 2010). A myriad of 'environmental' Acts, Regulations, Policies and Guidelines have relevance in this regard (refer to Section 5), all of which aim at giving effect to the fundamental environmental rights enshrined upon all South African citizens within section 24 of the constitution, 1996 (Act No. 108 of 1996)(Fugle and Rabie, 2009).

The EIA aims to ensure effective compliance and governance concerning the sustainable use of environmental resources, while simultaneously focusing on key issues such as stakeholder empowerment, and providing access to relevant and concise information to enable informed decision-making by competent authorities exercising a regulatory role in any aspect of the project. The EIA process is also used to examine alternatives and management measures to minimise negative and optimise positive impacts resulting from a project or activity. The ultimate objectives of the EIA process are to prevent significant detrimental impact on the environment and to ensure sustainable development into the future.

An EIA should not aim to stop, hinder or obstruct development, but should rather act as a 'green-filter' to development proposals, that seeks to ensure that developments/activities proceed in an environmentally acceptable and sustainable manner (unless of course significant impact may result from an activity that truly renders the undertaking of that activity 'fatally flawed').

The EIA has to consider the different perspectives and requirements of all role players, who derive different benefits from participating in the EIA process. These include the following:

- Decision-making Authorities:
  1. Enabling informed decision-making;
  2. Ensuring protection of environmental quality;
  3. Supporting the management, monitoring and sustainable utilisation of resources; and
  4. Understanding demands on bulk services, waste disposal sites, etc.

- Project Proponents:
  5. Pro-actively considering environmentally sustainable design and management principles in all that they undertake;
  6. Investigating natural resource opportunities and constraints;
  7. Identifying the risks and opportunities associated with environmental and operational aspects;
  8. Evaluating the potential for pollution and the prevention thereof; and
  9. Optimising energy, water and other resource use.

- Interested and affected parties (IAPs):
  10. Providing an opportunity to be informed and give comment / express concerns;
  11. Protecting environmental rights;
  12. Utilising local and indigenous knowledge;
  13. Increasing knowledge and environmental awareness; and
  14. Informing the decision-making process.

2.3. PURPOSE OF THE ENVIRONMENTAL IMPACT REPORT

This section of the report gives a brief background of the purpose of the Environmental Impact report (EIR, or EIA Report) as there is more often than not misinterpretation between the Scoping phase and the Environmental Impact Assessment phase of the EIA process. The Scoping and Environmental Impact Assessment (EIA) process flow diagram is presented in Figure 2-3.

The EIA process is divided into two main phases: Scoping and EIA. Scoping is a critical stage of any EIA process, and it is the initial step in involving interested and affected parties (IAPs) in environmental considerations for all stages of planning and development

processes. Scoping involves the identification of various priority issues from a broad range of issues that should be addressed in the EIA; therefore scoping is the first critical step in compiling an EIA. Its main purpose is to identify the most important and significant issues that must be further investigated as part of the EIA and exclude issues that are of no concern; it therefore focuses the assessment on key issues.

Scoping focuses the EIA process on significant issues and always involves participation by interested and affected parties (government, the public, proponent and industries) to help identify key issues of concern. It gives IAPs an opportunity to participate in planning decisions of the development.

The above scoping process resulted in the production of a final Scoping Report and plan of study for EIA (PoSEIA) for the competent authority. The approval of the final scoping report and PoSEIA occurred on 25 January 2013 by the DEA. Additionally, detailed visual, heritage, soil and biodiversity studies were undertaken and finalised as well as being made available for stakeholder review, together with this draft EIA Report and the draft Environmental Management Plan (EMPr) (See Appendix 8).

This EIR therefore includes the various investigations undertaken as outlined in the Scoping Report and the PoSEIA. All the relevant aspects identified in the scoping process have been investigated and assessed in detail (see Section 9 of the EIR) to determine the significance of each potential identified impact and accordingly apply relevant mitigation measures. These mitigation measures will ensure that impacts likely to occur are reduced/ eliminated as to protect the integrity of the receiving environment.

The Environmental Impact Assessment phase of the EIA process (See Figure 2-3) therefore assesses the impact of all significant impacts on the environment so that appropriate mitigation measures may be proposed (Aucamp, 2009).

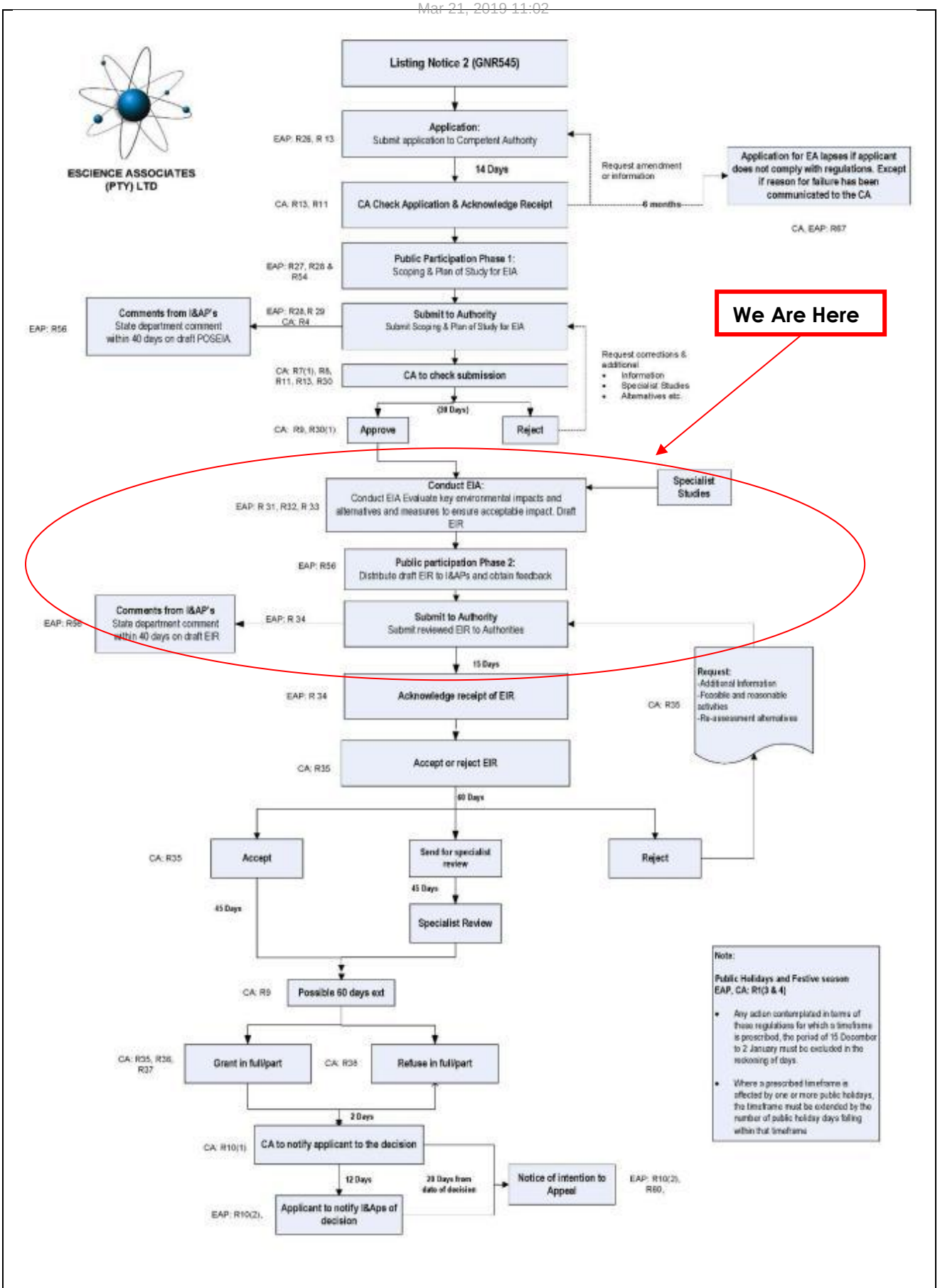


Figure 2-3: Scoping & EIA Process as prescribed by the NEMA 2010 EIA regulations (ESA, 2012)

2.4. DETAILS OF ENVIRONMENTAL ASSESSMENT PRACTITIONERS (EAP)

The Environmental assessment for this application was undertaken by EScience Associates (Pty) Ltd. (ESA), as an independent Environmental Assessment Practitioners (EAP's) to Biotherm Energy (Pty) Ltd. The Environmental Impact Assessment study team was led by Mr Hanre Crous, senior environmental scientist with more than 13 years' experience in environmental management, with Roelof Letter and Bradley Thorpe in the EIA project management role (see Appendix 9 for relevant CVs).

Table 2-1: Details of the EAPs

Name	***Qualification***
Hanre Crous	MSc Zoology
Bradley Thorpe	BSc (Hons) Wildlife Management / MSc Environmental Management (in progress)
Roelof Letter	BSc (Hons) Environmental Management

2.4.1. LIST OF SPECIALISTS AND SPECIALIST STUDIES UNDERTAKEN AS PART OF THIS EIA

A brief list of specialists and specialist studies which were undertaken are shown in Table 2-2 below:

Table 2-2: List of Specialists and Specialist Studies

	Specialist Study	***Specialists***
1	Environmental Legal Review	Hanre Crous and Roelof Letter (ESA)
2	Biodiversity and wetland assessments	Simon Todd, Simon Todd Consultancy
3	Archaeology and Heritage Impact assessment	Mr Anton Pelser (Archaetnos Consultants)
4	Desktop Paleontological assessment	Bruce Rubidge; University of the Witwatersrand.
5	Visual Impact Assessment/GIS/3-D visualizations	Emmanuel Tshuma (ESA) and Kotie Geldenhuys (Propaganda Studios)
6	Soil Impact Assessment	Bradley Thorpe and Roelof Letter (ESA) in consultation with Prof. A. Claassens (Soil science and plant nutrition consultant)
7	Cumulative impact assessment	Hanre Crous and Roelof Letter (ESA)
8	Environmental reporting, public participation, project management	Roelof Letter and Hanre Crous (ESA)

2.5. LAND, LANDOWNER DETAILS AND SURFACE RIGHTS

The EIA is undertaken on portion 6 of the farm Konkoonsies 91 (the "Property") in the Northern Cape approximately 36 km north-easterly from Pofadder on the divisional road – R358 to Onseepkans border post. Only the area in close proximity to the Paulputs substation on the farm Konkoonsies 91 and a small portion of the neighbouring property Scuit Klip will be investigated. Figure 2-4 indicates the area within the farm Konkoonsies 91 that was identified as a potential location of the solar facility. The delineated study area is approximately 531 hectares and has been assessed in detail as part of the environmental assessment phase of the proposed project (see Figure 2-3). The portion on the farm Scuit Klip has been assessed as part of this EIA to allow for connection of the proposed project

to the existing Paulputs substation, which resides on that farm. Discussions are underway to conclude a servitude agreement between Eskom, BioTherm and Abengoa (owners of Scuit klip) for construction of a 132kV line across the property.

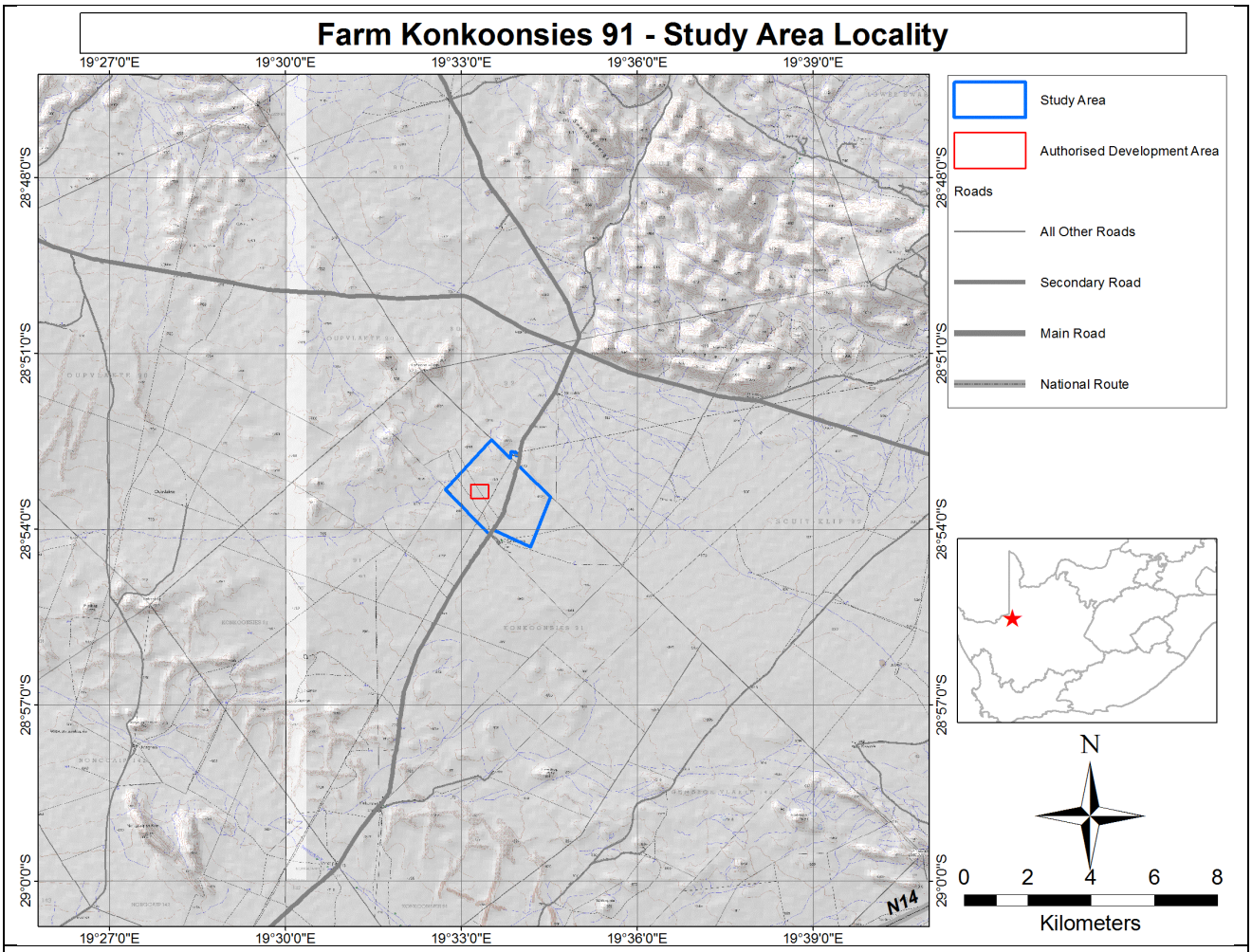


Figure 2-4: Topographical locality map of portion 6 of the Farm Konkoonsies 91

BioTherm (Pty) Ltd is not the owner of the Property, but they have entered into a land use and lease agreement with the owner, together with an option to purchase the land in the future. It should also be noted that a portion of the study area has already received an Environmental Authorisation from the Department of Environmental Affairs for the development of a 10 MW PV facility of less than 20 hectares (Appendix 2). The proposed solar facility, which this application covers, will be developed adjacent to the currently authorised facility. Figure 2-4 indicates the study area as well as the area demarcated for the development of the 10 MW PV solar facility.

Table 2-3: Details of the farm Konkoonsies	
Farm Portion	Owner/contact person
Konkoonsies No. 91, portion 6 approximately 36 km north-east of Pofadder in Northern Cape.	Gloudina Maria Van den Heever

Table 2-4: Surveyor General 21 digit codes for farm Konkoonsies 91 included in the EIA process:																			
C	0	3	6	0	0	0	0	0	0	0	0	0	0	9	1	0	0	0	0	6
Surveyor General 21 digit codes for farm Scuit Klip included in the EIA process:																			
C	0	3	6	0	0	0	0	0	0	0	0	0	0	9	2	0	0	0	0	4

2.6. MUNICIPALITY AND REGIONAL DETAILS

Table 2-5: Municipality and regional details	
District Municipality:	Namakwa District Municipality
Local Municipality (LM):	Khai Ma Local Municipality
Nearest town/city:	Pofadder

2.7. THE PROPONENT (APPLICANT)

BioTherm Energy (Pty) Ltd (BioTherm) is one of South Africa's leading renewable energy developers. As one of South Africa's first Independent Power Producers (IPP), BioTherm has embarked on delivering clean, renewable energy to South Africa with a series of wind and solar farms in the Western and Northern Cape provinces and reached financial close on three Round I projects which will begin construction shortly, the only South African developer to do so.

BioTherm was founded in 2003 and its business was initially focused on developing waste gas and heat cogeneration projects. In October 2007, BioTherm commissioned a 4.2 megawatt biogas project at the PetroSA refinery in Mossel Bay, Western Cape, which was the first non-recourse, project-financed independent power producer transaction completed in South Africa. Further, BioTherm is currently engaged in the commissioning of an anaerobic digester at Kanhym, the largest piggery in Africa.

As a proudly South African Company, BioTherm is a strong advocate for attaining the national goals of increasing the extent of renewable energy use in the country, not just as an energy source but as an integral part of the economic, environmental and social aims of the country. BioTherm has strong Broad Based Black Economic Empowerment (B-BBEE) partners, who are actively participating in the development of its projects.

BioTherm was one of the successful bidders in Round I of the IPP Programme and was selected as preferred bidder on two solar projects (one being the 10 MW plant located at the site under review in this report) and one wind project. These projects have reached financial close with construction expected to start in Q1 2013.

Renewable energy has enormous potential to meet the needs of South Africa's growing economy, creating employment opportunities and new industries. BioTherm has the unique ability to fully develop renewable energy projects in-house, with experts in site development, wind and solar resource measurement and analysis, turbine selection, carbon reduction, construction and maintenance.

2.8. PROJECT MOTIVATION, NEEDS AND DESIRABILITY

The proposed activity will entail the construction of a solar power (Photovoltaic) generation facility. With populations in South Africa growing rapidly, and the need for "green" energy (such as wind and solar power) becoming more prevalent, the project aims to provide a sustainable, renewable energy resource for present and future generations. The positive aspects of using solar power far outweigh the negative compared with conventional power generation utilising fossil fuels. The proposed site will aid the new renewable generation capacity of the national grid and contribute to the 42% share targeted by the Department of Energy for renewable energy (Integrated Resource Plan, 2010-2030). According to the strategy, 8.4 GW of new generation capacity in South Africa is proposed to be obtained from PV solar sources over the next twenty years.

A target of 10,000 GWh of renewable energy was set by the South African government for 2013, due to the high level of renewable energy potential in the country. In order to contribute towards achieving this target, to initiate the renewable energy industry in South Africa, and promote socio-economic and environmentally sustainable growth, a market mechanism needed to be established. The Independent Power Producer (IPP) Procurement Programme was introduced in 2011 for the procurement of renewable energy projects. A maximum tariff was set for each technology and developers would bid for projects and compete on a competitive price basis to obtain approval of projects from the Department of Energy.

The IPP Procurement Programme promotes the Government's 10,000 GWh 2013 Renewable Energy Target and also encourages competitive markets in long term sustained growth of renewables in comparison with conventional power generation. South African electricity generation from renewable energy offers various socio-economic and environmental benefits, including:

- Increased energy security: The current electricity crisis outlines the need for more sustainable sources of electricity generations as the number of consumers increases. A grid connection with renewable energy acts as an alternative source of electricity as traditional sources become strained and more expensive.
- Resource savings: Water and natural resources can be saved by using solar technologies as conventional coal-fired power plants are major consumers of valuable natural resources.
- Pollution reduction: Major by-products of fossil fuel burning such as nitrogen, oxides and sulphur have a detrimental impact on human health though the formation of smog and cause the spread of respiratory illnesses. PV solar generation transforms solar radiation directly into electrical energy and therefore no toxic pollutants are emitted.
- Employment creation: The development, scale, installation, management and maintenance of solar facilities have significant potential for job creation in South Africa.

The activity will provide local communities in the Khai Ma Local Municipality area with several benefits including job creation, socio-economic development and infrastructural investment in the area. The proposed project will create electricity without any emissions to air, i.e. zero carbon emissions. This is in contrast to coal-fired power stations, for example, which have significant carbon emissions and require vast amounts of water for power generation. Society as a whole will benefit, as less carbon emissions means less global climate change, which means healthier and better functioning environmental ecosystems on the planet.

Further to this, according to De Jong 2011, *solar development has the "potential to create sustainable employment in the Northern Cape while addressing some of the fundamental drivers of Climate Change. Being one of the pioneers of solar power in South Africa the project has the inherent role of developing solar power technology for the region. The viability and success of this project is strategic to paving the way for sustainable power technologies in this region. This is a project of strategic and national importance and capable of enhancing South Africa's position in the global technology arena while aligning the commitments made by South Africa in Copenhagen."*

3. PROJECT DESCRIPTION

3.1. PROCESS DESCRIPTION AND PROPOSED ONSITE INFRASTRUCTURE

Photovoltaic power production has been doubling roughly every 2 years, increasing by an average of 48% each year since 2002, making it the world's fastest-growing energy technology. The volume of new grid-connected PV capacities world-wide rose from 16 GW in 2010 to 27 GW in 2011. This increased the total installed PV capacity world-wide to over 67 GW at the end of 2011. Roughly 90% of PV generating capacity consists of grid-tied electrical systems. Such installations may be ground-mounted (and sometimes integrated with farming and grazing) or built into the roof or walls of a building, known as Building Integrated Photovoltaics. Due to the growing demand for renewable energy sources, the manufacturing of solar cells and photo-voltaic modules has advanced dramatically in recent years.

Photovoltaics (PVs) are materials that convert solar radiation directly into electricity. Photovoltaic solar cells are divided into two distinct groups: Traditional crystalline silicon solar cells and thin film solar cells. The absorbed solar radiation excites the electrons inside the cells and produces what is referred to as a / the photovoltaic effect. The crystalline silicon solar cells are made from monocrystalline or polycrystalline silicon. The thin film technologies are comprised of thinner layers of semiconductor material which are produced using a splutter process. Photovoltaic solar power plants comprise of solar modules connected together to form solar arrays for the production of electricity. Direct current electricity is produced from the solar array which in turn is connected to inverters for conversion to alternating current. Power from the inverters is then stepped up via transformers to voltages suitable for injection into the national grid for distribution to consumers.

Solar power plants can either have fixed tilt systems or tracking systems as shown in the figures below. Modules in a fixed tilt system are mounted at an optimised angle facing the sun. With tracking systems, the surface of the arrays is moved to follow the sun resulting in large radiation gains. Systems can be set to track the sun's daily path and/or its annual path. Figure 3-1 below shows a typical example of a fixed tilt PV array and Figure 3-2 shows a typical example of a tracking PV array (These are illustrative examples of the technology only).

The proposed project may potentially also use Concentrated Photovoltaic (CPV) panels. CPV systems are very unique because they concentrate sunlight though a lens onto high performance solar cells and by doing so, increase the electricity generated. These CPV panels are mounted on tracking systems as to maximise the collection of energy from the sun. The concentrated light improves the efficiency of the cells and reduces the amount of expensive solar cell material needed to produce a specific amount of electricity. Some of these CPV panels can generate twice as much power per hectare in comparison with conventional solar panel technology. Certain designs of CPV use 23.5 meter wide panels with more than 1000 pairs of lenses and solar cells on each (See Figure 4-1). CPV panels are mounted on a dual axis system.

Figure 3-1: Fixed tilt PV array (sourced http://explow.com/solar_panel)

Figure 3-2: Tracking PV array (sourced http://solarblog.ca)

Photovoltaic (PV) arrays can be up to several hundred hectares in spatial extent. The panels are mounted on metal structures that are fixed into the ground, either through a

concrete foundation or a deep seated screw. Central inverters are wired to sections of the PV field, which can have a rated power of 500 kW-1250 kW each. The inverter is a pulse width mode inverter that converts DC current to AC current at grid frequency. A typical central inverter rated at 500 kW has a size of approximately 3 m x 2.5 m x 1 m and an output voltage of 480 V Alternating Current (AC).

The grid connection requires transformation of the voltage from 480 V up to between 22,000 V and 400 000 V depending on the existing infrastructure. The normal components and size of a distribution rated electrical substation is also required. Tracking Arrays (Figure 3-2) comprise of one (single axis) or two (dual –axis) motors and a sun sensor used to track the sun. The motors usually contain gears and moving parts that need greasing from time to time.

The solar power generation facility is proposed to accommodate an array of photovoltaic (PV) panels with a generation capacity of approximately 133 MW, depending on the specific technology, covering the entire feasible area of the site (267 hectares). The study area was assessed in detail and the entire feasible area for development has been determined based on the assessment (refer to Sections 9 & 10). Approximately 1.5 – 2 hectares are required per MW of installed PV panels. The following infrastructure is required for the establishment of PV solar facilities:

- Foundations to support the PV panels.
- The plant consists of arrays of photovoltaic (PV) panels: The panels are placed in number rows with a buffer from the boundary fence and access roads in between the each row. Panels will have a junction box located below the rows where all connections between rows meet up. Underground cables run from this box to the inverter/transformer house at 400 V-1000 V Direct Current (DC).
- Panels will be placed on a fixed rotating structure, which is done to ensure up and down movement to ensure maximum absorption of solar radiation. Each of these arrays of panels is expected to be approximately 3 m in height for fixed arrays to 9m for tracking systems.
- Access and inside roads/paths – An access road to the site as well as internal roads between the PV arrays would need to be constructed.
- Trenching – all DC and AC wiring within the PV plant must be buried underground. Trenches will have a river sand base, space for pipes, backfill of sifted soil and soft sand and concrete layer where vehicles will pass. Cable trenches will be approximately 600 mm (0.6 m) deep and 400 mm (0.4 m) wide and backfilled with sand. Manhole covers will be placed every 40 m or at each direction change. A concrete slab will be placed where vehicles pass over cable trenches.
- Inverter/transformer building-- 6 m X 3 m brick buildings located within the PV array each containing an inverter and a step up transformer will be constructed in the plant. The number of buildings will be dependent on the size of plant and inverters chosen. Alternatively a pre-packaged inverter/transformer housed in a concrete substation for outdoors can be utilised.
- Combined guard house/ control room – One (1) brick building of approximately 100m^2 on the perimeter of the plant. Guardhouse will include a small kitchen and toilet. Building will include a storeroom for spare parts kept onsite. The control room will contain switchgear and monitoring equipment for the PV plant. The buildings will be a standard height of approximately 3 m.
- Connection to grid: The grid connection requires transformation of the voltage from 480 V to between 22,000 V and 400,000 V depending on the available infrastructure. The normal components and size of a distribution rated electrical substation will be required.

- A small switching station for the plant will be located on the outside of the control room.

3.2. ACTIVITIES PROPOSED DURING DEVELOPMENT STAGES OF THE PROJECT

3.2.1. CONSTRUCTION PHASE

The physical construction (footprint) of the PV facility will cover the entire feasible area of the site identified through this EIA. An approved solar facility of 10 MW capacity which is about to begin construction as part of the IPP Procurement Program is located within the study (DEA Ref: 12/12/20/2098/1) (see Figure 2-4). This feasible area was only determined after all relevant specialist work and other environmental factors have been considered (see Figure 10-1)

There will be approximately 100-200 construction workers on site. Majority of the unskilled construction workers will be sourced from local communities and will be transported to the site during construction. Please refer to Section 7.17 for a detailed discussion regarding socio-economic issues. The typical procedures for the construction phase of the PV facility are as follows:

- Establishment of access roads: During the construction period internal roads need to be established; however these roads will only be temporary. There are a number of permanent roads that need to be established for operation and will be gravel based. Existing roads will be used where possible.
- Preparation of the site: Vegetation would need to be cleared for the footprint of the infrastructure as well as for the access roads to the site/internal roads and the laydown of the yard, etc. Topsoil stripping from the construction of access roads and infrastructure would need to be stockpiled and used to rehabilitated areas of the construction footprint.
- Transportation of equipment and components to the site: The main component of the proposed facility would be transported by road to the site. Excavators, graders, trucks and compacting equipment will need to be brought to the site.
- Establishment of workshops, temporary laydown areas and construction camps: Once all the equipment has been brought to the site a dedicated laydown and equipment camps will be established. Fuel will be stored on site during construction; appropriate mitigation measures must be employed to ensure no pollution occurs as a result.
- Construction of the PV array: The foundations for the PV panel array will be excavated. Another option would be to use a ramming system for the support structure which does not require excavation but is dependent on the geotechnical condition of the ground. Concrete and aggregates would need to be brought to the site. Trenches would also need to be excavated for underground connection of the panels to the inverters and subsequently to the plant substation.
- Site rehabilitation: Removal of all construction equipment from the site and rehabilitation of areas where reasonable and practical.

3.2.2. OPERATIONAL PHASE

The PV solar facility operational lifespan is estimated at approximately 20-25 years. The facility would create many permanent employment opportunities ranging from for skilled to unskilled individuals. The typical activities during the operational phase would be as follows:

- Operation of the electrical infrastructure and PV panels: Incoming solar radiation will be converted by the PV panels into electrical energy; associated inverters will convert this electrical energy into alternating current. This alternating current will be stepped up via transformers to grid voltage and transmitted via overhead cables to the Paulputs substation. Electrical and mechanical routine maintenance will also be carried out. Regular cleaning of the panels is also required and very labour intensive.
- Cleaning of PV panels using water: The major maintenance of the PV plant is that it requires quarterly cleaning with water to remove dust from the panels. The water will temporarily be stored in tanks on site. Water will be sourced from the local municipality. An option to abstract water from the Orange River for these purposes is also available. The panels would need to be cleaned quarterly. The water requirements for the facility would be approximately 2500 m³ per annum.
- Site security: Security will be stationed 24 hours a day on the site. The entire development area would have to be fenced off and security cameras installed.

3.2.3. DECOMMISSIONING PHASE

The proposed PV facility is expected to be decommissioned after 20 -25 years, but the operational time could be extended if economically viable. If the economic life is extended, this would mostly involve disassembling of components and installing more appropriate technologies of the time, however, if it is decided to close the facility, the site would need to be prepared to accommodate the relevant decommissioning activities. This would most likely be followed by disassembling of all the individual components of the entire plant. All materials that can be recycled/reused would be identified and sent to an appropriate facility. All foundation materials and associated infrastructures would need to be removed and disposed of at an appropriate landfill. Once the entire facility has been removed the area should be reshaped and re-vegetated as to ensure that the environment is rehabilitated to a similar degree as before. A decommissioning and closure plan would therefore be required at end of life of the facility and approved by the DEA before commencement.

3.2.4. SERVICE AVAILABILITY

Due to the distance from the town of Pofadder, municipal services are not directly available for the site. As around 100-200 construction workers will be stationed temporary on site during working hours and security personnel will be stationed on the site during the operational lifespan, sanitation, water, refuse and electricity facilities will be required to supplement service requirements during construction and operation. The site will be serviced as follows:

- Electricity: During the construction and operational period the electrical requirement would be supplied through auxilliary power from Eskom and diesel generators where necessary.
- Water: The construction period would be characterised with the largest consumption of water for construction, machinery and domestic use. During operation/construction water allocation will either be provided by the Khai Ma Local Municipality to the project company. Or via abstraction from the Orange river, pursuant to receipt of a Water Use License
- Sewage: Mobile chemical toilets will be used as far as possible for the construction/operational phase. However various alternative methods do exist some which require limited amount of water such as waterless toilet systems and bio digester systems which have been investigated by the proponent. The method chosen should be done in line with the EMPr of the site, to ensure that the method employed does not cause a significant impact.

- Waste Management: During the construction/operation phase all attempts will be made by the proponent to implement the general principles of integrated waste management through the waste hierarchy. This hierarchy includes: waste minimisation, waste reduction, waste recycling and finally disposal to an approved municipal facility. The waste generated during the construction phase will be mainly packaging, general construction and domestic waste; however the majority of waste produced during operation is of domestic nature.

4. ALTERNATIVES

The requirement for consideration of development alternatives were introduced into South Africa's 'environmental' legislation to encourage developers, 'industry' and 'mining' to consider different ways of doing things that may ultimately yield more desirable environmental outcomes, whilst still achieving their stated development goal(s). Going through the process of identifying and comparing alternatives, through inter alia cost-benefit analysis, will likely yield improvements to the original concept proposal. The ultimate goal of consideration of alternatives is typically to reduce negative environmental impacts and to enhance, or introduce, positive environmental outcomes.

4.1. SITE ALTERNATIVES

At present there are no alternative sites being considered for this particular project, but the optimum location for placement of all components of the solar facility within the existing study area will be selected primarily on the basis of environmental considerations. Renewable energy facilities require certain natural elements to ensure proper functioning of the facility. This most often result in site alternatives not being possible. These elements include the following:

- **Topography and site slope:** The placement of the panels require mainly flat topology with no mountains or hills in the immediate vicinity that would need excessive earthworks or cause shading issues.
- **Grid connectivity:** The site selection was restricted to areas where electrical grid connection is available. The current site was selected based on its close proximity to Paulputs Substation.
- **Site Access:** The site is directly accessible from a minor roads R-1a and R-2 (These minor roads are not official road numbers. Access to these minor roads is mainly from the N14 and R538).

This site was identified by BioTherm as being very desirable based on above characteristics. The placement of these facilities needs to be located within close proximity to existing substations/infrastructure to connect the plant to the national electrical grid. This also reduces the amount of disturbance to the environment.

4.2. TECHNOLOGY ALTERNATIVES

In terms of technology alternatives, it should be noted that both the proposed technology and its alternative can be implemented on site separately or in combination. The alternative technology that should be considered is Concentrated Photo-voltaic (CPV). CPV systems are very unique because they concentrate sunlight though a lens onto high performance solar cells and by doing so, increase the electricity generated. These CPV panels are mounted on tracking systems so as to maximise the collection of energy from the sun.

The concentrated light improves the efficiency of the cells and reduces the amount of expensive solar cell materials required to produce an equivalent amount of power in a

comparable PV array. In comparison to normal PV panels, certain designs of CPV use 23.5 meter wide panels with more than 1000 pairs of lenses and solar cells on each panel (See Figure 4-1). These panels are all mounted on a dual axis tracking systems to maintain an optimal alignment with the sun throughout the day. The CPV technology is more expensive, larger (8 meters high), has a higher maintenance cost and requires more resources for installation compared to normal PV.

Figure 4-1: Example of Concentrated Photo-voltaic technologies (Bullis, 2011).

The materials used to construct these CPV panels are 95% recyclable due to the fact that the two main materials used are glass and aluminium (Lozanova, 2009).

Table 4-1: Comparison between PV and CPV

CPV vs. PV	
CPV	PV
Higher Efficiency	Lower Efficiency
Tracking Systems	Fixed and Tracking
Lenses/Mirrors/Panels	Panels
More Electricity	Less Electricity
Utility (Commercial)	All Markets
More Expensive than PV	Less expensive than CPV

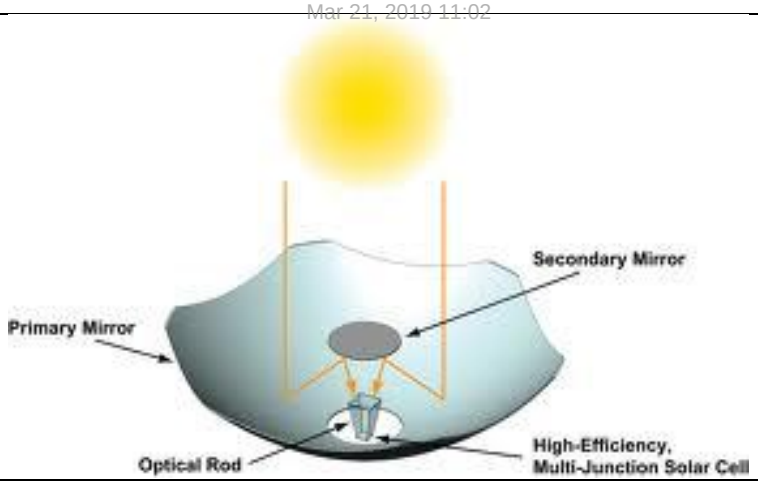


Figure 4-2: Diagram showing how Concentrated Photo-voltaic (CPV) works (Lozanova, 2009).

4.3. ALTERNATIVE GRID CONNECTIONS

Connection to the electrical grid is regulated by Eskom. The option currently being considered for connection to the Eskom substation is

- Through the construction of an onsite switching station and the building of a 132 kV line from the switching station to the Paulputs substation (See Figure 10-1 & Appendix 1).

4.4. NO-GO ALTERNATIVE

The no-go option refers to the alternative of the proposed development not going ahead at all. This alternative will avoid potentially positive and negative impacts on the environment, and the *status quo* of the area would remain. The implications of the no-go option will be evaluated as part of the EIA, focussing on comparing potential impacts from the proposed project with the *status quo*, and will be particularly relevant should it be found that detrimental impacts cannot be managed to an acceptable level.

Should this alternative be exercised the socio-economic and environmental benefits of renewable energy will not be realised. These benefits would include the following:

- Increased energy security:
- Resource savings
- Utilisation of our valuable renewable energy resources
- Climate friendly development
- Pollution reduction
- Support for international agreements
- Acceptability to society
- Employment creation

5. LEGAL AND POLICY FRAMEWORK

The following section is intended to provide an overview of all environmentally applicable legislation and associated regulatory requirements that need to be considered and addressed during the greater EIA process. The consideration of all relevant legislation will lead to improved decision making and the legally compliant commissioning of the proposed project.

5.1. CONSTITUTION OF SOUTH AFRICA

The Constitution of the Republic of South Africa (Act No. 108 of 1996) has significant implications for environmental management. The main effects are the protection of environmental and property rights, the drastic change brought about by the sections dealing with administrative law such as access to information, just administrative action and broadening of the *locus standi* of litigants.

These aspects provide general and overarching support and are of major assistance in the effective implementation of the environmental management principles and structures of the NEMA. Section 24 in the Bill of Rights of the Constitution specifically states:

- "Everyone has the right - to an environment that is not harmful to their health or well-being";
- "To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that -
    - Prevent pollution and ecological degradation;
    - Promote conservation;
    - Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."

5.2. EIA & ENVIRONMENTAL AUTHORISATION

NEMA is South Africa's overarching environmental legislation, and contains a comprehensive legal framework to give effect to the environmental rights contained in Section 24 of The Constitution. Section 2 of NEMA contains environmental principles that form the legal foundation for sustainable environmental management in South Africa. NEMA introduces the principle of integrated environmental management that is achieved through the environmental assessment process in Section 24, which stipulates that certain identified activities may not commence without an Environmental Authorisation from the competent authority, in this case DEA. Section 24(1) of NEMA requires applicants to consider, investigate, assess and report the potential environmental impact of these activities. The requirements for the investigation, assessment and communication of potential environmental impacts are contained in the so-called 2010 amendment EIA Regulations (GN R.543, R.544, R.545 and R.546; 18 June 2010).

Based on the potential significance of impacts, the Regulations identify specific activities that are either subject to a Basic Assessment process, or more comprehensive Scoping and EIA processes. The proposed solar facility includes activities that require a Scoping and EIA. All activities are however included in the Scoping and EIA assessments, i.e. a single application procedure. The activities that would be (or are likely to be) associated with the proposed solar facility are listed in Table 5-1 below. It should be noted that the two lists below are comprehensive, but some of the activities may eventually not proceed. The activities ultimately undertaken by BTE will be based on the findings and

recommendations of the EIA investigation and final project infrastructure design, including certain capacity thresholds and the feasibility of identified alternatives.

Table 5-1: Listed activities applied for in terms of the NEMA 2010 EIA regulations		
Listing	Activity number	Description of each listed activity
Government Notice no 544 of 18 June 2010. "Listing Notice 1"	Activity 10	The construction of facilities or infrastructure for the transmission and distribution of electricity - (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or (ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more. *Reason: The facility could possibly only require connecting at a voltage lower than 275kV to the Paulputs Substation.*
Government Notice no 545 of 18 June 2010. "Listing Notice 2"	Activity 1	The construction of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more. *REASON: The proposed solar facility will have a power generation capacity of more than 20 MW.*
Government Notice no 545 of 18 June 2010. "Listing Notice 2"	Activity 15	Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more; except where such physical alteration takes place for: (i) linear development activities; or (ii) agriculture or afforestation where Activity 16 in this Schedule will apply. *REASON: The proposed solar facility will be developed in phases and on completion the facility will be more than 20 hectares in spatial extent.*
Gnr 546	Activity 4	Road wider than 4m with reserve less than 13.5m *REASON: An access road to the facility is required. Although the site has an exit access road, a small road would need to be constructed to the entrance of the facility.*
Gnr 546	Activity 14	The clearance of an area of 5 ha or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation *REASON: The study area consists mostly of undisturbed Bushmanland Arid Grassland; more than 5 hectares of this vegetation would therefore be removed.*

The process of applying for Environmental Authorisation includes a requirement to conduct an initial Scoping phase, followed by a detailed EIA as part of the application process. The assessment process (Figure 2-3) is comprehensive and detailed where appropriate, aimed at identifying potential positive and negative impacts on the environment (biophysical, socio-economic, and cultural), in order to:

- Examine alternatives/management measures to minimise negative and optimise positive consequences;
- Prevent substantial detrimental impact to the environment;
- Improve the environmental design of the proposal;
- Ensure that resources are used efficiently; and
- Identify appropriate management measures for mitigation and the monitoring thereof.

5.3. DUTY OF CARE

The National Environmental Management Act, Act 107 of 1998, (NEMA) places a duty of care on all persons who may cause significant pollution or degradation of the environment. Specifically, Section 28 of the Act states:

"28 (1) Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.

(2) Without limiting the generality of the duty in subsection (1), the persons on whom subsection (1) imposes an obligation to take reasonable measures, include an owner of land or premises, a person in control of land or premises or a person who has a right to use the land or premises on which or in which-

(a) any activity or process is or was performed or undertaken; or
(b) any other situation exists, which causes, has caused or is likely to cause significant pollution or degradation of the environment.

(3) The measures required in terms of subsection (1) may include measures to-

(a) investigate, assess and evaluate the impact on the environment;
(b) inform and educate employees about the environmental risks of their work and the manner in which their tasks must be performed in order to avoid causing significant pollution or degradation of the environment;
(c) cease, modify or control any act, activity or process causing the pollution or degradation;
(d) contain or prevent the movement of pollutants or the causant of degradation;
(e) eliminate any source of the pollution or degradation; or
(f) remedy the effects of the pollution or degradation."

Consequently, in the context of this assessment, the owner/operator of the PV facility must take "reasonable steps" to prevent pollution or degradation of the environment which may result from the proposed facility and related activity. These reasonable steps include the investigation and evaluation of the potential impact and identification of means to prevent an unacceptable impact on the environment, and to contain or minimise potential impacts where they cannot be eliminated.

5.4. BIODIVERSITY

5.4.1. NATIONAL FORESTS ACT (ACT NO. 84 OF 1998)

There are a number of tree species that are protected according to Government Notice no. 1012 under Section 12(I)(d) of the National Forests Act, 1998 (Act No. 84 of 1998). In terms of Section1 5(1) of the National Forests Act, 1998 "*no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a license granted by the Minister to an (applicant and subject to such period and conditions as may be stipulated)*".

The only protected tree species observed within or in close proximity to the site was *Aloe dichotoma*, a number of individuals of which were observed at the site, largely within the rocky areas (Appendix 7.1). An application for a licence for the removal and/or relocation of these trees will be made with the Department of Agriculture, Forestry and Fisheries (DAFF0 if the development is to impact directly on these species, however as they are mostly concentrated within the rocky areas, which the development would avoid as far as possible. Where such avoidance may be impractical, the Applicant will apply for the necessary permits to remove. The applicant will therefore make every effort to ensure that no trees are removed without the necessary permits obtained.

5.4.2. CONSERVATION OF AGRICULTURAL RESOURCES ACT (ACT 43 OF 1983)

As defined by the Conservation of Agricultural Resources Act (CARA) (Act 43 of 1983), **Conservation** is defined as: "in relation to the natural agricultural resources, includes the protection, recovery and reclamation of those resources;"

The objectives of the CARA, as stated in Section 2 of the Act, entitled "Objects of Act", are:

"The objects of this Act are to provide for the conservation of the natural agricultural resources of the Republic by the maintenance of the production potential of land, by the combating and prevention of erosion and weakening or destruction of the water sources, and by the protection of the vegetation and the combating of weeds and invader plants."

Furthermore, Regulation 5 of CARA entitled: "Prohibition of spreading weeds", states:
No person shall-

(a) sell, agree to sell or offer, advertise, keep, exhibit, transmit, send, convey or deliver for sale, or exchange for anything or dispose of to any person in any manner for a consideration, any weed; or

(b) in any other manner whatsoever disperse or cause or permit the dispersal of any weed from any place in the Republic to any other place in the Republic.

Regulation 5 is noted, and the solar facility will strive to meet this requirement of CARA, and the management and mitigation measure to achieve this will be defined in the EIA.

Furthermore, Government Notice Regulation (GNR) 1048 of 25 May 1984 has been promulgated under the Conservation of Agricultural Resources Act (CARA). Amongst others, GNR 1048 defines the following key aspects:

"**flood area:** in relation to a water course, means the area which in the opinion of the executive officer is flooded by the flood water of that water course during a 1-in-10 years flood"

Utilisation and protection of vlei, marshes, water sponges and water courses:

7. (1) Subject to the provisions of the Water Act, 1956 (Act 54 of 1956), and sub regulation(2) of this regulation, no land user shall utilise the vegetation in a vlei, marsh or water sponge or within the flood area of a water course or within 10 metres horizontally outside flood area in a manner that causes or may cause the deterioration of or damage to the natural agricultural resources.

(2) Every land user shall remove the vegetation in a water course on his farm unit to such an extent that it will not constitute an obstruction during a flood that could cause excessive soil loss as a result of erosion through the action of water.

(3) Except on authority of a written permission by the executive officer, no land user shall-

(a) drain or cultivate any vlei, marsh or water sponge or a portion thereof on his farm unit; or
(b) cultivate any land on his farm unit within the flood area of a water course or within 10 metres horizontally outside the flood area of a water course.

(4) The prohibition contained in subregulation (3) shall not apply in respect of-

(a) a vlei, marsh or water sponge or a portion thereof that has already been drained or is under cultivation on the date of commencement of these regulations provided it is not done at the expense of the conservation of the natural agricultural resources; and
(b) Land within the flood area of a water course or within 10 metres horizontally outside the flood area of a water course that is under cultivation on the date of commencement of these regulations, provided it is already protected effectively in terms of Regulation 4 against excessive soil loss due to erosion through the action of water.

(5) The provisions of Regulation 2 (2), (3) and (4) shall apply mutatis mutandis with regard to an application for a permission referred to in subregulation (3).

These regulations will be adhered to as far as possible, and addressed accordingly in the EIA phase, where impacts and mitigation measures are tabled and discussed.

5.4.3. NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT (ACT 10 OF 2004)

The National Environmental Management: Biodiversity Act (Act 10 Of 2004) (NEMBA) is the primary legislation governing biodiversity management in South Africa. Section 2: "Objectives of the Act", states the following:

Objectives of Act:

2. The objectives of this Act are-
    a. within the framework of the National Environmental Management Act, to provide for-
        i. the management and conservation of biological diversity within the Republic and of the components of such biological diversity.

ii. the use of indigenous biological resources in a sustainable manner; and
iii. the fair and equitable sharing among stakeholders of benefits arising from bioprospecting involving indigenous biological resources;

b. to give effect to ratified international agreements relating to biodiversity which are binding on the Republic;
c. to provide for co-operative governance in biodiversity management and conservation; and
d. to provide for a South African National Biodiversity Institute to assist in achieving the objectives of this Act.

The objectives of this Act will be upheld and promoted during the development of the EIR and EMPr. The specialist who will be undertaking the biodiversity assessment has included this legislation in the development of their management and monitoring recommendations.

5.4.4. REQUIREMENTS FOR BIODIVERSITY ASSESSMENTS

It is acknowledged that there are no national guidelines for biodiversity assessments; however, in November 2009, the Department of Agriculture and Rural Development: Directorate of Nature Conservation published the "GDARD requirements for biodiversity assessments" (Version 2). Although these guidelines are specific for Gauteng Province, the essence of reporting on biodiversity issues and the minimum requirements for biodiversity studies can be adapted and used in any situation.

These guidelines will act as reference documentation for the reporting of biodiversity aspects on the Proposed PV Solar Project.

5.5. NORTHERN CAPE CONSERVATION ACT (ACT NO. 9 OF 2009)

The Northern Cape Nature Conservation Act provides inter alia for the sustainable utilisation of wild animals, aquatic biota and plants as well as permitting and trade regulations regarding wild fauna and flora within the province. In terms of this act the following section may be relevant with regards to any security fencing the development may require.

Manipulation of boundary fences

Section19. "No Person may –

a) erect, alter remove or partly remove or cause to be erected, altered removed or partly removed, any fence, whether on a common boundary or on such person's own property, in such a manner that any wild animal which as a result thereof gains access or may gain access to the property or a camp on the property, cannot escape or is likely not to be able to escape therefrom;"

The Act also lists protected fauna and flora under 3 schedules ranging from specially protected (Schedule 1), protected (schedule 2) to common (schedule 3). The majority of mammals, reptiles and amphibians are listed under Schedule 2, except for listed species which are under Schedule 1. A permit is required for any activities which involve species listed under schedule 1 or 2. Of relevance for the current development is the fact that several plant families and genera are listed in their entirety as protected, this includes, inter alia *Mesembryanthemaceae*, *Amaryllidaceae*, *Apocyanceae*, *Asphodeliaceae*, *Crassulaceae*, *Iridaceae* and *Euphorbia*. Although there are few species of conservation concern within these families and genera at the site, the species present within the development footprint will need to be listed with the permit application. A permit obtainable from the DENC permit office in Kimberly would be required for the site

clearing. A permit would also be required to destroy or translocated any nationally or provincially listed species from the site. A single permit, which covers all of these permitting requirements as well as meets TOPS regulations, is used

5.6. WATER

5.6.1. NATIONAL WATER ACT (NWA), 1998 (ACT 36 OF 1998)

The National Water Act (NWA), 1998 (Act 36 of 1998), aims to manage national water resources in order to achieve sustainable use of water for the benefit of all water users. This requires that the quality of water resources is protected, and integrated management of water resources takes place.

In terms of Section 21 of the National Water Act, Act No. 36 of 1998 (NWA) a water use licence is required for:

a) taking water from a water resource;
b) storing water;
c) impeding or diverting the flow of water in a watercourse;
d) engaging in a stream flow reduction activity contemplated in Section 36;
e) engaging in a controlled activity identified as such in Section 37 (1) or declared under Section 38 (1);
f) discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
g) disposing of waste in a manner which may detrimentally impact on a water resource;
h) disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
i) altering the bed, banks, course or characteristics of a watercourse;
j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
k) using water for recreational purposes.

Other provisions of the NWA have been taken into account, specifically relating to Part 4 (Section 19), which deals with pollution prevention, in particular situations where pollution of a water resource occurs or might occur as a result of activities on land. A person who owns, controls, occupies or uses the land in question is responsible for taking measures to prevent pollution of water resources. If these measures are not taken, the catchment management agency concerned may itself do whatever is necessary to prevent the pollution or to remedy its effects, and to recover all reasonable costs from the persons responsible for the pollution.

The project company plans to source water from the local municipality and if sufficient water is not available a water use licence will be applied for if one or more of the uses listed above are triggered from Department of Water Affairs (DWA).

5.7. HERITAGE

Aspects concerning the conservation of cultural resources are dealt with mainly in two acts. These are the National Heritage Resources Act (Act 25 of 1999) and to a lesser extent, the National Environmental Management Act (Act 107 of 1998). A similar study was done on the farm for BTE/APS during January 2011, during which a number of archaeological sites were recorded. Based on the results of the earlier work Biotherm has positioned their plant in order not to negatively impact these sites. The 2012 assessment

was necessitated by the fact that a second area on the farm Konkoonsies 91, for the expansion of the solar plant, has been selected for development.

5.7.1. NATIONAL HERITAGE RESOURCES ACT (NHRA) (ACT 25 OF 1999)

According to the above-mentioned act the following is protected as cultural heritage resources:

a. Archaeological artefacts, structures and sites older than 100 years
b. Ethnographic art objects (e.g. prehistoric rock art) and ethnography
c. Objects of decorative and visual arts
d. Military objects, structures and sites older than 75 years
e. Historical objects, structures and sites older than 60 years
f. Proclaimed heritage sites
g. Grave yards and graves older than 60 years
h. Meteorites and fossils
i. Objects, structures and sites or scientific or technological value.

A Heritage Impact Assessment (HIA) is the process to be followed in order to determine whether any heritage resources are located within the area to be developed as well as the possible impact of the proposed development thereon. An Archaeological Impact Assessment (AIA) only looks at archaeological resources. An HIA must be done under the following circumstances:

i. The construction of a linear development (road, wall, power line, canal etc.) exceeding 300 m in length
ii. The construction of a bridge or similar structure exceeding 50 m in length
iii. Any development or other activity that will change the character of a site and exceed 5 000 m^2 or involve three or more existing erven or subdivisions thereof
iv. Re-zoning of a site exceeding 10 000 m^2
v. Any other category provided for in the regulations of SAHRA or a provincial heritage authority

Structures

Section 34 (1) of the NHRA states that no person may demolish any structure or part thereof which is older than 60 years without a permit issued by the relevant provincial heritage resources authority. A 'structure' refers to any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith. 'Alter' means any action affecting the structure, appearance or physical properties of a place or object, whether by way of structural or other works, by painting, plastering or the decoration or any other means.

Archaeology, palaeontology and meteorites

Section 35(4) of this act deals with archaeology, palaeontology and meteorites. The act states that no person may, without a permit issued by the responsible heritage resources authority (national or provincial):

a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or paleontological site or any meteorite;
b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or paleontological material or object or any meteorite;

c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or paleontological material or object, or any meteorite; or
d) bring onto or use at an archaeological or paleontological site any excavation equipment or any equipment that assists in the detection or recovery of metals or archaeological and paleontological material or objects, or use such equipment for the recovery of meteorites.
e) alter or demolish any structure or part of a structure which is older than 60 years as protected.

The above mentioned may only be disturbed or moved by an archaeologist, after receiving a permit from the South African Heritage Resources Agency (SAHRA). In order to demolish such a site or structure, a destruction permit from SAHRA will also be needed.

Human remains

Graves and burial grounds are divided into the following:

A. ancestral graves
B. royal graves and graves of traditional leaders
C. graves of victims of conflict
D. graves designated by the Minister
E. historical graves and cemeteries
F. human remains

In terms of Section 36(3) of the National Heritage Resources Act, no person may, without a permit issued by the relevant heritage resources authority:

a) destroy, damage, alter, exhume or remove from its original position of otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;
b) destroy, damage, alter, exhume or remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation, or any equipment which assists in the detection or recovery of metals.

Human remains that are less than 60 years old are subject to provisions of the Human Tissue Act (Act 65 of 1983) and to local regulations. Exhumation of graves must conform to the standards set out in the Ordinance on Excavations (Ordinance no. 12 of 1980) (replacing the old Transvaal Ordinance no. 7 of 1925). Permission must also be gained from the descendants (where known), the National Department of Health, Provincial Department of Health, Premier of the Province and local police. Furthermore, permission must also be gained from the various landowners (i.e. where the graves are located and where they are to be relocated) before exhumation can take place. Human remains can only be handled by a registered undertaker or an institution declared under the Human Tissues Act (Act 65 of 1983 as amended). Unidentified/unknown graves are also handled as older than 60 until proven otherwise.

Following the completion of the AIA and HIA the coordinates of the entities identified will be added to the location map. The entities will be classified in terms of the ranking afforded to each in the report, and the applicant will aim to minimise the impact on any identified entities throughout the detail design phase, and prior to finalising permits for

destruction and/or exhumation, which will only be considered in circumstances when mitigation is impossible.

5.8. VISUAL

5.8.1. WESTERN CAPE DEPARTMENT OF AND DEVELOPMENT PLANNING: GUIDELINE FOR INVOLVING VISUAL AND AESTHETIC SPECIALISTS IN EIA PROCESSES

A guideline document was developed by the Provincial Government of the Western Cape: Department Of Environmental Affairs and Development Planning (WCDEADP), which is entitled: "Guideline for Involving Visual and Aesthetic Specialists in EIA Processes".

This guideline document, which deals with specialist visual input into the EIA process, has been organised into a sequence of sections, following a logical order covering the following:

- the background and context for specialist visual input;
- the triggers and issues that determine the need for visual input;
- the type of skills and scope of visual inputs required in the EIA process;
- the methodology, information and steps required for visual input;
- finally, the review or evaluation of the visual assessment process.

PRINCIPLES AND CONCEPTS UNDERPINNING VISUAL INPUT

The following key principles and concepts will be considered during visual input into the EIA process (WCDEADP, 2005):

- Awareness that 'visual' implies the full range of visual, aesthetic, cultural and spiritual aspects of the environment that contribute to the area's sense of place.
- The consideration of both the natural and the cultural landscape, and their inter-relatedness.
- The identification of all scenic resources, protected areas and sites of special interest, together with their relative importance in the region.
- An understanding of the landscape processes, including geological, vegetation and settlement patterns, which give the landscape its particular character or scenic attributes.
- The need to include both quantitative criteria, such as 'visibility', and qualitative criteria, such as landscape or townscape 'character'.
- The need to include visual input as an integral part of the project planning and design process, so that the findings and recommended mitigation measures can inform the final design, and hopefully the quality of the project.

5.9. NATIONAL PLANNING AND POLICY CONTEXT ON ENERGY

5.9.1. WHITE PAPER ON THE ENERGY POLICY OF SOUTH AFRICA, 1998

The white paper on South African energy policy governs the development of South Africa energy sector (DME, 1998). This document identifies key objectives for energy supply such as managing energy related environmental impacts, access to affordable energy services and securing energy supply though diversity.

5.9.2. RENEWABLE ENERGY POLICY IN SOUTH AFRICA, 2003

The white paper on renewable energy (DME, 2003) supplements the energy policy and sets out government's strategic goals, vision, policy principles and objectives implementing and promoting renewable energy in South Africa. South Africa has various sources of renewable resources such as solar and wind that are supported by this policy. From a fuel resource perspective, renewable energy applications are proven to be the

least costly, especially from an environmental and social perspective. Meeting technical and economic as well other constraints is one of the major concerns of the governmental policy on renewable energy.

South Africa has set a 10 year 10 000 GWH target for renewable energies by 2013 to be produced mainly from solar, wind and biomass as well small scale hydro. This amounts to approximately 4% of the country's estimated demands by 2013.

5.9.3. FINAL INTEGRATED RESOURCE PLAN, 2010 -2030

The Ministry of Energy is obligated as per the Energy Act of 2008 to publish and develop an integrated resource plan for energy. The Department of Energy (DOE) in partnership with the National Energy Regulator of South Africa (NERSA) has published the Integrated Resource Plan (IRP) for the time period 2010 to 2030. The main objective of the IRP develops an electricity investment strategy that is sustainable for the transmission infrastructure and generation capacity of South Africa for the next 20 years.

The white paper on renewable energies states that it is of global/national importance to supplement existing energy demand with renewable forms of energy in order to combat climate change. The outcome of this IRP acknowledged that coal fired power generation facilities will still be required over the next 20 years. The DOE released the final IRP in March 2011and parliament accepted it at the end of March. In addition to all existing and committed power plants the IRP includes 6.3 GW of coal, 9.6 GW for Nuclear, 17.8 GW for renewables (including 8.4 GW for solar) and 8.9 GW from other sources.

5.10. ASTRONOMY GEOGRAPHIC ADVANTAGE ACT, 2007

The objectives of the Astronomy Geographic Advantage Act are as follows:

a) to provide measures to advance astronomy and related scientific endeavours in the Republic;
b) to develop the skills, capabilities and expertise of those engaged in astronomy and related scientific endeavours in Southern Africa;
c) to identify and protect areas in which astronomy projects of national strategic importance can be undertaken;
d) to provide a framework for the establishment of a national system of astronomy advantage areas in the Republic, to ensure that the geographic areas in the Republic which are highly suitable for astronomy and related scientific endeavours due to, for example, high atmospheric transparency, low levels of light pollution, low population density or minimal radio frequency interference are protected, preserved and properly maintained;
e) to regulate activities which cause or could cause light pollution or radio frequency interference or interfere in any other way with astronomy and related scientific endeavours in those areas;
f) pursuant to Section 5, to provide for the declaration and management of astronomy advantage areas; and
g) to enable the Minister to participate in efforts to preserve the astronomy advantage of Southern Africa and to coordinate astronomy within this area.

In line with the above the MEC may declare astronomy advantage areas (AAA). The provisions provide for the minister within the act to declare any area in the Northern Cape Province as an AAA; however no such declaration may be made in respect to any area demarcated in terms of the Municipal Demarcation Act and falling within the Sol Plaatje Municipality. The entire Northern Cape province excluding Sol Plaatji Municipality was declared an astronomy advantage area within GN: 31855 (No. 82 of 2009) in terms of Astronomy Geographic Act, 2007 (Act No. 21 of 2007).

Notice of intention to declare the Karoo astronomy advantage area was published for public comment in General Notice 115 of 2009 within GN. 31855 of 2009. This general notice describes the boundaries of radio Astronomy Advantage Areas, including Karoo core radio AAA, Karoo Central radio AAA 1, Karoo Central radio AAA 2 and Karoo Central radio AAA 3

The purpose of declaring areas as astronomy advantage areas is mainly to ensure that areas suitable for astronomy and related scientific endeavours in South Africa are preserved and maintained. These areas consist of, among other things, atmospheric transparency, low levels of light pollution, low population density or minimal radio frequency interference. The AAAs also enhance and provide management to existing geographic advantage areas.

In terms of this act no person without prior permission from the delegated management authority in terms of the act, may:

1. "Enter any core astronomy advantage area
2. Reside in a core astronomy advantage area
3. Have in their possession, within a core astronomy advantage area designated by the Minister in terms of Section 7(1)(c) for radio astronomy, any interference source, mobile radio frequency interference source or short range device, unless the source or device has been turned off and, when in that state, is incapable of causing any form of radio frequency interference; and
4. Perform any other activity in a core astronomy advantage area that might be harmful to astronomy and related scientific endeavours or to the preservation of the area's astronomical advantage."

In terms of this act restrictions can also be placed on the use of radio frequency spectrums in astronomy advantage areas. Draft regulations regarding radio astronomy protection levels in astronomy advantage areas were published in GN .539 of 2011 in terms of the Astronomy Geographic Advantage Act, 2007 (Act No. 21 of 2007).

5.11. OTHER RELEVANT LEGISLATION AND GUIDELINES CONSULTED

5.11.1. NAMAKWA DISTRICT MUNICIPALITY INTEGRATED DEVELOPMENT PLAN INTEGRATED DEVELOPMENT PLAN (2010/2011 REVISION)

The municipality is looking to peruse diversification of its reliance on traditional economic drivers (such as mining, coastal fisheries). The executive mayor noted in the IDP that the municipality should support investment in amongst others green energy and tourism. The district is located in an area with excellent solar and wind resources and it is noted that it can provide a significant contribution on a national and provincial scale.

5.11.2. KHAI MA LOCAL MUNICIPALITY: INTEGRATED DEVELOPMENT PLAN, 2012 – 2016.

The main aim of the municipality is to create a municipality that enhances the communities' and inhabitants' standards of living. This would be mainly done through providing communities in the area with excellent services and good governance. Various priority issues have been identified by the municipality:

- Lack of economic development
- Lack of access to electricity
- Lack of training and skills development
- Lack of job opportunities

The proposed project would therefore be in line with the issues identified within the IDP. In order to help alleviate local unemployment, employment, mostly during construction, will be sourced from the local population, and training programmes will be implemented for these individuals as to allow them the opportunity to become eligible for permanent positions. The production of electricity by the project will ensure a reliable local electricity supply and reduce the demand for importing electricity from areas outside the Northern Cape.

5.11.3. NATIONAL VELD AND FOREST FIRE ACT (ACT 101 OF 1998)

The purpose of this Act is to prevent and combat veld, forest and mountain fires. The Act provides for a variety of institutions, methods and practices for achieving the purpose such as the formation of fire protection associations. It also places responsibility on landowners to develop and maintain firebreaks as well as be sufficiently prepared to combat veld fires in terms of equipment as well as suitably trained personnel.

The site is however arid and given the sparse vegetation cover, it is highly unlikely that fires are a normal occurrence in the area. Fires at the site are not currently considered to be a significant risk. However, if site is not grazed occasionally, there is a danger that sufficient biomass to carry a fire would build up. Given the risk that this would pose to the development, it would be in the operators' interests to manage plant cover at an acceptable level through grazing or alternative management practice.

5.11.4. EQUATOR PRINCIPLES

Project financing would require the development proposal to comply with the Equator Principles. These principles are a set of international standards that are voluntarily implemented to identify, assess and manage environmental and social risks. The Equator Principles are based on the guidelines of the World Bank group of social policies of the International Finance Corporation (IFC). Once financial institutions adopt the Equator Principles they place a commitment onto themselves not to finance projects that do not comply with these principles.

The Equator Principles would be considered in monitoring and managing the project in line with these requirements. The following table represents the principles that have been considered in compiling this report.

Table 5-2: Equator Principles considered	
Principle 1: Review and Categorisation	"Category C – Projects with minimal or no social or environmental impacts."
Principle 2: Social and Environmental Assessment	This subject report is compiled to assess the environmental and social impact of the proposed development. The mitigation measures are prescribed in this report as well as in the EMPr (Appendix 8)
Principle 3: Applicable Social and environmental Standards	The following IFC performance standards are applicable to the proposed project: 1. Social and environmental Sustainability 2. Labour and Working conditions 3. Pollution prevention and abatement 4. Community health, Safety and Security 5. Land Acquisition and Involuntary

Table 5-2: Equator Principles considered	
	Resettlement 6. Biodiversity Conservation and Sustainable Natural resource Management 7. Cultural Heritage
Principles 4: Action Plan and Management system	The EMPr should be used as the management plant to develop a site-specific Action Plan that would need to be implemented as part of the site's Environmental Management System (EMS) and implemented by the site Environmental Control Offices
Principles 5: Consultation and Disclosure	The public participation process has been and will be undertaken in line with South African legislation in terms of NEMA: EIA regulation R543.
Principles 6: Grievance Mechanism	A grievance process will be implemented by the project development company to ensure disclosure, consultation and public engagements during all phases of development of the facility.
Principles 7: Independent Review	Independent review of all environmentally related aspects/documents of the proposed project lender must be undertaken.
Principle 8: Covenants	All South African legislation must be complied with by the proponent.
Principle 9: Independent Monitoring and Reporting	ECO must monitor the site to ensure independent verification of monitoring results.
Principle 10: EPFI Reporting	Annual report must be submitted to the relevant lender.

5.11.5. OCCUPATIONAL HEALTH AND SAFETY

The EIA process assesses impacts on the environment, and does not specifically focus on issues of internal health and safety, as these are regulated by other legislation such as the Occupational Health and Safety Amendment Act, Act No. 181 of 1993, (OHSA). However there are instances in which the application of health and safety regulation is relevant within the domain of impact on the environment. The Occupational Health and Safety Act (OHSA) regulations include Regulation 1179 (Hazardous Chemical Substances) and Regulation 7122 (Major Hazard Installations). A "hazardous chemical substance" is defined in Government Notice R.1179 Hazardous Chemical Substances Regulations (1995) as any toxic, harmful, corrosive, irritant or asphyxiant substance, or a mixture of such substances for which (a) an occupational exposure limit is prescribed, or (b) an occupational exposure limit is not prescribed; but which creates a hazard to health.

In terms of Section 8(2d) of the Occupational Health and Safety Act, 1993, the employer has to establish, as far as is reasonably practicable, what hazards to the health or safety of persons are attached to any work which is performed, any article or substance which is produced, processed, used, handled, stored or transported and any plant or machinery which is used in his business; and he shall, as far as is reasonably practicable, further establish what precautionary measures should be taken with respect to such work, article,

substance, plant or machinery in order to protect the health and safety of persons. The employer shall, furthermore, provide the necessary means to apply such precautionary measures.

A Major Hazardous Installation is defined in terms of the Occupational Health and Safety Act as an installation:

- "where more than the prescribed quantity of any substance is or may be kept, whether permanently or temporarily; or
- where any substance is produced, used, handled or stored in such a form and quantity that it has the potential to cause a major incident".

A major incident as referred to above is defined as "*an occurrence of catastrophic proportions, resulting from the use of plant or machinery, or from activities at a workplace*". It is impossible to put a specific value to "catastrophic" because it will always differ from person to person and from place to place. However, when the outcome of a risk assessment indicates that there is a possibility that the public will be involved in an incident, then the incident can be seen as catastrophic (Department of Labour 2005). Certain substances listed in Schedule A of the General Machinery Regulations may possibly be used or stored in quantities exceeding the stated thresholds. However due to previous experience with such this would not necessarily be the case.

5.11.6. GUIDELINES PUBLISHED IN TERMS OF NEMA EIA REGULATIONS:

- Guideline 3: General Guide to Environmental Impact Assessment Regulations, 2006 (DEAT, June 2066).
- Guideline 4: Public Participation in support of the Environmental Impact Assessment Regulations, 2006 (DEAT, June 2006)
- Guideline 5: Assessment of alternatives and impact in support of the Environmental Impacts Assessment Regulations, 2006 (DEAT, June 2006)
- Integrated Environmental Management Information series
- South African national Biodiversity Institute (SANBI) published guidelines.

5.11.7. GUIDELINES ON THE INVOLVEMENT OF SPECIALISTS IN THE EIA PROCESS

The Western Cape Department of Environmental Affairs and Development Planning (WC DEADP) have developed policy guidelines around specialist involvement in EIA processes. The guidelines aim to improve the quality of specialist input and facilitate informed decision-making. The guidelines clarify the roles and responsibilities of all role players with regard to specialist input in the EIA process. These guidelines have been derived to help practitioners draft appropriate terms of reference for specialist input and assist role players to evaluate the appropriateness of specialist input in individual cases. Although these guidelines have been developed by the Western Cape, they can be adopted for use anywhere in the country.

Hence, the EIA process will endeavour to adhere to these set of guidelines, in order to be in line with provincial guidelines relevant to EIAs.

These guidelines include:

- Guideline for Determining the Scope of Specialist involvement in EIA processes (June 2005)
- Guideline for the Review of Specialist input in EIA processes (June 2005)
- Guideline for involving Biodiversity specialists in EIA processes (June 2005)
- Guideline for involving Heritage specialists in EIA processes (June 2005)

- Guideline for involving Visual and Aesthetic specialists in EIA processes (June 2005)
- Guideline for Environmental Management Plans
- Guideline for Involving Social Assessment Specialists in EIA Processes

The full versions of these reports can be downloaded from: http://www.capegateway.gov.za/eng/pubs/guides/G/103381

6. PUBLIC PARTICIPATION

6.1. INTRODUCTION

Public participation provides the opportunity for Interested and Affected Parties (I&APs) to participate on an informed basis, and to ensure that their needs and concerns are considered during the impact assessment process. In so doing, a sense of ownership of the project is vested in both the project proponent and interested or affected parties. The Public Participation Process is aimed at achieving the following:

- Provide opportunities for I&APs and the authorities to obtain clear, accurate and understandable information about the expected environmental and socio-economic impacts of the proposed development.
- Establish a formal platform for the public with the opportunity to voice their concerns and to raise questions regarding the project.
- Utilise the opportunity to formulate ways for reducing or mitigating any negative impacts of the project, and for enhancing its benefits.
- Enable project proponent to consider the needs, preferences and values of I&APs in their decisions.
- Clear up any misunderstandings about technical issues, resolving disputes and reconciling conflicting interests.
- Provide a proactive indication of issues which may inhibit project progress resulting in delays, or which may result in enhanced and shared benefits.
- Ensure transparency and accountability in decision-making.

The public participation process is discussed below: (Appendix 5 – Public participation)

- The project Background Information Document (BID);
- Proof of notifications to IAPs of the application to DEA for Environmental Authorization;
- Proof of press advertisements and site notices;
- List of I&APs; and
- 30 day commenting period for registered I&APs and 40 days commenting period for key governmental stakeholders (DAFF, DEA, DWA etc.) on draft scoping report
- 30 day commenting period was given on the final scoping report to registered I&APs as well key governmental stakeholders.
- 30 day commenting period was given on the draft amended scoping report to registered I&APs as well key governmental stakeholders (Including additional required stakeholders by DEA).
- 21 day commenting period on the final amended scoping report to registered I&APs as well key governmental stakeholders (Including additional required stakeholders by DEA).
- Comments and Responses Report (C&RR).

6.2. IAP NOTIFICATION & CONSULTATION TO DATE

The first step in the public participation process was to advertise the project as required by the 2010 EIA Regulations, in order to inform potential IAP's of the proposed project and EIA process. This was done by means of the following:

- A Background Information Document (BID) was compiled giving details on the applicant, the Environmental Assessment Practitioner (EAP), the scope and locality of the proposed project, the EIA process, purpose and process of public participation, and included an invitation to register as an IAP and provide comment.
- Pre-identification of interested and affected parties (IAPs), including adjacent landowners, using existing databases, and distributing the BID to these stakeholders. The BID was also sent to any other IAPs who responded to site or press notifications.
- Advertising the proposed project and associated EIA process in "Die Gemsbok" on 16 March 2012. The advertisements indicated where written comments may be directed to and were placed in English.
- A2-size site notices were erected on the site
- The draft Scoping report was distributed to all registered I&APs for a 30 day commenting period from 23 April 2012 to 23 May 2012. All key identified commenting authorities were sent a hardcopy as well, including electronic copies (via email) of the draft scoping report on 20 April 2012 and also received a 40 day commenting period.
- The final Scoping report was distributed to all registered I&APs for a 30 day commenting period from 14 June 2012 to 14 July 2012. All parties were instructed to send comments directly to the Department. All key identified commenting authorities were sent a hardcopy as well, including electronic copies (via email) of the final scoping report on the 14 June 2012 and also given a 40 day commenting period
- All existing as well as additional stakeholders (SANPARKS, ESKOM and SKA) as per DEA requirements has been given an opportunity to comment on the draft amendment of the Scoping report from the 6 September 2012 to the 6 October 2012.

Proof of these advertisements, sending of the BID, proof of site notices, communications with IAP's, availability of scoping reports and others are contained in the public participation report attached as Appendix 5 to this report.

6.3. IAP NOTIFICATION & CONSULTATION FOR THE REMAINDER OF THE ASSESSMENT

- The availability of the draft EIR will be advertised in Gemsbok newspapers as well the particular amendment required to the application form.

- A copy of the draft EIR will be placed in the local Pofadder Library (Hoofweg Street, Pofadder, next to the Roman Catholic Church) for review by interested stakeholders. This will be communicated to all registered IAPs and also included in the advertisement.
- The draft EIR will be distributed to all registered IAPs for a 40 day commenting period from 8 April to 20 May 2013.

- The draft EIR will also be distributed to all important commenting stakeholders/authorities and given a 40 day commenting period from 8 April to 20 May 2013
- The final EIR will also be distributed to IAPs and commenting stakeholders/authorities for a 21 day commenting period. All parties will be instructed to send their comment directly to the DEA.

6.4. EIA PUBLIC MEETING PHASE

To date, no public meeting has been held regarding the proposed project. The public interest in the proposed project to date has been very low. If the need arises once the draft EIR has been distributed a public meeting will be held. However, to date, interest in the project has been limited.

6.5. AUTHORITIES CONSULTATION

The National Department of Environmental Affairs is the assigned competent authority for the environmental authorisation of power generation application. All official correspondence from the DEA regarding this specific application is contained within Appendix 2 of this report. Consultation with the regulating authority as well as key commenting authorities have continued throughout the EIA process thus far. These include the following:

- Submission of application form for Environmental Authorisation to the Department of Environmental affairs.
- Submission of draft Scoping Report to the DEA as well key commenting authorities for a 40 day commenting period as well 30 day period to IAP
- Submission of final Scoping report to DEA for review as well key commenting authorities for 30 day period to IAP/key commenting authorities
- Submission of draft amended scoping report to DEA as well key commenting authorities for a 40 day commenting period as well 30 day period to IAP.
- Submission of final amended scoping report to DEA as well key commenting authorities for a 40 day commenting period as well 30 day period to IAP.
- Submission of draft Environmental Impact Report (EIR) to DEA as well key commenting authorities for a 40 day commenting period as well 30 day period to IAP.

For the remaining EIA process, the final EIR will be submitted to the DEA after a 40 day commenting period for key commenting authorities as well as a 40 day commenting period for IAPs. The following key stakeholders/ authorities have been requested to provide their comment on the draft and subsequent final report.

Table 6-1: Key commenting authorities.			
Northern Cape Department Agriculture, Forestry and Fisheries (DAFF)	Mrs. Jacoline Mans	054 338 5909	JacolineMa@nda.agric.za
Northern Cape Department of Environment and Nature Conservation	Mr. Tshlo Makaundi	053 807 7464	tmakaudi@ncpg.gov.za
Department of	Mr. A Abrahams & SR Cloete	053 830 8802 & 054 33 8500	AbrahamsA@dwa.gov.za & cloetes@dwa.gov.za

Water Affairs (DWA)			
Khai Ma Local Municipality	Mr. Thabo Molete	054 933 1000	munman@khaima.gov.za
Namakwa District Municipality	Mr. Immanuel Smith	027 712 8000	ismith@namakwa-dm.gov.za

Table 6-2: Other important IAPs who received electronic copies of the reports	
National Department of Agriculture, Forestry and fisheries (DAFF)	Ms Mashudu Marubini & Ms Thoko Buthelezi
South African Heritage resource Agency (SAHRA).	Kathryn Smuts
Eskom	John Geeringh (Pr Sci Nat), KevinLeask & RonaldMarais
SKA	Dr. Adrian Tiplady

Please also refer to the public participation report (Appendix 5)

6.6. COMMENTS & ISSUES

Table 6-3: Comments from IAPs to date

Comment	Response
Jacoline Mans (NC DAFF): 1. DAFF is mainly concerned about the potential impact on protected tress species. See the National forest Act, Act 84 of 1998 (NFA) as amended section 12(1)(d) read with s15(1) and s62(2). The list of protected tree species was published in GN 734 of 16 September 2011. Please ensure that the anticipated impact (if any) on protected trees are properly assessed during the EIA phase. 2. The final scoping report pointed out that a biodiversity assessment will be conducted during the EIA phase. Please send a copy of this report to the DAFF as soon as it becomes available for comment. .	Noted. The necessary assessment has been conducted and the Biodiversity Assessment provided to DAFF. The only protected tree species observed within or in close proximity to the site was *Aloe dichotoma,* a number of individuals of which were observed at the site, largely within the rocky areas. A removal/translocation permit for affected individuals will be made to the DAFF before construction commences.
Comments received on amended scoping report	
Jacoline Mans (NC DAFF): 1. The DAFF is mainly concerned about the potential impact on protected tree species. See the National Forests Act, Act 84 of 1998 (NFA) as amended. Section 12(1)(d) read with s15(1) and s62(2)(c). The list of protected tree species was published in GN 734 of 16 September 2011. Page 51 of the amended Scoping Report confirmed the presence of Boscia albitrunca within the study area, yet no indication was given of how many protected Trees will be affected. Therefore is it not clear from the report what will be the extent of the impact on protected trees.2 2. Page 28 of the amended Scoping Report (SR) refers to the Northern Cape Nature Conservation Act as Act No. 1374 of 2009. Please note it should read Act No.9 of 2009. 3. Page 28 stated that in terms of the Northern Cape Nature Conservation Act (NCNA), a permit is required from the Department of Agriculture. Forestry and Fisheries (DAFF). Please note that the DAFF has no mandate in terms of the NCNA. Permits issued in terms of the NCNA must be obtained from the provincial Department of Environment and Nature Conservation (DENC). The DAFF issue licenses for the removal or disturbance of protected trees in terms of the National Forests Act, Act 84 of 1998 only. 4. Page 34 point 5.9.1 refers to the National Veld and Forest Fires Act. Act	1. Amended in the Scoping report 2. Amended in the Scoping report 3. Amended in the Scoping report 4. Amended in the Scoping report 5. Noted 6. Amended in the Scoping report 7. The screening assessment was done to identify if there was a need for a detailed assessment. Through this process followed the need for a detailed biodiversity assessment was identified and was conducted as part of this EIA phase (See Appendix 7.1). (Pease note this was undertaken by a different consultant that who undertook the desktop screening assessment). 8. The draft Environmental impact report (EIR), detailed faunal and flora specialist report as well associated draft Environmental management program report (EMPr) will be distributed to DAFF for comment and review. 9. As per previous responses, the screening desktop assessment attached to the report was undertaken to inform the scoping process and a detailed biodiversity report was compiled (See Appendix 7.1) during the EIA phase of the project. 10. The detailed assessment was conducted within the optimal period as indicated between August and November. 11. Amended in the Scoping report

101 of 1998 (NVFFA). It stated that a company must burn firebreaks in terms of section 21 of the NVFFA. Please note that s21 of the NVFFA refers to the procedure for making Regulations and has nothing to do with firebreaks. The relevant section is section 12.

5. Page 39 refers to the key commenting authorities. Please take note of the new telephone number at the Forestry Office in Upington: (054) 338 5909.

6. Page 42 refers to earlier comments made by the DAFF. Please check the spelling errors and the error with the date on which the protected tree list was published. It was published in 2011.

7. Page 50 refers to vegetation in the study area and stated that "a detailed species account within the study area was not assessed, however this will be made obligatory to the proponent before construction commences following approval of regional DAFF". The Department of Forestry is concerned about this statement. What if numerous plant species of special concern are present on site? The Environmental Impact Assessment (EIA) must assess the potential impact on the environment before a project is authorized and if there are sensitive features it should be mapped and avoided as far as possible. This includes the potential impact on plants of special concern. To say that a detailed plant species account will be assessed before construction commences but after authorization was obtained is not acceptable, unless if it is merely for the purpose of obtaining a permit or license for the destruction of protected plant species. The applicant cannot be exempted from doing a vegetation survey during the EIA phase. It is necessary to assess the potential impact on the vegetation. According to the amended Scoping Report, endangered and protected plant species could occur in the study site.

8. Page 67 stated that a biodiversity study will be conducted during the EIA phase. Kindly provide this office with the biodiversity assessment and the draft Environmental Management Plan (EMP) as soon as it is available.

Vegetation Assessment

9. Page 25 of the vegetation assessment dated July 2012 summarized results and stated that a detailed assessment of local vegetation communities was beyond the scope of the report and that satellite imagery was used to highlight ecosystem diversity in the area. As pointed out above, the DAFF is concerned about this.

10. Page 34 stated that is highly likely that threatened flora could occur within the study site and that the optimal period to survey for these species appears to be August to December. Since we are now in this optimal period for such a survey, the DAFF suggests that the survey be conducted as soon as possible. 11. Page 49 stated that protected trees (National Forests Act, Act 84 of 1998) were observed in the study site and that a "permit would have to be obtained from the Department of Water Affairs .. ." Please note that Forest Act Licenses are obtainable from the Department of Agriculture, Forestry and Fisheries.	
Comments were received from SAHRA on the 03 September 2012 please refer to the public participation report Appendix 5	
Comments received from John Geering (Snr Env Advisor) from Eskom on the 5 September 2012: The proposed development is in close proximity to the existing Eskom Transmission 275kV power line connecting Paulputs substation to the National Grid. Eskom is planning to construct a new high voltage power line from Aggeneys substation to Paulputs substation. It is my understanding that there is an existing environmental authorisation for the power line that was granted by DEA. Please contact Mr Kentridge Makhanya, whom I have copied in this mail, with regards to the proposed Aggeneys-Paulputs HV power line. Please also find attached general requirements for works at or near Eskom assets (Please refer to Appendix 5 for these requirements).	Mr Kentridge Makhanya have been contacted regarding the proposed Aggeneys-Paulputs HV power line and it was determined that the proposed development would not conflict with this infrastructure.

7. DESCRIPTION OF THE RECEIVING ENVIRONMENT

7.1. REGIONAL LOCATION

The site for the proposed facility lies within the Namakwa District Municipality and within the Khai-Ma local Municipality. Portion 6 of the farm Konkoonsies 91 is located on the gravel road between the N14 national tar road and the R358 Pofadder-Onseepkans road in the Northern Cape. Namakwa District Municipality covers an area of approximately 126 747 square kilometres. The area demarcated in red within the study area refers to the area which already has received environmental authorisation and is a preferred bidder of the DoE IPP programme.

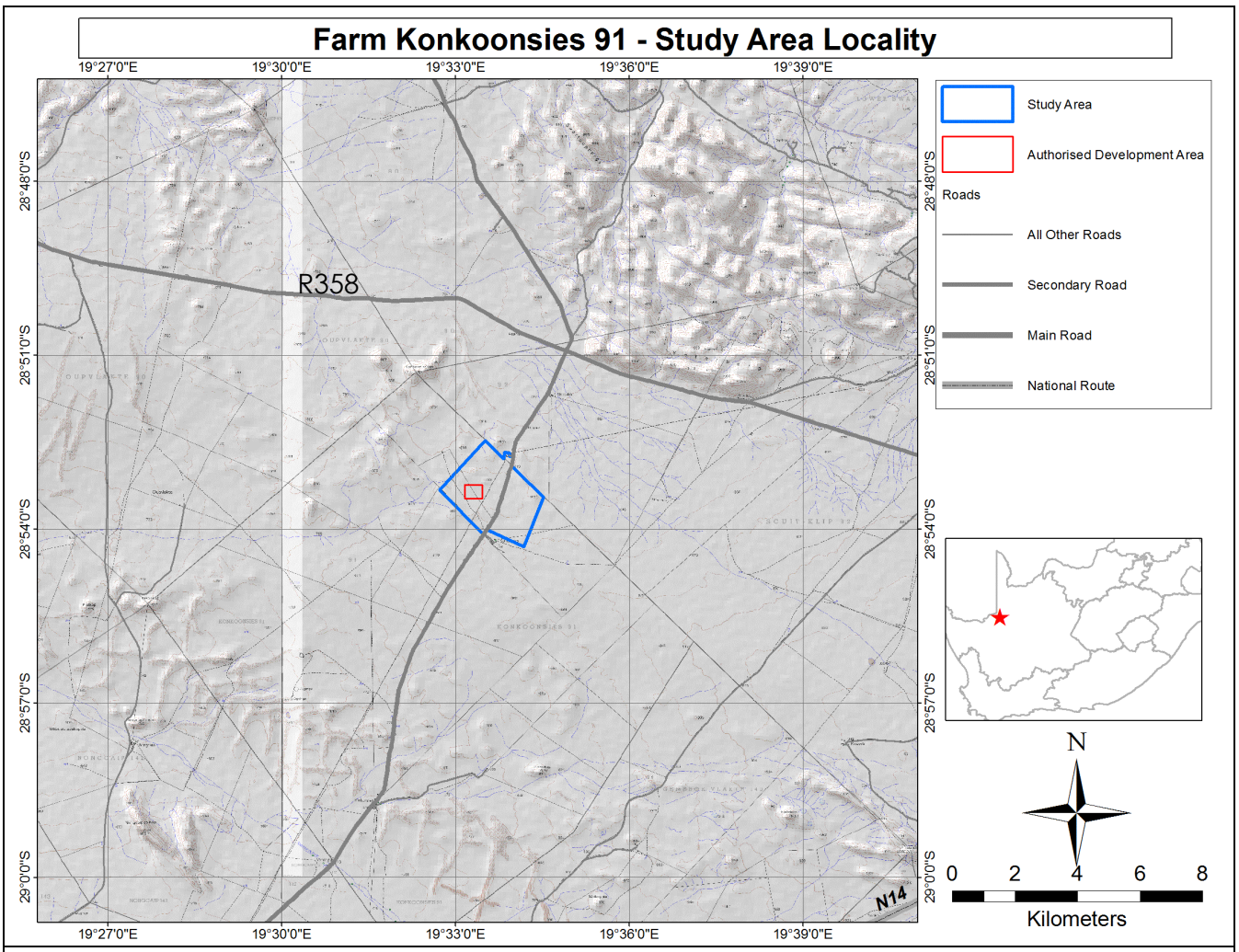


Figure 7-1: Topographical locality map of portion 6 of the farm Konkoonsies 91

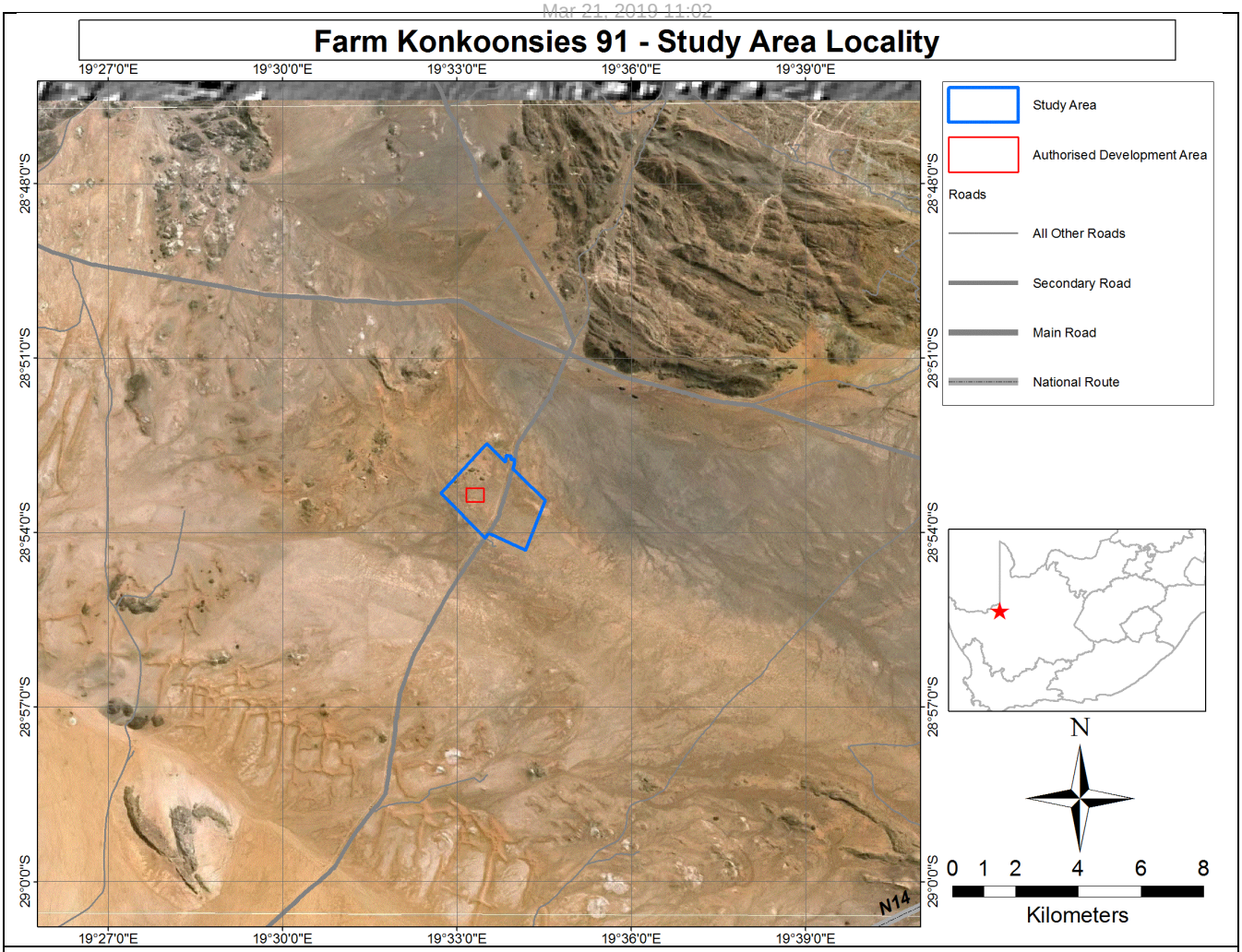


Figure 7-2: Google Earth locality map of portion 6 of the farm Konkoonsies 91

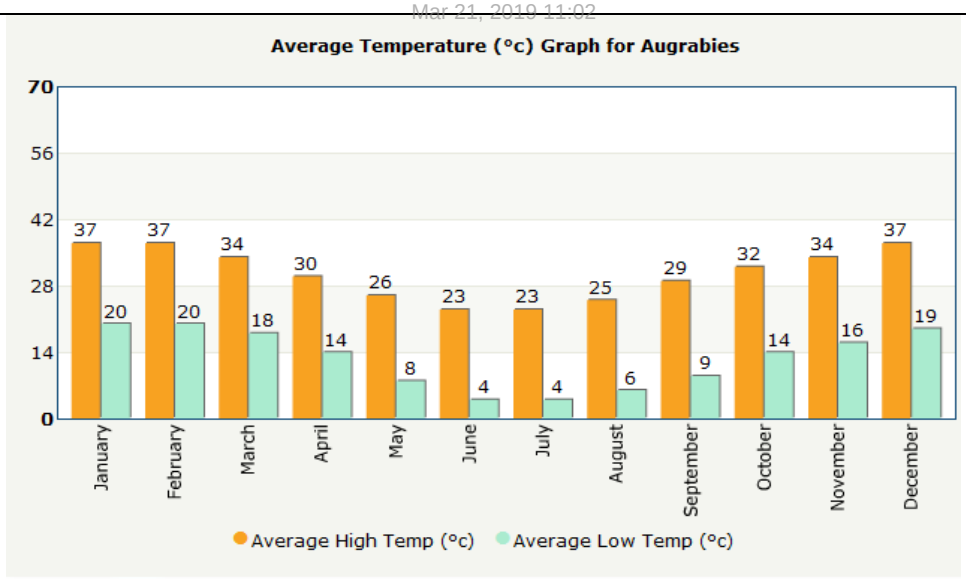
7.2. LAND-USE AND LAND-COVER OF THE STUDY AREA

The predominant land use activities within the Northern Cape are mining and goat, sheep, cattle and game farming. The site is characterised by mostly cattle and sheep farming, with limited irrigational schemes using the Orange River to the north. The surrounding land cover is mostly grassland and scrubland. The main issues identified as relating to land resources in the Northern Cape Province are desertification, land degradation, land ownership and land use. The province is classified to be 30.3% moderately degraded and 24.2% of the land classified as extremely degraded. This results in approximately 50% of the province land falling into the above categories. The Northern Cape Province is very susceptible to desertification and measures should be put in place to ensure sustainable land management.

7.3. CLIMATE

7.3.1. TEMPERATURE

The daily average maximum temperatures in the town of Pofadder range from 37 °C in January and February to 23 °C in July. Temperatures during the winter months of June and July are considered the coldest with an average night time temperature of 3.1 °C.



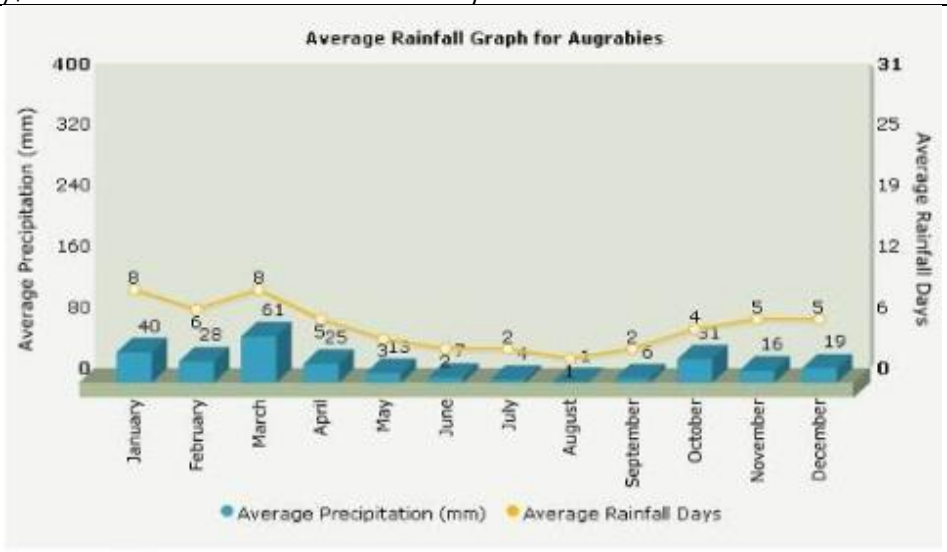
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
37°c	37°c	34°c	30°c	26°c	23°c	23°c	25°c	29°c	32°c	34°c	37°c
20°c	20°c	18°c	14°c	8°c	4°c	4°c	6°c	9°c	14°c	16°c	19°c

Figure 7-3: Average temperature graph for Augrabies region (http://www.worldweatheronline.com)

7.3.2. RAINFALL

There are no official rainfall stations in close proximity to the study area. It was subsequently necessary to use data from the nearest official rainfall station. The acquired information was retrieved from the following website, www.worldweatheronline.com. The data is for the Augrabies Falls National Park on the Orange River some 72 km east-northeast of the study area.

Table 7-17-2: The monthly average rainfall for the Augrabies Falls National Park. (Courtesy, www.worldweatheronline.com)



Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
40mm	28mm	61mm	25mm	13mm	7mm	4mm	1mm	6mm	31mm	16mm	19mm
8	6	8	5	3	2	2	1	2	4	5	5

The above weather station is located in quaternary catchment D81A within the Augrabies Falls National Park east of the two quarterly catchments over which the study area is located. The average rainfall within this catchment is slightly more than the study area, however it would have virtually the same monthly rainfall trends. Therefore we can derive average monthly rainfall of the study area by using the average monthly rainfall table.

The Augrabies weather station receives an average rainfall of 127 mm/a. We can use this value along with the average monthly rainfall table of Augrabies to derive the average monthly rainfall at the study area. The table below indicates the derived average monthly rainfall at the Konkoonsies site (Krige, 2012).

Table 7-37-4: The derived values for Konkoonsies, using a slightly equalised trend in rainfall at Augrabies as the base for the calculations (Krige, 2012).

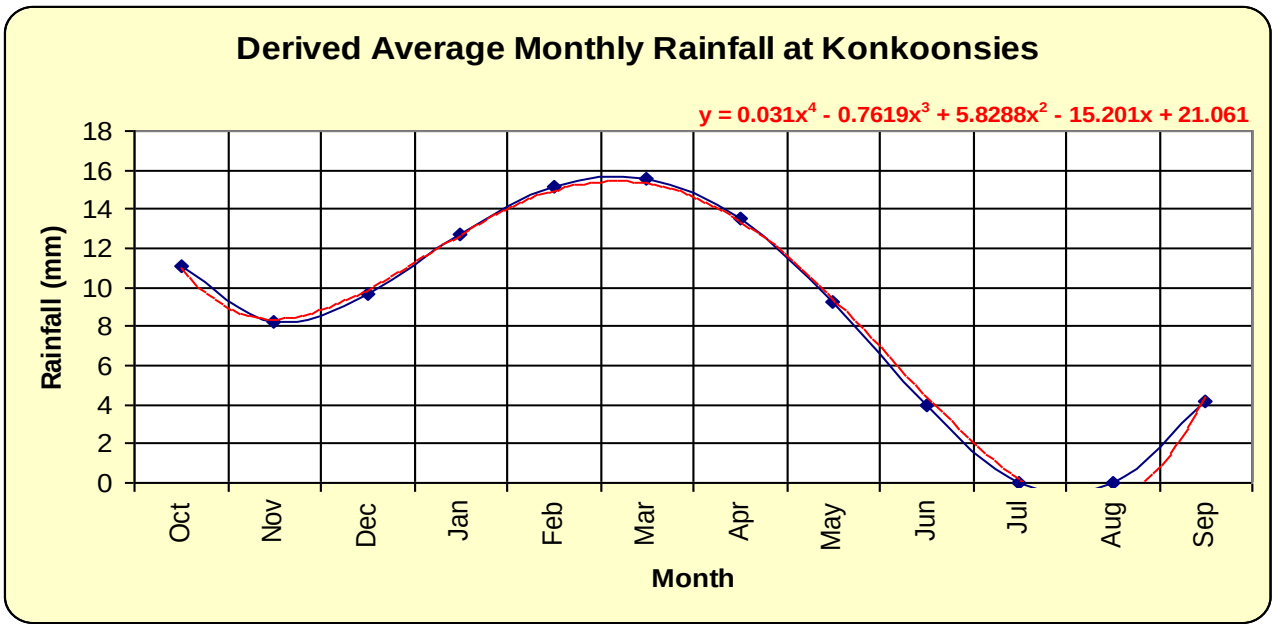


Table 7-57-6: The average monthly rainfall at Konkoonsies as derived from the rainfall trend at Augrabies (Krige, 2012).

	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall (mm)	12.7	15.1	15.5	13.5	9.3	3.9	0	0	4.1	11.1	8.2	9.7

The tables above indicate that the Konkoonsies site rainfall pattern does not simply vary seasonally. There are peaks in rainfall during February, March and April and then again during the end of September and October. It could therefore be quite safely assumed that the solar plant development would not have to contend with large volumes of surface run-off water (Krige, 2012).

7.3.3. WIND

Figure 7-4 represents a wind rose of the dominant wind direction in the Augrabies region (Augrabies is the closest area where reliable data could be retrieved within the area) that is predominately south easterly. This is expected as Augrabies is in a part of the country where the mean flow is from the anticlonic circulation from the South Atlantic high pressure.

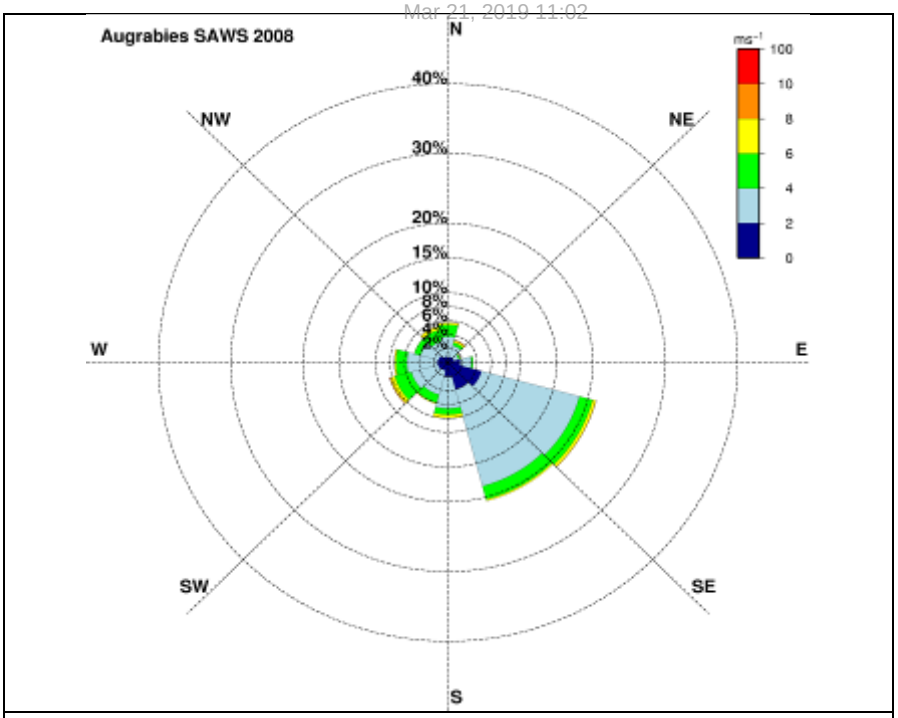


Figure 7-4: Augrabies wind rose

7.4. TOPOGRAPHY

The proposed study area has very dominant rocky outcrops (koppies) on the site, with flat land in between. The majority of the site is flat, with minimal change in elevation throughout. The broader region around Konkoonsies is also flat, with higher mountains (Ysterberg) approximately 4 km's to the north-east of the site. Figure 7-5 below shows the regional topography of the study area. The figure indicated that the study area is relatively flat with no major topographical constraints to the proposed development.

The average slope of 1.14 ˚ (2%) (East West) and 1.14˚ (2%) (North South) (Figure 7-6 & Figure 7-7). The study area has an average elevation 838 mamsl. The highest point within the study area was recorded at 857 mamsl

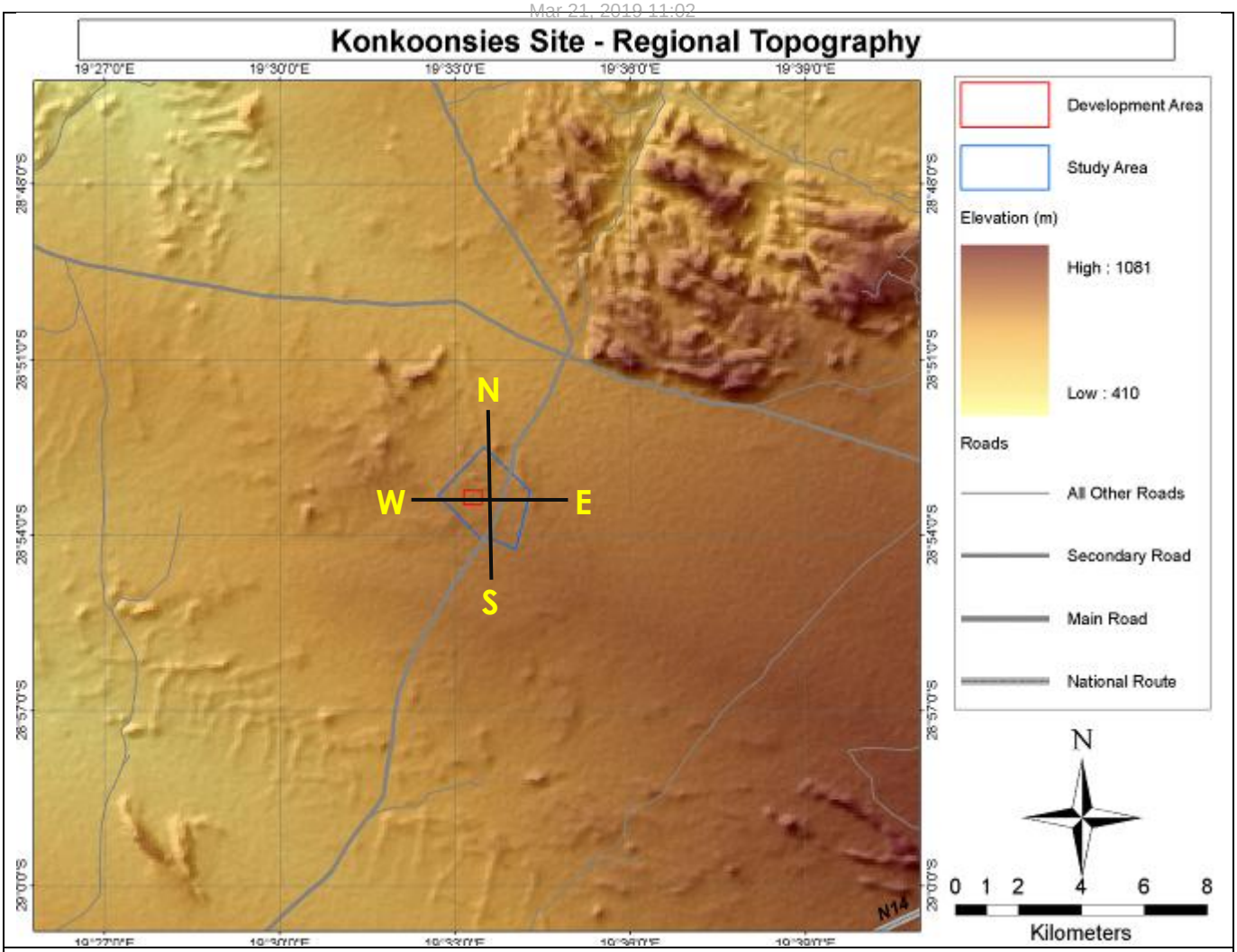


Figure 7-5: Regional topography map of the study area

North South

Figure 7-6: North South Slope analysis of the study area.

East West

Figure 7-7: East West Slope analysis of the study area.

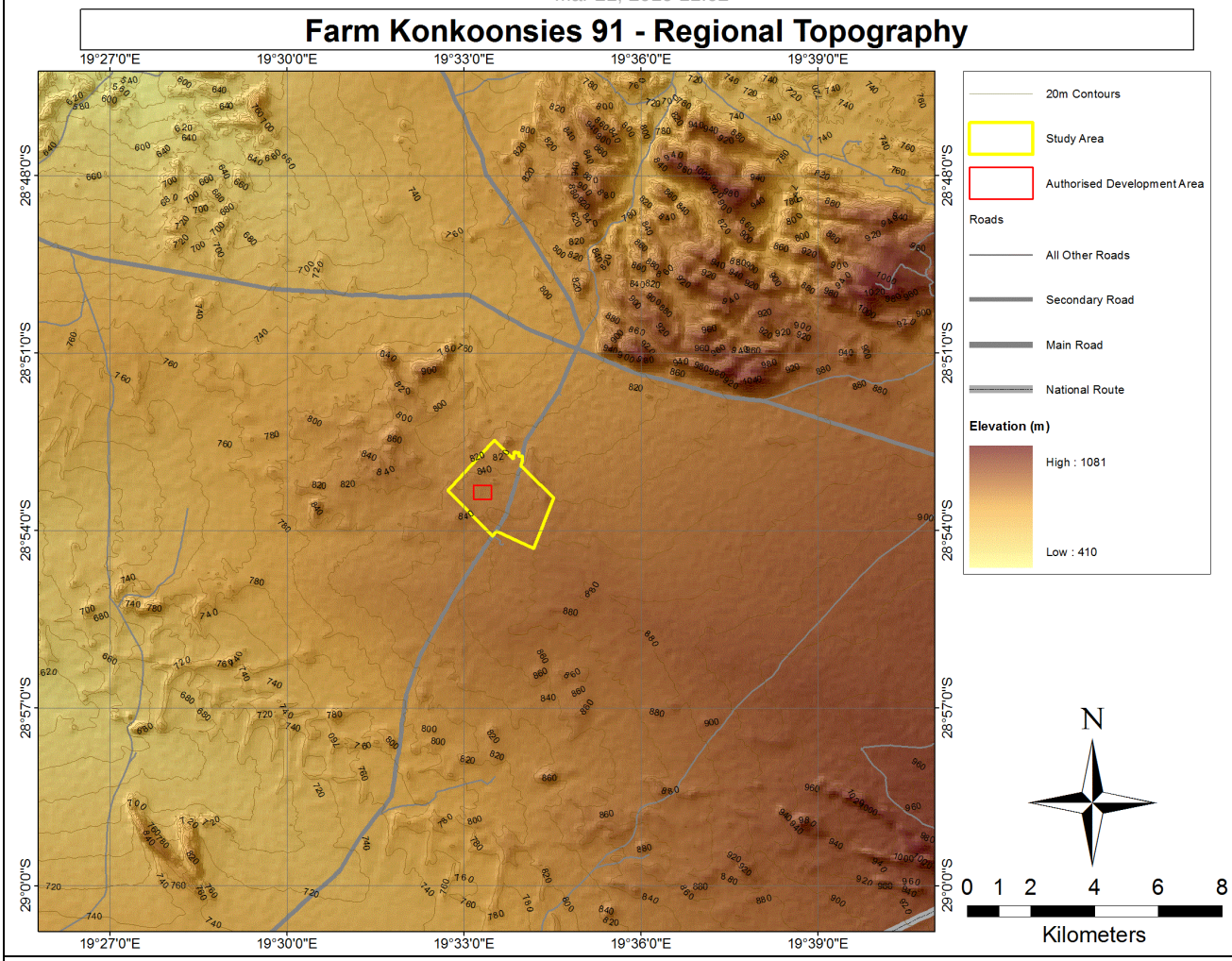


Figure 7-8: Konkoonsies 91 Contours

7.5. GEOLOGY

The study area is located predominantly on unconsolidated quaternary sediments. The Little Namaqualand Suite outcrops to the northern boundary of the study area and the Hoogoor Formation outcrops to the west of the site. Essentially the site exists within the Namaqualand Metamorphic Province, which consists of an assemblage of metasedimentary, metavolcanic and intrusive rocks, which are schistose and/or gneissose (Visser, 1989). Strikes and dips are not constant and dips are fairly steep almost everywhere (Rison, 2012).

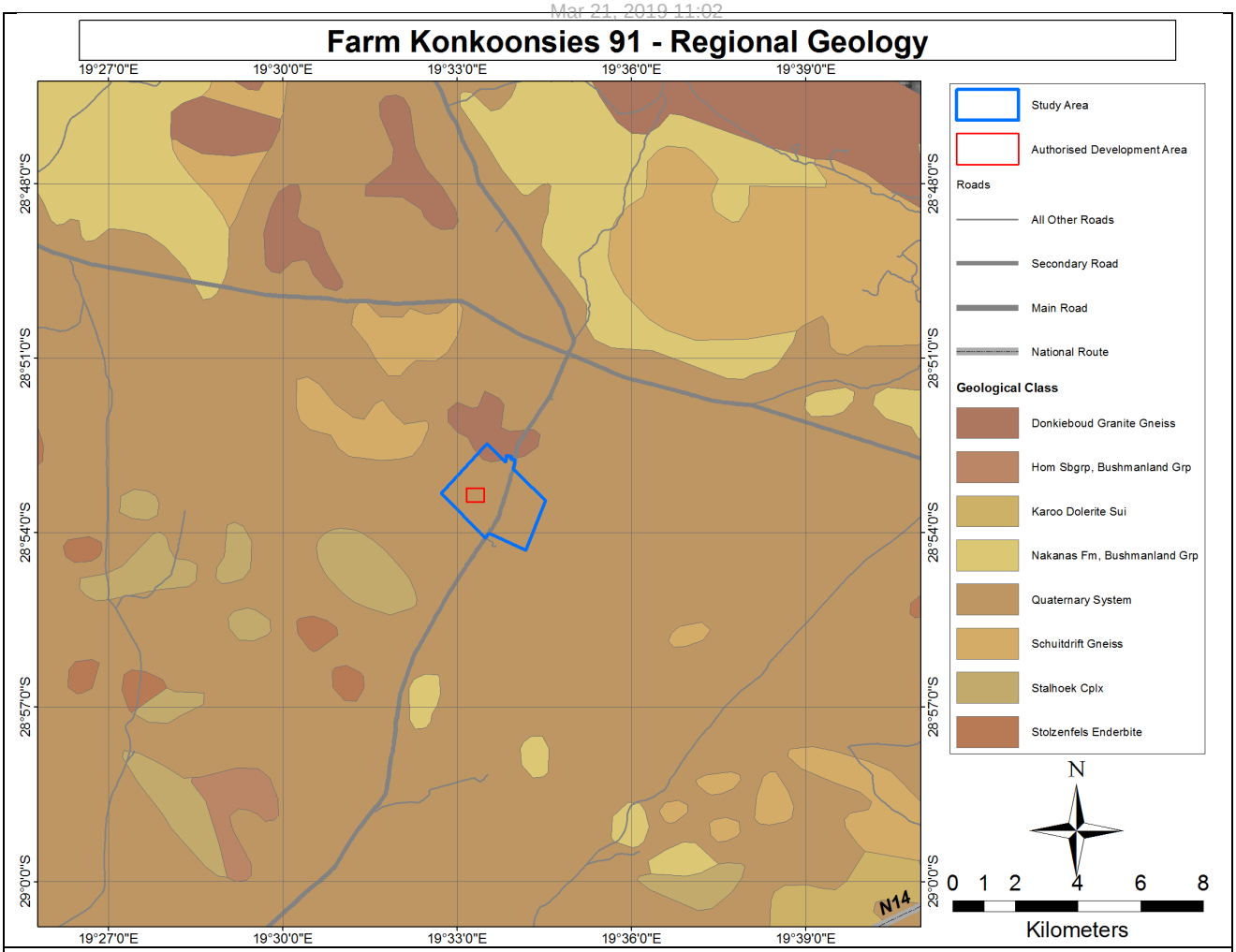


Figure 7-9: General surface geology surrounding the study area.

7.6. SOIL

7.6.1. LAND TYPE DATA

Land degradation is seen as the reduction or loss of biological or economic productivity and complexity in different land covers/uses. Approximately 21% of the Province has light degradation whilst around 30% is moderately degraded. About 24.2% is extremely degraded, meaning that just over half the Province falls into the moderate and extreme degradation categories. Veld degradation was found to be serious but decreasing - the Province has the third highest provincial veld degradation index in South Africa. Soil degradation on the other hand was not perceived to be a serious problem. Overall, commercial farming areas require the most attention. (SoER, 2004)

The majority (66%) of the farm Konkoonsies falls within land type Ag37. The remainder of the farm falls within land types Af14 (25 %) and Ae67 (8%) (Figure 7-10).

Land type Af14, Ag37 and Ag67 soil forms are present within the area encompassing the greater farm Konkoonsies, however, only Ag37 occurs within the proposed study area on Ptn. 6 thereof. The soil forms potentially occurring in this land type are as follows, with each different form likely to occur within a different landscape feature:

Land type Ag37:

1. Mispah form on the high lying areas. Soil depth varies from 100 – 200 mm. Soils are very sandy in nature.

2. Hutton soils form lower down the slopes. Soil depth varies from 200 – 300 mm. In certain areas these soils are deeper. Soils are sandy to sandy loam.
3. Dundee and Oakleaf soils are found in the lover lying areas (valley bottom) which have depths of up to 1000 mm. Soils are very sandy.
4. The major soil restriction is solid rock.

According to the '*Environmental Potential atlas for the Northern Cape- Generalised Soil Description'* (Figure 7-11), the soils within the study area are considered to be soils with minimal development, usually shallow on hard or weathered rock, with or without intermittent diverse soils. Lime is indicated as being generally present in part, or most, of the landscape. The general soil depth in the area is <450 mm, with <15% clay content within the topsoil. (DEA et al., 2000).

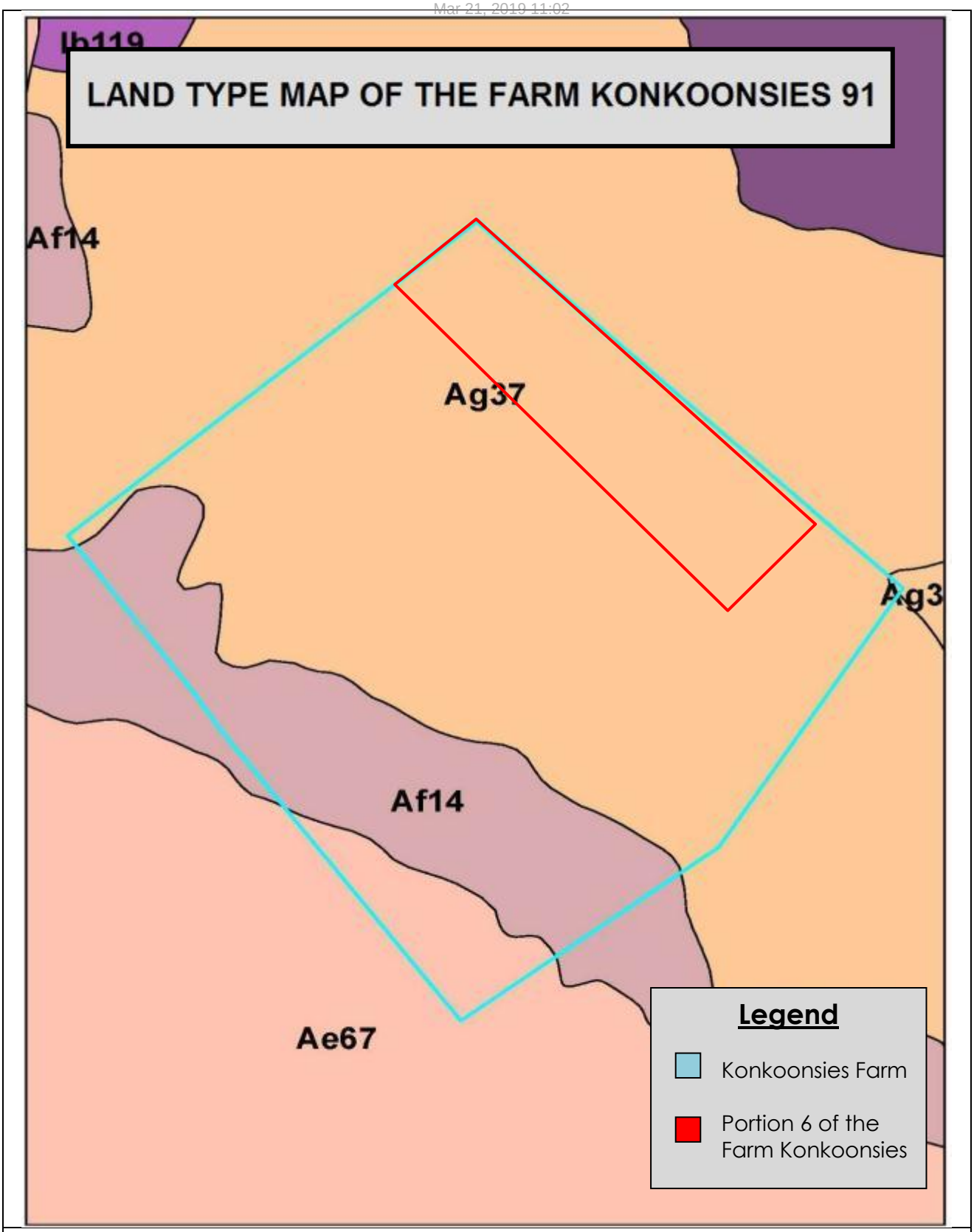


Figure 7-10: Land type map for the farm Konkoonsies 91

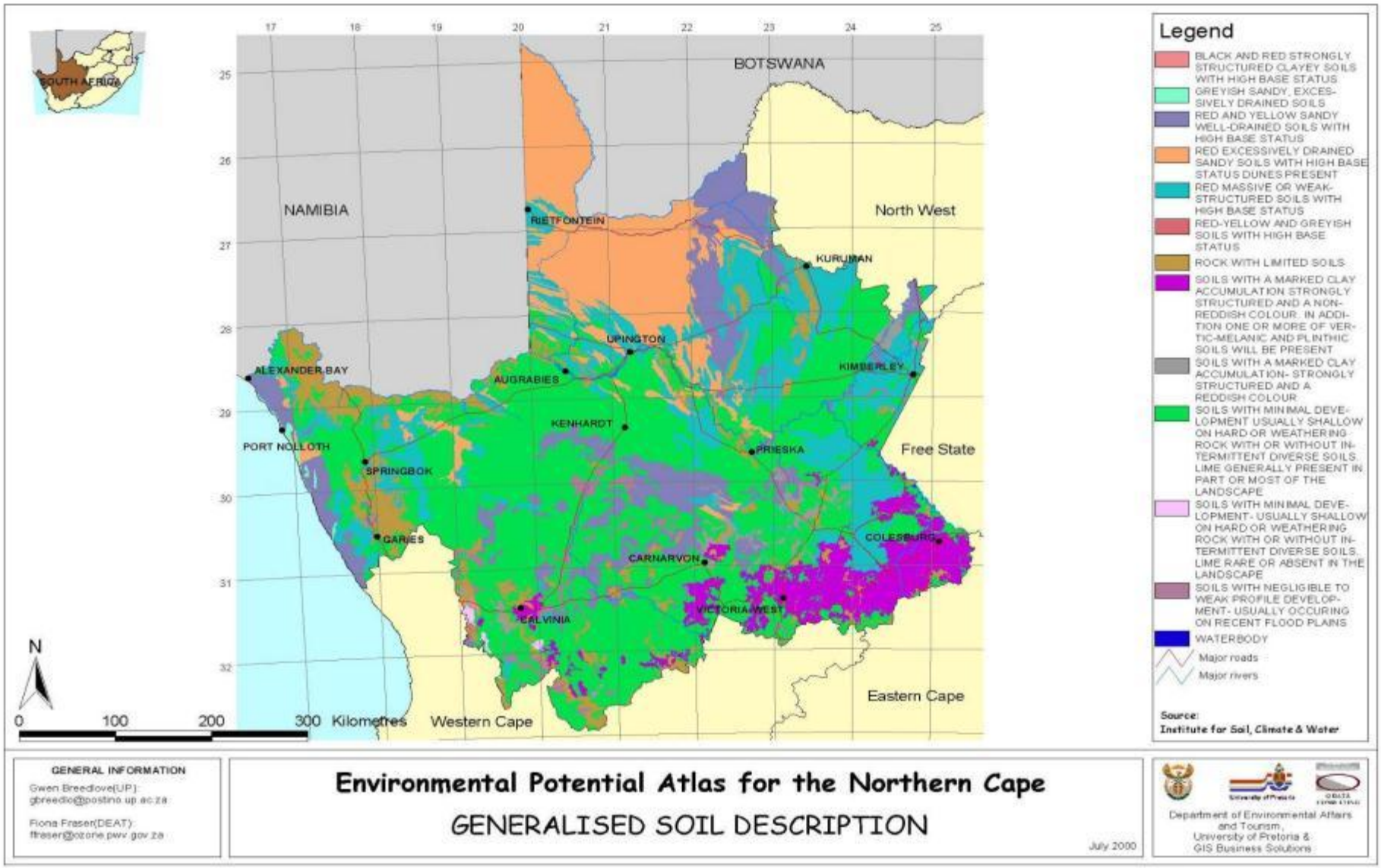


Figure 7-11: General soil description map of the Northern Cape Province (http://www.environment.gov.za)

7.7. BIODIVERSITY

Willem de Frey (EcoInfo) was appointed to conduct a baseline biodiversity assessment (refer to appendix 7.2). Following recommendations made in his report, Simon Todd (Simon Todd Consultancy) was appointed by ESA to conduct a detailed site faunal and floral assessment (refer to Appendix 7.1) of the site. A concise overview of the findings thereof is presented in the sections that follow.

7.8. BIOME AND BIO REGION

The proposed study area is situated within the Bushmanland Arid Grassland vegetation type. Approximately 45 478 km^2 of the Northern Cape is covered by this vegetation type, which is also the second most extensive vegetation type in South Africa. The site is primarily located in the Namaqualand Metaporphic Province containing metasedimentary, metavolcanic rocks and schistose and/or gneissose intrusions. Soils are largely shallow Mispah and Hutton forms with a deeper layer of sandy Dundee and Oakleaf (Ag37 land type). More than 99% of the original extent of the vegetation type is still intact and classified as being least threatened.

7.9. VEGETATION TYPE

The vegetation type contains the Bushmanland endemic *Tridentea dwequensis*, as well as the succulent shrubs *Dinteranthus pole-evansii*, and the herb *Lotononis oligcephala,* among others. The vegetation type is classified as least threatened with approximately 99% still regarded intact. The presence of extensive intermittent river channels as well a large number of endohetic pans is a characteristic of the vegetation type (Todd, 2012).

7.9.1. FLORA

Three different plant communities were apparent on site, each associated with different habitats on site. These plant communities include sandy grasslands, rocky outcrops and stony hills. The site is however mainly dominated by open grasslands on sandy soils (Characteristic of Bushmanland Arid Grassland vegetation type). There are a number of rocky outcrops present on site as well stony hill towards the northeast of the site.

1. Sandy Grassland

   This is the most predominate vegetation community on site (see Figure 7-12). The following grass species were present in these areas: *Stipagrostis anomala*, *Stipagrostis obtusa*, *Stipagrostis ciliata* var. *capensis*, *Stipagrostis uniplumis* var. *neesii* and *Schmidtia kalahariensis.* The most dominant shrub species present on the site is as follows: *Rhigozum trichotomum*, *Lycium eenii*, *Hermannia spinosa* and *Eriocephalus microphyllus* var. *pubescens.* No large trees were present on site, however two low tree species Boscia foetida subsp. foetida and Parkinsonia Africana were relatively common. These species as indicated by the specialist is very widespread and common throughout the area and contain relativity low diversity and abundance of species of conservation concern (Todd, 2012).

Figure 7-12: Sandy Grassland community type occurring mainly throughout the site (Todd, 2012).

2. Rocky Outcrops

The species occurring in these areas on the site is highly distinctive from the surrounding plains and contain various species not found elsewhere. The area also provides important habitat for various faunal species (see Figure 7-13). Species observed on the rocky outcrop include *Chascanum garipense*, *Tricholaena capensis subsp. capensis*, *Montinia caryophyllacea*, *Cissampelos capensis*, *Hermannia minutiflora*, *Enneapogon scaber*, *Commiphora gracilifrondosa* and *Aloe dichotoma*. It was indicated by the specialist that these areas are considered highly sensitive and that it's recommended that no development should disturb these areas (Todd, 2012).

Figure 7-13: Rocky Outcrops on site (Todd, 2012).

3. Stony Hills

The third flora habitat is that of the stony hills, which run along the northeastern and southwestern edges of the site (See Figure 7-14). Unlike the rocky outcrops, the stony hills are characterised by smaller rock fragments, which in turn give rise to a distinctive plant community. Within the stony hills, the typical plant species usually include *Kissenia capensis*, *Boscia foetida* subsp. *foetida*, *Enneapogon scaber*, *Barleria rigida*, *Monechma spartioides*, *Hermbstaedtia glauca*, *Microloma incanum* and *Aptosimum spinescens*. These plants according to the specialist are moderately sensitive; mainly due to the higher plant and faunal diversity associated with the plant communities recorded (Todd, 2012).

Figure 7-14: Stony Hills within the north eastern margin of the study area (Todd, 2012)

7.9.2. LISTED FLORAL SPECIES

A total of 286 plant species have been recorded within the quarter degree squares (50km X 50Km) around site 2819 CD, DC and 2919 AB, BA. *Hoodia gordonii* (classified as DDD – Data deficient – insufficient information), *Caesalpinia bracteata* (classified as Vulnerable), and *Acacia erioloba* (classified as Declining) are known from the area, but only *Hoodia gordonii* was observed on the site. In addition to the species from the South African Red Data List, there were also several species found which are protected under the Northern Cape Nature Conservation Act, the most common being *Boescia foetida*.

It should be noted that the site falls within the planning domain of the Namakwa Biodiversity Sector Plan. The site falls just south of an extensive Ecological Support Area, however the development will not impact the CBAs or ESA in the vicinity.

The open generic, flat landscape of the study area on a broad scale means that there is limited ecological gradient and processes likely to operate across the site. The habitat of the study area is widely available and similar (Todd, 2012). The specialist indicated that the potential for broad scale fragmentation or loss of connectivity due to the proposed project is low.

7.9.3. FAUNA

Mammals

The site falls within the distribution range of 43 terrestrial mammals and therefore the site is not considered to have a rich faunal community. Because of the relatively diverse array of habitats available, however, most of these 43 species are likely to occur within the site boundaries. The rocky outcrops found on-site are associated with species such as Klipspringer (*Oreotragus oreotragus*), Rock Hyrax (*Procavia capensis*), Dassie Rat (*Petromus typicus*), Pygmy Rock Mouse (*Petromyscus collinus*), Western Rock Elephant Shrew (*Elephantulus rupestris*) and Hewitts' Red Rock Rabbit (*Pronologus saunsersiae*). The sandy plains are associated with species such as the South African Ground Squirrel (*Xerus inauris*), Aardvark (*Orycteropus afer*), gerbils, Cape and Bat-eared Fox (*Vulpes chama* and *Otocyon megalotis*), Steenbok (*Raphicerus campestris*) and Meerkat (*Suricata suricatta*).

Only one listed mammal, the Black-footed Cat *Felis nigripes* (listed as Vulnerable), may potentially be found on site. However, this particular species' habitat is widespread and the relatively small development of the PV facility would not amount to a significant loss of habitat.

The only antelope which are likely to occur on the site are Steenbok (*Raphicerus campestris)* and possibly the Common Duiker (*Sylvicapra grimmia)*.

The following carnivorous species although not observed on the site are likely to occur on site: Meerkat (*Suricata suricatta*), Yellow Mongoose (*Cynictis penicillata*), and Bat-eared Fox (*Otocyon megalotis*). Other mammal species which are most likely to occur are the Aardvark (*Orycteropus afer*), and Hewitt's Red Rock Rabbit (*Pronologus saunsersiae*).

A small mammal community is likely to be dominated by the following species: Cape Porcupine *(Hystrix africaeaustrolis),* South African Ground Squirrel *(Xerus inauris), and* Namaqua Rock Mouse (*Micaelamys namaquensis)*.

Species associated with sandy substrates such as Brants's Whistling Rat *Parotomys brantsii* and Hairy-footed Gerbil *Gerbillurus paeba* will be largely restricted to areas with deeper soils such as along the drainage lines. The overall abundance of small mammals at the site is likely to fluctuate widely from year to year depending on rainfall which regulates small mammal abundance through its effects on plant cover and food availability.

The likelihood of bat occurring in the area is reduced due to the lack of suitable habitat on site as well directly availability of water. The proposed facility would therefore not directly affect bat communities likely to occur in the area. Please note the potential impact on bats is not considered applicable to the study area. As there are no suitable habitats located within the study area for bat communities the impact is not considered significant and not considered further in this assessment. Recommendation has also been made in section Fauna and Flora regarding installation low UV emitting lighting at the facility as to red

The proposed development apart from direct habitat loss would also potentially disrupt the connectivity of the landscape for mammals, due to the erection of fences around the facility. However, the open landscape and underdevelopment of the area would not significantly reduce the movement of mammals as they would be able to circle past the facility with relative ease.

Reptiles

The site has a known distribution range of 46 reptile species, which is considered a diverse reptile community. Given the range of habitats available at Konkoonsies, a large number of these reptiles are likely to be found on site. The reptile composition at the site would most likely be as follows:

- Tortoise 1x
- Snakes 17x
- Lizards and skinks 19x
- Geckos 8x
- Chameleon 1x

This would suggest a reptile fauna composition low in tortoises and snakes species, but rich in lizards, skinks and geckos. This composition of reptile fauna reflects the lack of vegetation cover and structure as the site favours nocturnal and fast moving species

adapted to open ground. Reptile species that prefer areas of sandy, stony and open ground and more likely to occur on the site. The following species were confirmed on site: Namaqua Sand Lizard *Pedioplanis namaquensis*, Ground Agama *Agama aculeata* and Western Rock Skink *Mabuya sulcata*. No species which may occur in the area are listed as endangered, but the Bushmanland Tent Tortoise is protected under provincial ordinance and is also listed under Appendix II of the act of Cites which regulates trade in these species.

The development is expected to impact the direct natural vegetative habitat of the site; some infrastructural components constructed by the development would attract species which utilize such structures such as tubercled geckos (*Chondrodactylus* spp) and agamas (*Agama* spp). Artificial lighting on site would attract insects which in turn attract geckos and other night-feeding insectivores (such as bats) to the vicinity of the lights. This could however be easily mitigated by using low-UV emitting lights such as most LEDs.

Amphibians

Given the scarcity of water in the area amphibian species are extremely unlikely to occur on the site. The only species likely to occur on-site and is able to tolerate extended dry periods is the Marbled Rubber Frog (*Phrynomantis annectens*). The greatest threat to amphibians associated with the development is probably chemical and fuel/oil spills related to the construction activities, rather than the presence of the development in the long-term.

Avifauna

The Northern Cape is generally considered to be poor in bird species richness, although the province is considered to be an important habitat for many terrestrial and often cryptic bird species; such as larks, korhaans and chats. Nama-karoo is an important speciation centre for stenotropic warblers and lark species. The province therefore consists of range of endemic (or near endemic) species such as the Scalater's lark, Red lark and the Cinnamon-breasted Warbler. The majority of these species is threatened mostly due to habit destruction and alteration (e.g. Grazing) (Pachnoda Consulting cc, 2010).

The Bushmanland arid grassland ecological conforms to the habitat requirements of mainly bird species such as the Karoo Korhaan (*Eupodotis vigorsii*) and Ludwig's Bustard (*Neotis ludwigii).* As the site is dominated by Bushmanland sandy grasslands and therefore large section of the ecological type corresponded with the distribution range of the endemic Red lark (*Calendulauda burra*). Avifaunal communities pertaining to the grassy plains habitat type can be divided into three major groups (Pachnoda Consulting cc, 2010):

1. Facultative nomadic passerines (such Chat Flycatcher, and Spike-heeled Lark)
2. Large terrestrial species (such Burchell's Courser, Karoo Korhaan and Ludwig's Bustard.
3. Highly nomadic, mainly granivous species: Grey-blacked Sparrow-lark, Namaqua Sandgrouse, Lark-like Bunting and Starks lark

The major concern regarding avifaunal impacts is the potential electrocution and collision of birds to infrastructure. This is mostly associated with the proposed transmission line infrastructure from the facility switching station to the Paulputs substation. It should be be noted, however, that transmission line infrastructure already exists on the site.

7.9.4. EXOTIC AND INVASIVE SPECIES

Alien species abundance at the site was relatively low and alien plant species observed within the study area included *Datura stramonium, Nicotiana glauca,* and *Prosopis glandulosa.* These species should be controlled or removed.

7.10. SURFACE HYDROLOGY

The proposed study area is located within a very dry, warm climate mostly associated with deserts and receives an annual rainfall of approximately 103 mm. It is located within the arid Kalahari Basin in the Northern Cape. No surface water whatsoever occurs within the vicinity of the site. There are no rivers or surface streams in close proximity to the study area. The drainage channels that do exist in the vicinity of the study area are almost perpetually dry, only conveying water during the odd occasion when it rains in the area. In most cases with the drainage channels around the study area, these streams also only flow for a limited distance before they merely disappear into the Kalahari Basin sand. (Krige, 2012)

The site is located on a watershed between quaternary catchment D81E and D81F, both falling in the Lower Orange River Water Management Area. The non-perennial Kaboep River drains quaternary catchment D81F, while the drainage channel nearest to the study area draining quaternary catchment D81E does not have a name.

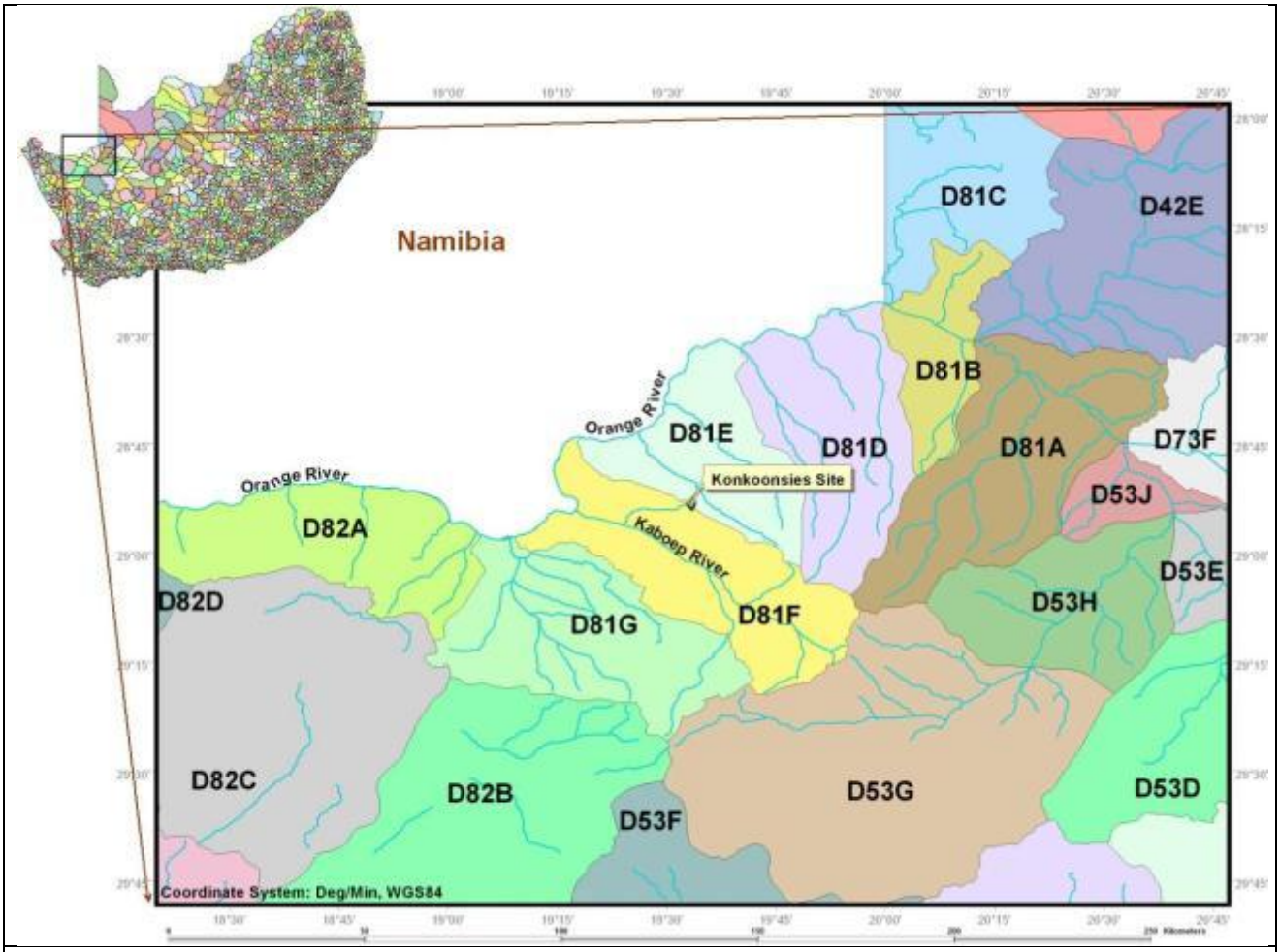


Figure 7-15: Map showing the quaternary catchments and major rivers

Quaternary catchment D81F has a mean annual rainfall (MAP) of 91.34 mm and a mean annual run-off (MAR) into surface streams of only 0.5 mm, while quaternary catchment D81E has a MAP of 97.01 mm and a MAR of 0.6 mm (Midgley et. al. 1994) (Middleton and

Bailey, 2005 – WR2005). Refer to Figure 7-15 for details of the quaternary catchments at the study area. (Krige, 2012).

7.10.1. DRAINAGE DENSITY OF STUDY AREA

There are no perennial streams in the vicinity of the site. The nearest perennial river is the Orange River, some 30 km north of the study area in quaternary catchment D81F. The only source of water within the vicinity of the site is therefore groundwater. (Krige, 2012)

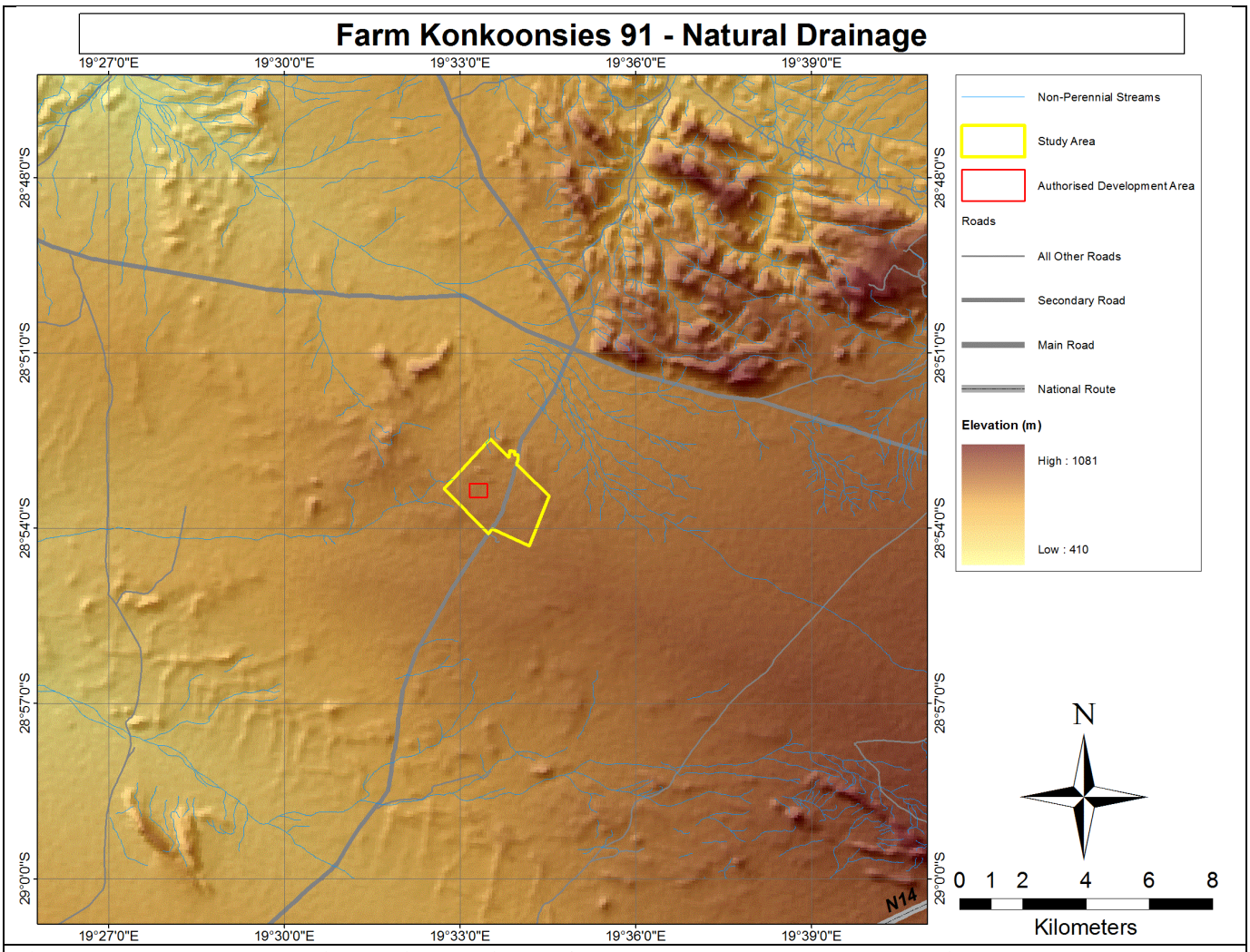


Figure 7-16: Non perennial drainage lines of the study area and surroundings.

7.11. GROUNDWATER

It is assumed that the site is underlined by two aquifers, namely a deeper secondary fractured hard rock aquifer where fracture flow dominates and an unconfined primary aquifer within quaternary sediments. This is mainly a result of the underlying geology.

Within the unconfined primary aquifer, groundwater migration will be governed by dyke contacts, jointing while major faults and shears from significant conduits at depth. The aquifer is further classified as semi-confined. The underlying aquifer is classified as a type d2 aquifer by the Department of Water Affairs and Forestry (1999). A d2 aquifer is regarded as intergranulas and fractured with yield averaging between 0.1 – 0.5 L/s (Van Bart, 2012).

DWAF (1999) produces a schematic cross section to illustrate groundwater occurrence in the Onseepkans area to the Orange River (Figure 7-18). The cross section is oriented northeast – southwest. The number one (1) in the figure below represents intense folding especially in the granite-gneiss of the Little Namaqualand suite and lava gneiss and the metasediments of the Orange River Group (Van Bart, 2012). The pink line in the figure suggests that topology clearly controls groundwater levels (Van Bart, 2012).

Groundwater development is mainly located at targeted fractures and joints on crests of anticlines. Number 2 represented in the figure below typically contains water in weathered zones and joints as well as along lithological contacts such as gneiss with quartzitic and pelitic zones, amphibole-gneiss and subordinate foliated porphyritic granite.

The Konkoonsies site straddles two quaternary catchments namely D81E. The cumulative surface area is approximately 3582 km^2. Aquifer recharge in Namaqualand is approximately 1.5 % of the annual precipitation (107 mm) which is equivalent to 5 767 020 m^3 (Van Bart, 2012).

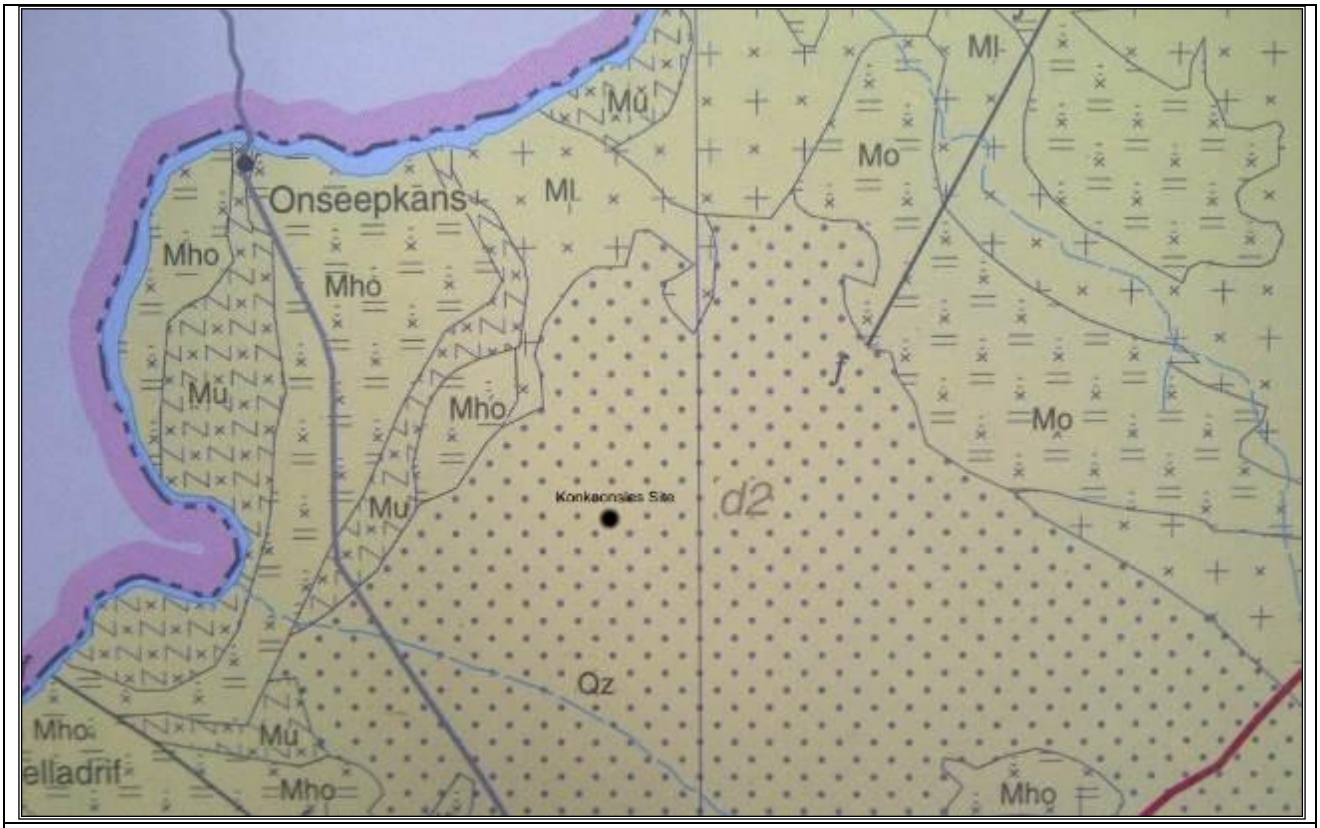


Figure 7-17: DWAF (1999) aquifer classification based on yield (Upington 2718).

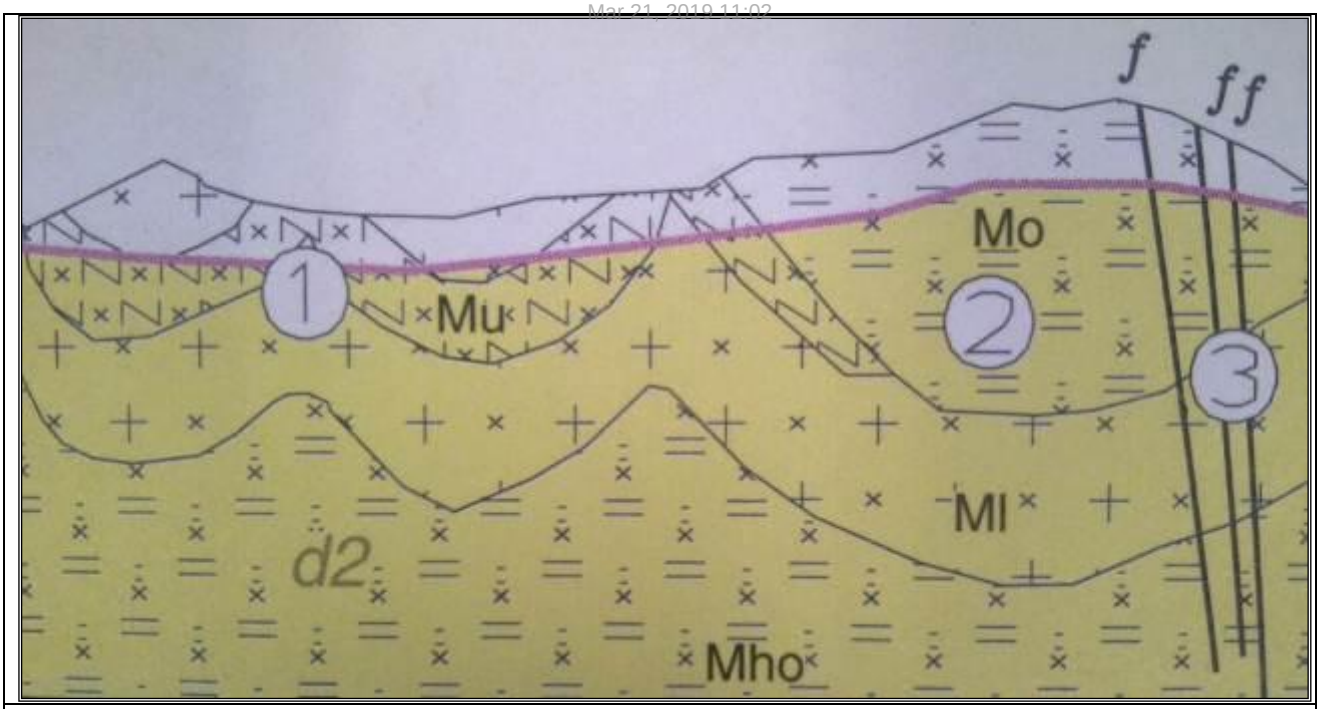


Figure 7-18: DWAF (1999) cross-section illustrating groundwater occurrence

7.12. NOISE

The area is generally characterized by farming and the ambient noise levels are very low. Vehicular traffic on the gravel dirt road is the only source of increase in ambient noise levels in the area. There are therefore no major contributors to the static noise levels in the area.

7.13. VISUAL AESTHETICS

The general appearance of the farm Konkoonsies is dominated by largely unspoilt natural Nama- Karoo vegetation on a relatively flat landscape. The landscape consists of plains of saturated light brown Nama Karoo flats. The general "sense of place" (Figure 7-20) of the area is a particular kind of openness and generally unspoilt natural beauty. As the area is dominated by open land of the Karoo, the visual and aesthetic feeling of the area is pleasant. There are however some visual intrusions existing around the proposed site; various power lines going into the substation as well as the substation itself (Figure 7-19)(Geldenhuys, 2012).

Figure 7-19: Cultural Modification & Adjacent Scenery (Geldenhuys, 2012)

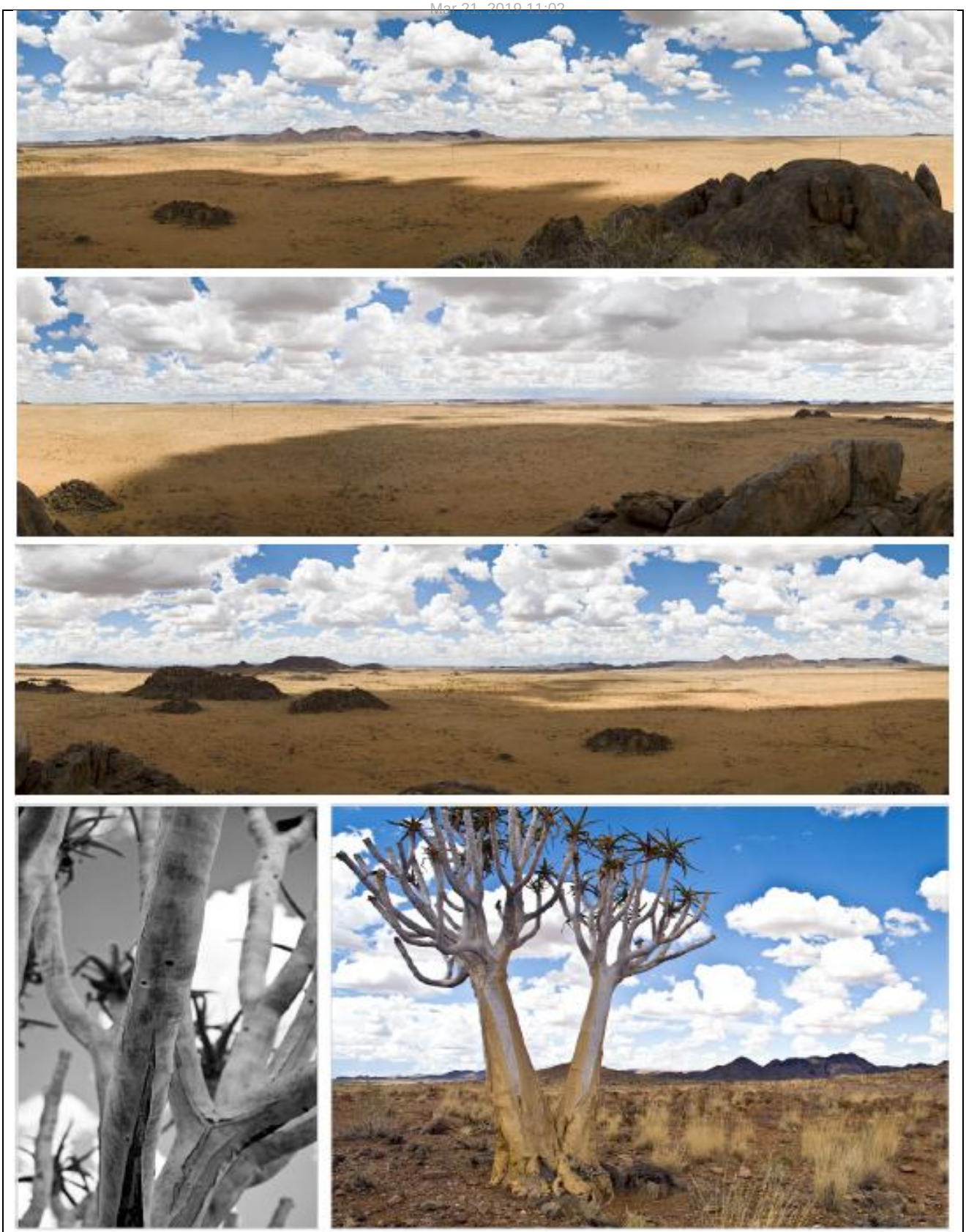


Figure 7-20: Sense of place photos (Geldenhuys, 2012).

It was identified by the visual specialist that no conservation areas occur within the development site's viewshed. Konkoonsies is however situated directly adjacent to the Augrabies National Park's proclaimed Priority Natural Area.

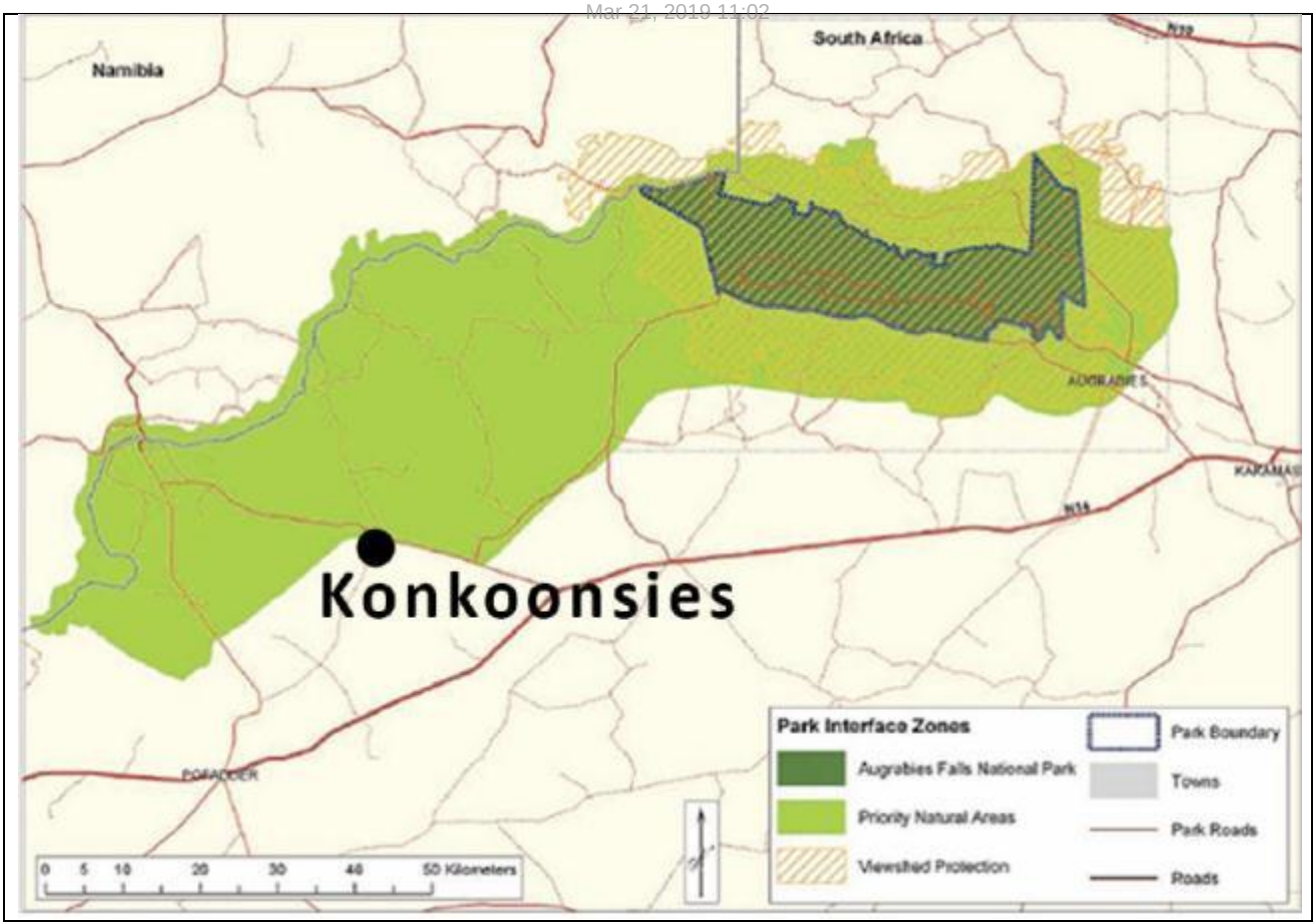


Figure 7-21: Viewshed Protection Area of the Augrabies National Park (Geldenhuys, 2012).

7.14. TRAFFIC

The road network around the proposed PV power plant is displayed in Figure 7-22 below and consists of the National Road (N14), Divisional Road (R358), Minor Road (R-1) and Minor Road (R-2). Two access routes exist to the Konkoonsies Photovoltaic Power Plant via the N14.

- Intersection A: Follow roads R358 (11 km) and R-2 (22 km). The entire 33km of the road is gravel.
- Intersection B: Follow roads R-1 (22km) and R-2 (22km) Only 6km out of the 33 km consist of gravel road.

The quality of the road via the R-1 is much more superior than the other routes and therefore mostly be used for all vehicles traveling to the site. The flowing section gives a indication of the quality of the various road network to the site (Schwartz, 2012).

Figure 7-22: Surrounding road networks and relative access routes to the site.

7.14.1. NATIONAL ROAD – N14

This road extends from Springbok in the Northern Cape to Brakfontein interchange in Gauteng, and passes through the town of Pofadder. The road is a single carriageway paved road with paved shoulders. The road is 8m wide with a road reserve of 45m. The maximum speed limit of the road is 120 km/h (Schwartz, 2012).

Figure 7-23: Visual presentation of the N14.

7.14.2. DIVISIONAL ROAD – R358

This road extends from Bitterfontein (on the N7) to Onseepkans border post in the Northern Cape and passes through the town of Pofadder. The condition of the road is considered good, it is 10m wide and has a road reserve that varies between 20 – 50 meter wide (Schwartz, 2012).

Figure 7-24: Visual presentation of the R358

7.14.1. MINOR ROAD – R-1

This road extends from the N14 approximately 45 km north of the town Pofadder to the Divisional Road R358. Approximately 22km of the first section of this road is carriageway paved road with a gravel shoulder. The section of the road is a single carriageway gravel road (Schwartz, 2012).

Figure 7-25: Visual presentation of the Minor Road R-1

7.14.1. MINOR ROAD – R-2

This road extends from the Divisional Road R358 to the Minor Road R-1. The road is a single carriageway gravel road.

Figure 7-26: Visual presentation of the Minor Road R-2

7.15. ARCHAEOLOGY, HERITAGE & CULTURE

An assessment of the initial 20 hectare site was undertaken in 2011. This study recorded a number of sites, features and objects of archaeological nature; however these were mostly located close to and around the outcrops and hills that occur in the area. The assessment on the expansion of the facility to the east resulted in an additional assessment to be undertaken in 2012. This study identified some sites located in similar areas. It was indicated by the specialist that very little archaeological material is found in the flat areas away from the ridges and outcrops. To identify possible archaeological objects, features and sites that could possibly be unearthed and disturbed during the proposed development, it is necessary to provide background regarding the different phases of human history and the history and archaeology of the area in general.

7.15.1. STONE AGE

The Stone Age is the period in human history when lithic (stone) material was mainly used to produce tools (Coertze & Coertze 1996: 293). In South Africa the Stone Age can be divided into three periods. It is however important to note that dates are relative and only provide a broad framework for interpretation. The division for the Stone Age according to Korsman & Meyer (1999: 93-94) is as follows:

Early Stone Age (ESA) 2 million – 150 000 years ago
Middle Stone Age (MSA) 150 000 – 30 000 years ago
Late Stone Age (LSA) 40 000 years ago – 1850 - A.D.

According to David Morris of the McGregor Museum in Kimberley, the archaeology of the Northern Cape is rich and varied, covering long spans of human history. The Karoo is particularly bountiful. Some areas are richer than others, and not all sites are equally significant. The significance of sites encountered in the study area may be assessed against previous research in the region and subcontinent.

The lack of archaeological research in the area is mostly as a result of the remoteness of the area in relation to research institutions. The area has been subjected to relatively marginal human settlement for most of the area's history; however it is exceptionally rich in terms of rock art and Stone Age sites. This has been documented by relatively few but important studies in the area.

Archaeological sites found on both sides of the Orange River appear to be ephemeral occupations by small groups in the hinterland. The appearance of herders in the Orange River basin resulted in the competition over resources and ultimately resulted in the

marginalisation of the hunter-gathers. Some of these hunter-gathers occupied the Bushmanland mainly in the last millennium and focused their hunting and gathering around the limited water resources in the region. There has been evidence of human occupation in the way of granite inselberg shelters on red dunes. These provided clean sand for sleeping in or around the seasonal pans. It is also suggested that herders moved into the Orange River hinterland due to artefact sites where ample pottery was found near Aggeneys and east Pofadder at Schuitdrift south.

All the sites, features or objects identified during the assessment date to the Stone Age and more than likely to the LSA. For the finds of the Heritage Impact Assessment please refer to Appendix 7. 4.

7.15.2. IRON AGE

The Iron Age is the name given to the period of human history when metal was mainly used to produce artefacts (Coertze & Coertze 1996: 346). The expansion of early farmers, who, among other things, cultivated crops, raised livestock, made ceramic containers (pots), mined ore and smelted metals, occurred in this area between AD 400 and AD 1100 and brought the Early Iron Age to South Africa. They settled in semi-permanent villages (De Jong 2010: 35).

While there is some evidence that this age continued into the 15th century in the South African Lowveld, on the escarpment it had ended by AD 1100. The Highveld became active again from the 15th century onwards due to a gradually warmer and wetter climate. From here communities spread to other parts of the interior. This later phase, termed the Late Iron Age (LIA), was accompanied by extensive stonewalled settlements, such as the Thlaping capital Dithakong, 40 km north of Kuruman (De Jong 2010: 35-36).

Sotho-Tswana and Nguni societies, the descendants of the LIA mixed farming communities, found the region already sparsely inhabited by the Late Stone Age (LSA) Khoisan groups, the so-called 'first people'. Most of them were eventually assimilated by LIA communities and only a few managed to survive, such as the Korana and Griqua. This period of contact is sometimes known as the Ceramic Late Stone Age and is represented by sites such as the Blinkklipkop specularite mine near Postmasburg and finds at the Kathu Pan (De Jong 2010: 36).

No known Iron Age archaeological sites are located in the area.

7.15.3. HISTORICAL AGE

Factors such as population expansion, increasing pressure on natural resources, the emergence of power blocs, attempts to control trade and penetration by Griquas, Korana and white communities from the south-west resulted in a period of instability in Southern Africa that began in the late 18th century and effectively ended with the settlement of white farmers in the interior. This period, known as the *difaqane* or *Mfecane*, also affected the Northern Cape Province, although at a relatively late stage compared to the rest of Southern Africa. Here, the period of instability, beginning in the mid-1820s, was triggered by the incursion of displaced refugees associated with the Tlokwa, Fokeng, Hlakwana and Phuting tribal groups (Pelser, 2012).

The Difaqane coincided with the penetration of the interior of South Africa by white traders, hunters, explorers and missionaries. The first was PJ Truter's and William Somerville's journey of 1801, which reached Dithakong at Kuruman. They were followed by Cowan, Donovan, Burchell and Campbell and their journey resulted in the establishment of a London Mission Society station near Kuruman in 1817 by James Read (Pelser, 2012).

The Great Trek of the Boers from the Cape in 1836 brought large numbers of Voortrekkers up to the borders of large regions known as Bechuanaland and Griqualand West, thereby coming into conflict with many Tswana groups and also the missionaries of the London Mission Society. The conflict between Boer and Tswana communities escalated in the 1860s and 1870s when the Korana and Griqua communities became involved and later also the British government. The conflict mainly centered on land claims by various communities. For decades the western border of the Transvaal Boer republic was not fixed. Only through arbitration (the Keate Arbitration), triggered by the discovery of gold at Tati (1866) and diamonds at Hopetown (1867) was part of the western border finally determined in 1871. Ten years later, the Pretoria Convention fixed the entire western border, thereby finally excluding Bechuanaland and Griqualand West from Boer domination (De Jong 2010: 36).

7.16. PALEONTOLOGICAL RESEARCH

The site is situated in the Namaqua-Natal Metamorphic Province comprising of Precambrian igneous and metamorphic rocks of the Naro, Witwaterm Hoogoor and Grunau suites which are exposed in places bit in turn are covered by quaternary alluvial deposits. The granites and gneisses of the Naro, Witwater, Hoogoor and Grünau suites, which are Precambrian in age, are unlikely to contain fossils. There is a slight, but unlikely, possibility of Quaternary fossils being present in the unconsolidated alluvial deposits. It is unlikely that the proposed development will have an impact on paleontological heritage, but it is essential that if fossils are uncovered in the process of development activities that a professional palaeontologist be bought in to access the situation. Please refer to the paleontological assessment for the site (Appendix 7.5)

7.17. SOCIO-ECONOMIC BASELINE SUMMARY

The Northern Cape is the province with the smallest economy. It is situated towards the west of the country. The province shares international borders with Namibia and Botswana and provincial boundaries with the North West, Free State, Western Cape and Eastern Cape provinces. The Namakwa District Municipality (NDM) is situated in the north-western corner of South Africa. NDM is geographically the largest municipality in the country, covering an area of approximately 126 747 km^2.

7.17.1. ECONOMIC PROFILE

The region has been plagued with an increase in unemployment due to various closures of mines and retrenchment of workers. The Khai Ma Local Municipality has a growing 15.5% unemployment rate of the population which falls within the working age category 15-65 years. The exploitation of the climate of the area though the use of renewable solar energy is therefore aligned with the IDP of the NDM "development shift," through supporting increases of capital investment in the area (NDM IDP, 2011). According to Stats SA the Namakwa DM contributed approximately 6% of the Northern Cape GDP in 2006 (Stats SA, 2006).

7.17.2. DEMOGRAPHIC PROFILE

The Namakwa District Municipality is very sparsely populated with a population of about 126 515 people; low population density is typically associated with the Northern Cape Province (NDM IDP, 2011). The district is losing its young economically active population through migration to more viable regions.

The population density in the Northern Cape region is generally low and is frequently congregated around towns. The surrounding residential population is largely limited to land owners and farm labours. The towns of Aggeneys, Pofadder, Augrabies, Keimoes and

Kakamas are the major centres of economic activity in the area. The Augrabies National Park is also a famous tourist attraction in the area. The demographics of the area are approximately 52.2% male and 47.8% female; however the district is very scarcely populated due its predominantly agricultural characteristic. In the provincial context the Northern Cape only accommodates approximately 1.8% of the population of South Africa. The region's population is considered mostly young with 57.7% of inhabitants being younger than 30 years (Barbour & Rogatschnig, 2011).

The population in the local Management Area comprised approximately 56 501 in 2007, the general demographics in the area are as follows:

White	7.8%
Coloured	66.5%
Black	22.2%

7.17.3. WATER SUPPLY

All domestic water needs are sourced from the Pelladrift regional water scheme. This water scheme supplies most water to the Khai Ma local municipality as well the Black Mountain Mine.

7.17.4. POWER SUPPLY

The majority of electrical supply is sourced from Eskom in the area.

8. IMPACT ASSESSMENT METHODOLOGY

The following criteria and methodology is proposed to determine the significance of environmental impacts caused by the proposed project.

8.1. TYPE OF IMPACTS

Potential environmental impacts may either have a positive or negative effect on the environment, and can in general be categorised as follows:

a) Direct/Primary Impacts
Primary impacts are caused directly due to the activity and generally occur at the same time and at the place of the activity.
b) Indirect/Secondary Impacts
Secondary impacts induce changes that may occur as a result of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken.
c) Cumulative Impacts
Cumulative impacts are those that result from the incremental impact of the proposed activity on common resources when added to the impacts of the other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time, and can include both direct and indirect impacts.

8.2. DETERMINING SIGNIFICANCE

The following criteria will be used to determine the significance of an impact. The scores associated with each of the levels within each criterion are indicated in brackets after each description [like this].

Nature

Nature (N) considers whether the impact is:
- positive [- ¼]
- negative [+1].

Extent

- Extent (E) considers whether the impact will occur:
- on site [1]
- locally: within the vicinity of the site [2]
- regionally: within the local municipality [3]
- provincially: across the province [4]
- nationally or internationally [5].

Duration

Duration (D) considers whether the impact will be:
- very short term: a matter of days or less [1]
- short term: a matter of weeks to months [2]
- medium term: up to a year or two [3]
- long term: up to 10 years [4]
- very long term, or permanent: 10 years or longer [5].

Intensity

Intensity (I) considers whether the impact will be:

- negligible: there is an impact on the environment, but it is negligible, having no discernable effect [1]
- minor: the impact alters the environment in such a way that the natural processes or functions are hardly affected; the system does however, become more sensitive to other impacts [2]
- moderate: the environment is altered, but function and process continue, albeit in a modified way; the system is stressed but manages to continue, although not with the same strength as before [3]
- major: the disturbance to the environment is enough to disrupt functions or processes, resulting in reduced diversity; the system has been damaged and is no longer what it used to be, but there are still remaining functions; the system will probably decline further without positive intervention [4]
- severe: the disturbance to the environment destroys certain aspects and damages all others; the system is totally out of balance and will collapse without major intervention or rehabilitation [5].

Probability

Probability (P) considers whether the impact will be:

- unlikely: the possibility of the impact occurring is very low, due either to the circumstances, design or experience [1]
- likely: there is a possibility that the impact will occur, to the extent that provisions must be made for it [2]
- very likely: the impact will probably occur, but it is not certain [3]
- definite: the impact will occur regardless of any prevention plans, and only mitigation can be used to manage the impact [4].

Mitigation or Enhancement

Mitigation (M) is about eliminating, minimising or compensating for negative impacts, whereas enhancement (H) magnifies project benefits. This factor considers whether –
A negative impact can be mitigated:

- unmitigated: no mitigation is possible or planned [1]
- slightly mitigated: a small reduction in the impact is likely [2]
- moderately mitigated: the impact can be substantially mitigated, but the residual impact is still noticeable or significant (relative to the original impact) [3]
- well mitigated: the impact can be mostly mitigated and the residual impact is negligible or minor [4]

A positive impact can be enhanced:

- un-enhanced: no enhancement is possible or planned [1]
- slightly enhanced: a small enhancement in the benefit is possible [2]
- moderately enhanced: a noticeable enhancement is possible, which will increase the quantity or quality of the benefit in a significant way [3]
- well-enhanced: the benefit can be substantially enhanced to reach a far greater number of receptors or recipients and/or be of a much higher quality than the original benefit [4].

Reversibility

Reversibility (R) considers whether an impact is:

- irreversible: no amount of time or money will allow the impact to be substantially reversed [1]

- slightly reversible: the impact is not easy to reverse and will require much effort, taken immediately after the impact, and even then, the final result will not match the original environment prior to the impact [2]
- moderately reversible: much of the impact can be reversed, but action will have to be taken within a certain time and the amount of effort will be significant in order to achieve a fair degree of rehabilitation [3]
- mostly reversible: the impact can mostly be reversed, although if the duration of the impact is too long, it may make the rehabilitation less successful, but otherwise a satisfactory degree of rehabilitation can generally be achieved quite easily [4].

8.3. CALCULATING IMPACT SIGNIFICANCE

The table below summarises the scoring for all the criteria.

Table 8-18-2: Scoring for Significance Criteria

CRITERION	SCORES					
	- ¼	**1**	**2**	**3**	**4**	**5**
N-nature	positive	negative	-	-	-	-
E-extent	-	site	local	regional	provincial	national
D-duration	-	very short	short	moderate	long	very long
I-intensity	-	negligible	minor	moderate	major	severe
P-probability	-	very unlikely	unlikely	likely	very likely	-
M-mitigation	-	none	slight	moderate	good	-
H-enhancement	-	none	slight	moderate	good	-
R-reversibility	-	none	slight	moderate	good	-

Impact significance is a net result of all the above criteria. The formula proposed to calculate impact significance (S) is:

- For a negative impact: $S = N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$; and
- For a positive impact: $S = N \times (E+D) \times I \times P \times (H)$.

Negative impacts score from 2 to 200. Positive impacts score from – ½ to -200.

8.4. UNDERSTANDING IMPACT SIGNIFICANCE

The following is a guide to interpreting the final scores of an impact (for negative impacts):

Table 8-3: Final Significance Scoring

Final score (S)	Impact significance	
0 – 10	Negligible	the impact should cause no real damage to the environment, except where it has the opportunity to contribute to cumulative impacts
10 – 20	Low	the impact will be noticeable but should be localized or occur over a limited time period and not cause permanent or unacceptable changes; it should be addressed in an EMP and managed appropriately
20 – 50	Moderate	the impact is significant and will affect the integrity of the environment; effort must be made to mitigate and reverse this impact; in addition the project benefits must be shown to outweigh the impact

Table 8-3: Final Significance Scoring		
Final score (S)	Impact significance	
50 – 100	High	the impact will affect the environment to such an extent that permanent damage is likely and recovery will be slow and difficult; the impact is unacceptable without real mitigation or reversal plans; project benefits must be proven to be very substantial; the approval of the project will be in jeopardy if this impact cannot be addressed
100 – 200	Severe	the impact will result in large, permanent and severe impacts, such as local species extinctions, minor human migrations or local economic collapses; even projects with major benefits may not go ahead with this level of impact; project alternatives that are substantially different should be looked at, otherwise the project should not be approved

Two examples will help illustrate this system:

SCENARIO 1 – An industrial facility proposes discharging effluent containing a high salt content into a nearby stream. These salts will cause temporary problems for the ecosystem, but are washed downstream, diluted and will have no long term effects. The short term damage to the stream can be reversed fairly easily, but only if the ecosystem has not been seriously damaged by the salts over a long time. A mitigation measure is also proposed whereby during low flow periods (dry season) a pulse of clean water is discharged into the stream after the saline effluent, diluting the salts and pushing them downstream faster, so that the salts become so dilute as to have little or no effect.

From this scenario, the criteria are:

- nature = negative = 1
- extent = local = 2
- duration = medium = 3
- intensity = moderate = 3
- probability = very likely = 4
- mitigation = moderate = 3
- reversibility = moderate = 3,

and therefore impact significance is:

S = N x (E+D) x I x P ÷ ½(M+R)
= 1 x (2+3) x 3 x 4 ÷ ½(3+3)
= 60 ÷ 3
= 20.

Note that the impact prior to mitigation is major, but that due to the mitigation and the fact that the ecosystem can recover easily from the effects of salt (high reversibility), the residual impact becomes minor/moderate.

SCENARIO 2 – The above scenario applies, except that the effluent contains metals. These metals become adsorbed onto clay and organic matter in the stream bed and are accumulative toxins within the ecosystem, getting into the food chain and concentrating upwards into predator species. Fresh water flushing will only very slightly mitigate this and ecosystem recovery will not be easy or fast.

From this scenario, the criteria are:

- nature = negative = 1

- extent = local = 2
- duration = very long = 5
- intensity = moderate = 3
- probability = very likely = 4
- mitigation = slight = 2
- reversibility = slight = 2,

and therefore impact significance is:
S = N x (E+D) x I x P ÷ ½(M+R)
= 1 x (2+5) x 3 x 4 ÷ ½(2+2)
= 84 ÷ 2
= 42.

Note that in this case, the original impact (of the metals) is more serious than the salt, but it is the limited mitigation and reversibility that also act on the residual score and result in this score being moderate.

9. IMPACT SIGNIFICANCE ASSESSMENT/ANALYSIS

9.1. INTRODUCTION

Impact analysis is, in a sense, the core of the EIA process. It is the phase where all relevant project information that has been gathered is manipulated and distilled – *it is the Environmental Impact Assessment*. The impact analysis has two major goals, starting with listing and describing all possible environmental impacts and then proceeding to give some perspective on the relative significance of the various impacts. The predicted effects of mitigation measures also need to be factored into the impact analysis.

Environmental impact analysis needs to take cognisance of the following issues that all fall under the definition of the 'environment':

- Physical natural environment: water, land, air;
- Biological natural environment: flora, fauna, ecosystems;
- Resources: land/space, minerals, water, rights of use;
- Economic: cost, profit, distribution of income, jobs, skills, permanence;
- Human health: occupational, environmental health, pollution, safety; and
- Human cultural: religion, tradition, aesthetics, heritage, recreation.

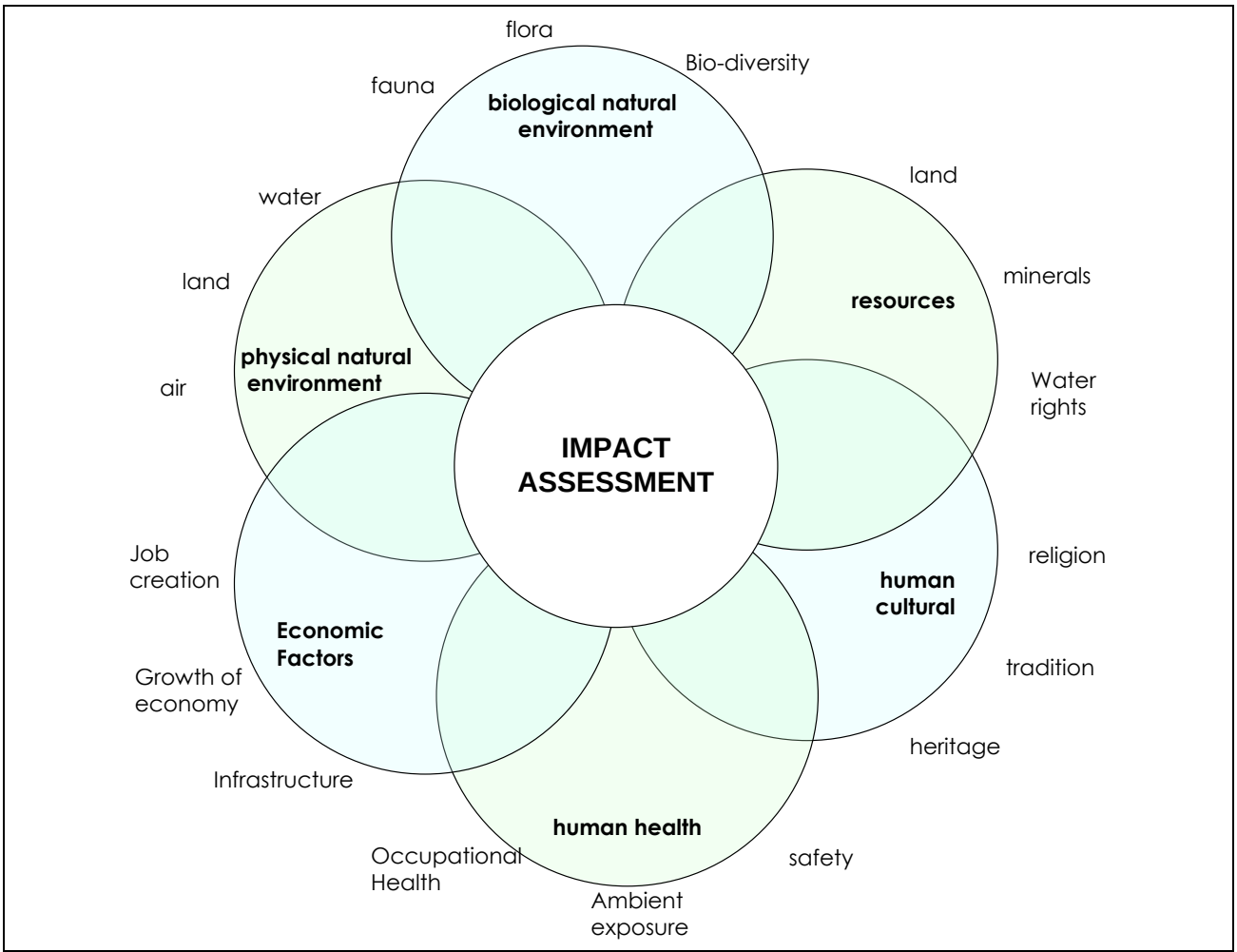


Figure 9-1: Widening Environment and Sustainability Agenda

One needs to, however, bear in mind that the natural environment is the most threatened and irreplaceable resource upon which all the other human aspects depend.

Impact significance is semi-quantitatively assessed (Section 7.2) for relevant aspects (e.g. water, air, biodiversity, noise, visual character, heritage resources, etc.) for each respective phase of the project referred to above. In addition, a brief description of mitigation to be implemented in order to minimise the significance of the potential impacts is provided. The details of *inter alia* required mitigation, monitoring and reporting are put forward in the comprehensive Environmental Management Programme Report (EMPr) for the project, which is annexed to this report.

The analysis of impact significance assessment for potential project impacts furthermore needs to consider impacts that may be realised through all project phases:

1. Construction:
The significant activities associated with the construction period will be the establishment of the access road, site preparation, construction camp establishment, panel foundations and infrastructure, transportation of all materials/components to the site and finally site rehabilitation after construction has ended.

2. Operation:
The operational phase of the facility will generate clean renewable electricity to be injected into the national grid. The site will need to have regular maintenance undertaken from time to time, such as washing the panels free of dust to ensure efficient operation of the facility.

3. Decommissioning:
The facility is expected to have a life cycle of approximate 25 years; however if the facility is deemed to be economically viable the facility will remain operational beyond this point. If the facility is closed down the decommissioning will include: disassembling of the components of the facility, site preparation and finally site rehabilitation to a degree depending on the final land use of the affected area. Decommissioning by itself is therefore not assessed in detail. The reason for this is that all activities associated with the decommissioning phase are similar in nature to construction impacts; however this is adequately addressed with the EMPr (Appendix 8). The REIPP Programme is designed to allow the proponent to operate the plant for a period of 20 years under a power purchase agreement. As the power plant can be operational for a longer period the economic conditions at that time will determine whether to continue with operation of the facility or decommission it. Any recyclable materials such as panels and steel structures will be sent to recycling facilities with other infrastructure disposed-off in accordance with the EMPr.

9.2. ASSESSMENT APPROACH

The assessment area covers an area of 531 hectares (Figure 2-4); however only the most feasible area from an environmental and engineering point of view will be developed. The EIA has been conducted in a professional manner in line with principles of environmental management according to NEMA. To date no impacts have been identified that in the opinion of the environmental specialists result in the project being fatally flawed; however since sensitive areas exist within the study area these will be avoided by the development as to ensure that the impact associated by the development of the solar facility on Portion 6 of the farm Konkoonsies 91 will be localised to the affected area only. These sensitive areas include:

- Ecologically sensitive areas include: The majority of the study area is considered not highly sensitive and provided that all the sensitive features of the site is avoided especially the rocky outcrop and their immediate environment avoided the impact

associated with the development is likely to be low especially after all mitigation measures within the associated EMPr are successfully implemented (Figure 9-2).

- Archaeological sensitive areas include: Various archaeological materials were observed on site, mostly dating to the stone age. These areas are however mainly concentrated around the rocky outcrops and stony hills on site. The specialist recommended that these area be avoided by the development to preserve these

Taking the environmental sensitivities as well the technical preferences into consideration on the proposed site a facility layout can be developed and contained within Section 10. This layout has been produced taking all the impacts identified and assessed within this chapter into consideration to identify the area most suitable from an environmental and engineering perspective.

The feasible development area available is 267 hectares and could produce approximately 133 MW of electricity. Especially during the construction phase, the area will be disturbed due to the installation of the necessary infrastructure and foundations for the facility. The impact assessment below was mainly supplemented by specialist inputs from various fields of study and the project developer. Although large scale public notification was distributed, interest in the project was fairly limited.

In order to adequately assess the potential impact of the proposed development on the environment, it was required to quantify the temporarily and permanently affected areas (both linear and development areas). The construction and operation impact as a result of the facility is described below.

9.3. CONSTRUCTION AND OPERATIONAL PHASES

9.3.1. INTRODUCTION

This phase of the project involves all those activities related to preparation of the site and subsequent construction/establishment of the various structures and associated infrastructure thereon once prepared (e.g. vegetation stripping, topsoil stripping, earthworks/levelling/excavations/foundations, building construction and engineering services installation, etc.). It is envisaged that the construction period will last for up to a year. The operational life span of the facility is expected to be 20-25 years with the option to extend this period. However most likely the facility will be disassembled and rebuilt with the appropriate technology of the time. Decommissioning is not assessed as part of this section due to the similarity to activities related to construction. The decommissioning activities are regarded as similar to construction activities in this particular case.

9.3.2. FAUNA AND FLORA

Introduction

The loss of biodiversity brings significant costs through damage to the services that ecosystems provide. Biodiversity conservation efforts in South Africa are largely species, or area, based. In the former, legal protection is given to species by providing prohibitions or restrictions to listed threatened or protected species (Fuggle and Rabie, 2009). In support of the above, no person in South Africa may "*carry out restricted activities (e.g. remove, destroy, transport or trade) involving a specimen of a listed threatened or protected species without a permit*".

Project implementation will require the stripping of large tracts of indigenous vegetation (within the 267 hectare site area) during the construction phase for subsequent earthworks and the construction of structures and infrastructure; where the referenced structures and infrastructures relates to the proposed PV solar facility.

A specialist floral and faunal assessment was undertaken for the subject project and contained within Appendix 7.1. The specialists constructed a sensitivity map of the site (Figure 9-2) by integrating existing literature and site observations of the fauna and flora communities. The sensitivity map indicates the majority of the site has a "medium sensitivity" and is suitable for the location of the PV facility. The rocky outcrops and drainage features within the site are sensitive and should be avoided. Space in between closely-spaced outcrops should be avoided as well, as these areas act as bridges for animals to travel between outcrops. Apart from these areas, there are no other ecological sensitive habitats or features present on the site. The Bushmann Arid Grassland vegetation types mainly covering the site are regarded low in faunal and floral sensitivity and therefore risk associated with the development areas is low.

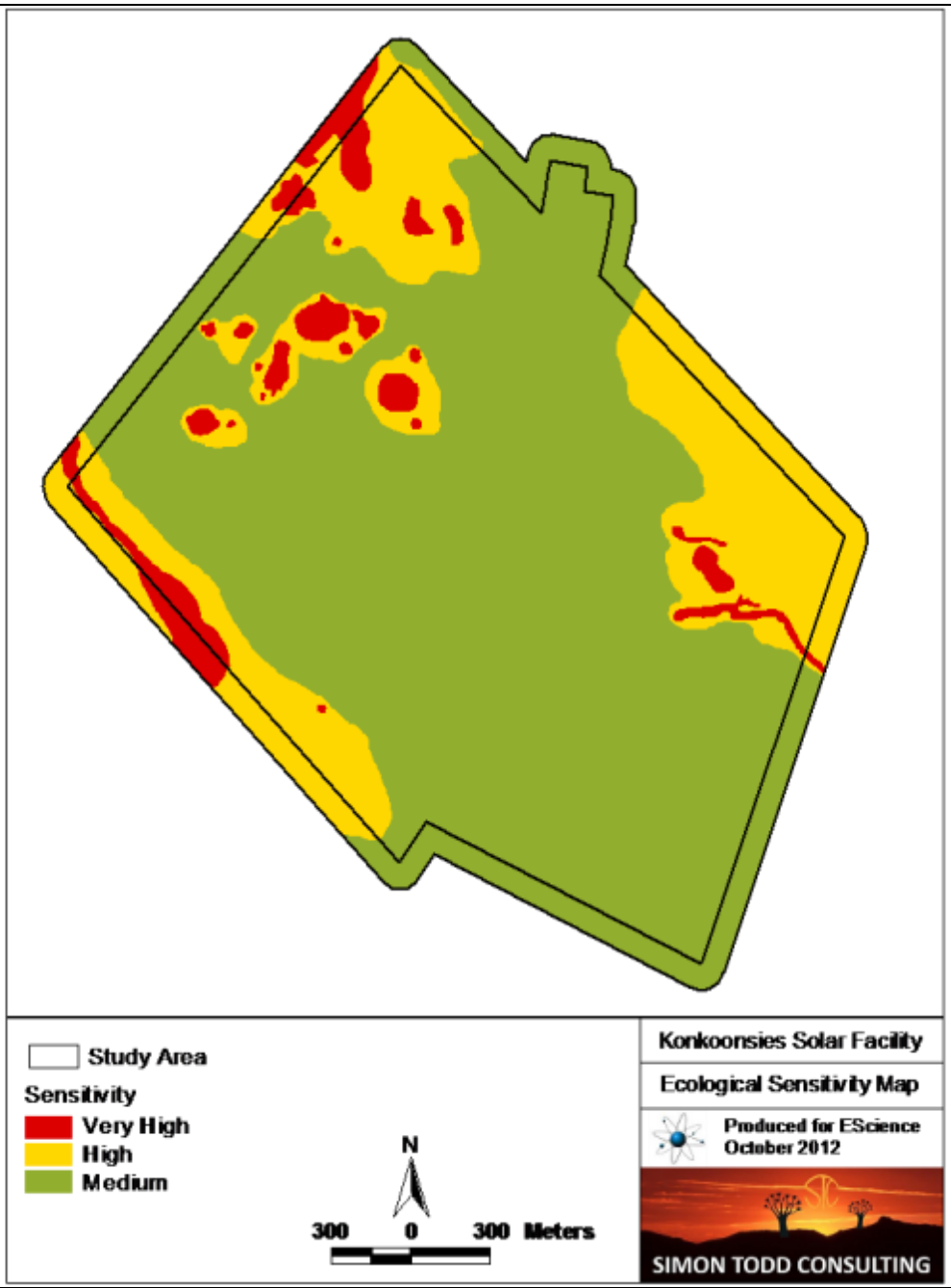


Figure 9-2: Ecological Sensitivity map of the proposed Konkoonsies II Solar Energy Facility site

The construction/operation phase of the project will have both direct and indirect impacts on indigenous site flora and fauna, as follows:

- Construction phase:
    - Vegetation clearing for PV panel supports, roads, buildings etc could impact listed plant species as well as high-biodiversity plant communities. Vegetation clearing will also lead to habitat loss for fauna and potentially the loss of sensitive faunal species, habitats and ecosystems.
    - Increased erosion risk would be highly likely to result due to the loss of plant cover and soil disturbance created during the construction phase. This may impact downstream riparian and wetland habitats if a lot of silt enters the drainage systems. Although the effects would probably only become apparent during the operational phase, the impact stems from the construction phase and suitable mitigation measures will also need to be applied at this stage.
    - Increased human presence can lead to poaching, illegal plant harvesting and other forms of disturbance such as fire.
    - Loss of connectivity & habitat fragmentation may result due to the presence of the generation infrastructure, roads, site fencing and other support infrastructure of the development.
    - Fire-related impacts (informal, unmanaged/indiscriminate, fires/burning regime by site contractors and construction personnel);
    - Soil and indigenous vegetation disturbances, leading to proliferation of alien vegetation; where such aliens would compete for space and available resources;
    - Removal/destruction of Red Data Listed (RDL) and protected floral species through site preparations (i.e. vegetation clearance);
- Operational Phase
    - The maintenance and operation activities of the facilities would generate some noise and disturbance which may deter some fauna from the area, amounting to a loss of connectivity & habitat fragmentation.
    - Maintenance activities such as vegetation clearing will impact the biodiversity of the site if not conducted in a sensitive manner.
    - Persistent avifaunal impacts would potentially result from the presence of power transmission infrastructure at the site
    - Fire related impacts (i.e. indiscriminate fires by contractors may lead to veld fires and the subsequent destruction of habitat to indigenous faunal species);

Flora Impact Discussion & Significance Assessment

The only significant features identified by the specialist are a number of *Hoodia gordonii* and an abundance of *Boscia foetida* within the development footprint. These species are not endangered, but are protected under national and provincial legislation, respectively, and can be trans-located if necessary outside of the development footprint.

The proposed development will inevitably result in a loss of natural vegetation within the development footprint. These impacts can to a large existence mitigated to acceptable levels and included as management recommendations. The potential cumulative impact is considered moderate on account of presence of a CSP development on the neighbouring farm, Scuitklip. The untransformed nature of the landscape would however reduce the significant of such cumulative impacts. It should be noted that localised vegetation loss within the development footprint is inevitable and therefore cannot be

avoided. As the development is suitable located outside areas of higher sensitivity on site the impacts on direct local vegetation is reduces quite significantly.

As the clearance of vegetation would result in soil disturbances, it would directly result in potential erosion risk. The impact would be more likely during operation as the constructed panels would increase runoff flows from the area. This impact can however be easily mitigated through regular monitoring and remedial action. The cumulative nature of the impact; without required mitigation has the potential to increase sedimentation in rivers and streams of the surrounding area. This would indirectly affect vegetation in these sensitive areas. Provided that the drainage features themselves are not directly impacted by the development, the major potential impact associated with the development of the site is likely to increased risk of soil erosion. The construction of roads, panel foundations and the other infrastructure of the site will require a significant amount of vegetation clearing and will create a lot of disturbance within the development footprint, leaving the soil exposed and vulnerable to erosion, particularly on the steeper slopes.

The loss of connectivity and potential for broad scale fragmentation is considered low as habitat occurring on site is widely available across an extensive area surrounding the site. The open and flat nature of the site suggests that limited ecological gradient and process is operating across the site in terms of the broad scale processes. The potential disruption therefore of upland-lowland gradients in the area is very low and not considered a significant concern in the area. The reason being mainly that no topographic diversity or physical or climatic gradients exist in the area that might result in important broad scale ecological gradients in the area

The site is not considered to be very sensitive and provided that the development is restricted outside the stony hills and rocky outcrops (Considered to be highly sensitive) and access to these areas restricted by personnel and contractors the overall impact resulting from the proposed development is regarded as low after mitigation. Direct vegetation loss as result of the proposed development is unavoidable; however the significance of this impact is low. The specialist indicated that the area has a low biodiversity importance and a lack of significant impact on species of conservation concern. Due to the extensive nature of the vegetation type, habitat fragmentation due to the proposed development will not be heavily impacted upon. One of the major concerns identified by the specialist is erosion risks associated with the development. Erosion impacts can be easily and successfully monitored and managed to make the residual impact negligible.

Table 9-1: Cumulative floral Impacts during construction and operation – Significance Rating		
Nature (N)	Negative impacts on site biological diversity	1
Extent (E)	On Site: Impact to flora will most be of a localised nature.	1
Duration (D)	Very long term: The impact will be largely reversed at the end of operation of the PV facility, but it may take several decades thereafter for floral species (particularly woody species) to re-establish.	5
Intensity (I)	Moderate: The disturbance to site flora will disrupt functions and processes at a localised level, thereby reducing diversity.	3
Probability (P)	Definite: Vegetation clearance is required for the	4

Table 9-1: Cumulative floral Impacts during construction and operation – Significance Rating			
	establishment of site structures and supporting infrastructure. Site clearance will however only be required within the development footprint.		
Mitigation (M)	Well mitigated: The impact can be substantially localised though adequate monitoring and rehabilitation practices, but the residual impact will still be noticeable/ minor.		4
Enhancement (H)	N/A		-
Reversibility (R)	Mostly reversible: Rehabilitation efforts at closure will largely reverse the impact, although this may never entirely return the site to its 'natural', pre-development, condition.		4
Significance Rating with Mitigation - Negative Impact (S)	N x (E+D) x I x P ÷ ½(M+R)	**Low**	18
Significance Rating without Mitigation - Negative Impact (S)	N x (E+D) x I x P ÷ ½(M+R)	**Moderate**	28.8
Significance Rating -Positive Impact (S)	N x (E+D) x I x P x (H).		-

Management Actions

- Vegetation clearing to be kept to a minimum. No unnecessary vegetation to be cleared.
- Sensitive areas, as demarcated on the sensitivity map (Figure 9-2), should be avoided as far as possible, and where these areas must be traversed by roads or infrastructure, specific precautions should be taken to ensure that impacts are minimized.
- All required permits must be obtained for the removal and/ or translocation of protected plant species.
- Although there are no major drainage lines within the site, roads which cross minor drainage lines should be constructed in manner which does not encourage erosion of the downstream channel and does not disrupt the natural flow of water down the channel.
- Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance.
- All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and re-vegetation techniques.
- An environmental control officer (ECO) should oversee the rescue and relocation of all protected flora to be moved;
- All areas outside and within the development footprint affected by construction should be rehabilitated upon completion of the construction phase of the development. Areas should be re-seeded with indigenous grasses/plant species as required;
- As much vegetation growth as possible should be promoted within the proposed development area in order to protect soils. In this regard special mention is made of the need to use indigenous vegetation species as the first choice during landscaping;

- In terms of the amendments to the regulations under the Conservation of Agricultural Resources Act, 1983 and Section 28 of the National Environmental Management Act, 1998, landowners are legally responsible for the control of invasive alien plants on their properties and it is therefore recommended that declared weed and invader species be removed from the subject property;
- Vehicles should be restricted to travelling only on designated roadways, in order to limit the ecological footprint of the proposed development activities;
- No uncontrolled fires whatsoever should be lit within the subject property;
- Impacts associated with the proposed development should not be allowed to impact on surrounding vegetation, outside the development footprint. Therefore the entire development footprint should be demarcated and no unauthorised access to these areas must be allowed.

Fauna Impact Discussion & Significance Assessment

Fauna in the direct affected development area will be highly affected; mainly through noise, human activity, habitat destruction, pollution, noise and infrastructure establishment. Mainly due to human activities as well noise levels, the majority of shy and sensitive fauna will move away from the area during activities relating to construction. Slow moving species such as tortoises may not be able to avoid construction activities and may be killed. Some species may also be vulnerable to illegal collection or poaching during construction. This would be as a result of large amount of construction workers present on the site. It is expected that the impacts discussed above can be mitigated to some extent. The direct faunal impact would largely be restricted to the amount of habitat loss within the development area. The surrounding landscape would remain mostly intact and this development will add to the cumulative impact with the CSP development nearby. Sufficient remaining habitat; as well space will be available for most species to move around these developments with relevant ease.

The proposed development could result in a disturbance of the broad scale ecological process. These processes include migration, dispersal or ability of fauna to respond to fluctuation in climate or other conditions. The major concern in terms of the above is the fencing off of the facility. This would ultimately disrupt connectivity of the landscape and restrict movement of animals. No fauna would be able to pass through the area and could also result in species being trapped inside the facility. This can be mitigated to some extent however it is considered more likely that faunal species would avoid the area regardless of management measures implemented.

Avifaunal impact associated with photovoltaic solar developments is generally considered to have minimal impact on birds. Impact can be moderately mitigated as most significant impact associated with the development would be bird electrocution due to transmission line infrastructure. If these structures are located alongside existing lines this impact would be moderately mitigated. Impacts associated with avifauna are not considered to be significant and mainly concentrated around habitat loss and electrocution by power lines.

Table 9-2: Impacts on Fauna during construction and operation – Significance Rating		
Nature (N)	Negative impacts on site faunal diversity	1
Extent (E)	On Site: Faunal species directly within the development site would be affected, mostly by habitat fragmentation and destruction	1
Duration (D)	Very long term: The impact will be largely reversed at the end of operation of the PV facility, but it may take	5

Table 9-2: Impacts on Fauna during construction and operation – Significance Rating			
	several years to resemble present state.		
Intensity (I)	Moderate: The disturbance to site fauna will disrupt functions and processes at a localised level, thereby reducing diversity and habitat loss.		3
Probability (P)	Definite: Vegetation clearance is required for the establishment of site structures and supporting infrastructure. This would result in direct habitat loss to local fauna.		4
Mitigation (M)	Well mitigated: The impact can be substantially localised though adequate monitoring, relocation and rehabilitation practices, but the residual impact will still be noticeable or significant, relative to the original impact.		4
Enhancement (H)	N/A		-
Reversibility (R)	Mostly reversible: Rehabilitation efforts at closure will largely reverse the impact, although this may never entirely return the site to its 'natural', pre-development, condition.		4
Significance Rating with Mitigation - Negative Impact (S)	N x (E+D) x I x P ÷ ½(M+R)	**Low**	18
Significance Rating without Mitigation - Negative Impact (S)	N x (E+D) x I x P ÷ ½(M+R)	**Moderate**	29
Significance Rating -Positive Impact (S)	N x (E+D) x I x P x (H).		-

Management Actions

- Any fauna directly threatened by the construction activities should be removed to a safe location by the ECO or other suitably qualified person.
- The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the demarcated construction site.
- Fires should only be allowed within fire-safe demarcated areas.
- No fuel/wood collection should be allowed on-site.
- No dogs should be allowed on site.
- If the site must be lit at night for security purposes, this should be done with low-UV type lights (such as most LEDs), which do not attract insects.
- All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill and as per the EMPr.
- No unauthorized persons should be allowed onto the site.
- Staff present during the operational phase should receive environmental education so as to ensure that that no hunting, killing or harvesting of plants and animals occurs.
- All proposed power line infrastructure at the facility be constructed immediately adjacent and running parallel to the existing power lines.

9.3.3. CONSTRUCTION AND INSTALLATION WASTE GENERATION (CONTRIBUTION TO LANDFILL, SEWAGE, WASTE HAZ & GEN ETC.)

Introduction

Waste will be generated during the construction of the proposed project structures/infrastructure and installation of equipment. The waste would predominantly comprise of building rubble, packaging and fabrication waste/s. Steel and electric cabling waste is also expected from installation. It is likely that most, if not all, of the waste generated would be non-hazardous/general waste. The generation of significant quantities of general waste could indirectly impact on the operational lifespan of the municipal landfill facility, through the permanent occupation of remaining available airspace at this facility.

Impact Discussion & Significance Assessment

The intensity of the impact will, however, be low relative to cumulative national and regional waste generation volumes (general and hazardous waste generation). As the waste will be taken off site regularly throughout the construction and operation phase, impacts associated with waste are not expected to be significant. However, mitigation measures would need to be implemented to ensure proper handling and storage of the wastes. It is also recommended that the proponent implements the general waste management principals of in terms of waste hierarchy such as; waste reduction, reuse, recycling and finally disposal. However these aspects have been suitably addressed within the associated EMPr (Appendix 8) and would therefore ensure commitment from project developer to responsible waste management.

If dry sanitation systems or digester systems are used it would result in the production of dry sewage waste materials. This material has very low pathogenic composition and regarded as manageable and can either be:

- Be used to make compost (Help in rehabilitation of vegetation or used as compost in landscaping)
- Used as source of fuel
- Dispose of it on a municipal waste facility.

Table 9-3: Impacts of Construction Waste Generation – Significance Rating		
Nature (N)	Indirect negative impact on landfill airspace availability.	1
Extent (E)	National: Use of hazardous landfill beyond the provincial boundary.	5
Duration (D)	Medium term: Construction phase (conservatively anticipated for up to a year, or possibly two).	3
Intensity (I)	Negligible: The anticipated impact will be negligible, with no discernible effect on relative airspace availability.	1
Probability (P)	Definite: The generation of waste during the construction phase is largely unavoidable (the amount generated can, however, be managed).	4
Mitigation (M)	Slight: A small reduction in the volumes of waste generated can likely be effected during construction.	2
Enhancement (H)	N/A	-
Reversibility (R)	Moderately reversible through reuse, recovery and/or recycling initiatives: Where the impact relates to	3

Table 9-3: Impacts of Construction Waste Generation – Significance Rating			
	contribution to landfill, any measure implemented to reuse, recover, or recycle such waste would constitute the reversal of the impact		
Significance Rating with Mitigation - Negative Impact (S)	N x (E+D) x I x P ÷ ½(M+R)	**Low**	12.8
Significance Rating without Mitigation - Negative Impact (S)	N x (E+D) x I x P ÷ ½(M+R)	**Low**	16
Significance Rating -Positive Impact (S)	N x (E+D) x I x P x (H).		-

Management Actions

Contractors will be required to provide a method statement specific to waste minimisation, reuse, recovery and recycling, as well as temporary storage and disposal; such plans would need to be signed off by competent site environmental personnel/environmental control officer (ECO), prior to the start of construction activities.

All construction and installation waste will be stored temporarily in a way that protects surface and groundwater, and appropriately disposed of at the permitted municipal disposal site (where the waste in question is classified as general waste). Temporary waste storage areas will be sited under the guidance of site environmental personnel prior to the start of construction activities. Construction personnel will be trained in their correct use and the sites will be regularly inspected to ensure that they are being appropriately managed.

During construction all sewage waste should be stored in a closed system. A schedule for servicing and disposal of the sewage waste will be set forth so as not to cause unpleasant or unhygienic conditions for the site personnel by an approved service provider specializing in the maintenance and treatment/disposal of sewage waste.

9.3.4. SURFACE- AND GROUNDWATER QUALITY & QUANTITY

Introduction

The inappropriate storage, management and handling of fuel, oil and other potentially hazardous chemicals and substances during the construction period could result in potentially negative impacts on surface and ground water quality. In particular, spillages could enter the groundwater environment through the ready infiltration of contaminated surface run-off. Poorly managed vehicles will also impact negatively on ground water quality (where no surface water is located in close proximity to the site). Contamination of this nature, associated with the construction phase of this project would typically be hydrocarbon-based (i.e. petrol, diesel and oil leaks and spillages to bare soil surfaces). Temporary concrete batching plants can also impact negatively on groundwater.

Poor placement and maintenance of temporary sanitary arrangements (i.e. portable toilets) can also result in detrimental impacts on water resources in one or another of the following ways (Fuggle and Rabie, 2009), depending on the nature and extent of potentially affected water resources:

- Eutrophication – referring to "*the enrichment of water with nutrients, such as nitrates and phosphates, which give rise to excessive growth of aquatic algae and cyanobacteria in surface water resources in particular*";

- Nitrification – referring to "*the contamination of drinking water supplies with elevated levels of nitrates;* and
- Microbial contamination – referring to the contamination of drinking water supplies with harmful pathogenic agents, such as *E. coli* bacteria and other faecal coliforms.

Groundwater contamination as above would generally be restricted to the confines of the site. This impact can further be mitigated through the use of dry or digester toilet systems on the market such as EcoSan.

In addition, during construction, temporary stockpiles of building material, excavated sand and rock, as well as waste, will be produced. It is important that these stockpiles are located in a centralised area where temporary measures such as berms will prevent sediment run-off, specifically during heavy rainfall episodes. Therefore it would be particularly important to develop a storm water management plan for the site. These particular waste streams are, however, not expected to be hazardous, or pose a contamination risk to groundwater.

Impact Discussion & Significance Assessment

The anticipated extent of surface water run-off will be negligible. This is a result of the sandy nature of the underlying soils, where surface water will readily infiltrate soil surfaces as opposed to travelling any significant distance at the surface. The study area is located in the arid Kalahari area and no surface water exists in close proximity to the site, except within the Orange River some 30 km downstream of the study area. There are no identifiable wetlands in the study area.

The proposed site is located in a watershed between two quaternary catchments. The slope of the study area is relatively flat (except in the north-eastern extent of the study area). The site is also located in a very arid region of South Africa, with vegetation cover considered to be sparsely distributed and soil characterised as being very sandy in nature; surface water runoff from the area is negligible. Most drainage lines in the area are dry river beds and most rainfall within the area infiltrates into the groundwater environment. A small amount of water actually ends up as runoff. The major concern regarding surface water runoff is potential erosion caused by an increase in runoff from the constructed PV panels; however through implementing appropriate measures this can be appropriately mitigated.

The groundwater flow within the proposed development area is in the north-westerly direction. The project uses photovoltaic solar panels, i.e. energy from the sun will be converted into directly electricity by the solar panels. As this process does not involve the generation of steam, heating of liquids or other fluids to convert solar radiation into electricity, there are no direct impacts due to the physical technological operation of the facility. Therefore spillages of hazardous/harmful substances would not occur that could have negative impacts on the surface/groundwater water environment. Rainwater running of these panels is classified as clean water and no water contamination is expected. The major concerns regarding groundwater/surface water quality is potential groundwater contamination due to mainly hydrocarbon (during construction) and microbial (during construction and operation) contamination mainly by: inadequate storage, spillages and microbial (as result of inadequate sewage management) contamination.

Table 9-4: Impact on Ground/Surface water Quality (During construction) -Significance rating			
Nature (N)	Negative impacts of construction related to hazardous substance contamination		1
Extent (E)	Site: Within the vicinity of the development area of the study area.		2
Duration (D)	Long term: Treatment of groundwater contamination (once occurred) is a long and arduous process.		4
Intensity (I)	Major: Adjacent farmers/farming communities reliant on groundwater for their livelihood.		4
Probability (P)	Likely: Impact likely to occur, to the extent that provisions must be made for it.		2
Mitigation (M)	Well mitigated: A comprehensive range of effective mitigation measures is readily available.		4
Enhancement (H)	N/A		
Reversibility (R)	Irreversible: No amount of time or money will sustainably reverse the impact.		1
Significance Rating with Mitigation - Negative Impact (S)	N x (E+D) x I x P ÷ ½(M+R)	**Low**	19.2
Significance Rating without Mitigation - Negative Impact (S)	N x (E+D) x I x P ÷ ½(M+R)	**Moderate**	48
Significance Rating -Positive Impact (S)	N x (E+D) x I x P x (H).		-

Table 9-5: Impacts due to Surface Water Runoff (During construction & Operation) - Significance rating		
Nature (N)	Negative impacts of construction/operation related to surface water runoff.	1
Extent (E)	Site: Within the vicinity of the development area of the study area and surroundings.	1
Duration (D)	Very short term: Only occurring during heavy rainfall periods.	5
Intensity (I)	Negligible: There is an impact on the environment, but it is negligible, having no discernible effect.	2
Probability (P)	Likely: Impact likely to occur, to the extent that provisions must be made for it.	1
Mitigation (M)	Well mitigated: The impact can be mostly mitigated and the residual impact is negligible or minor.	4
Enhancement (H)	N/A	
Reversibility (R)	Mostly Reversible: The impact can mostly be reversed, although if the duration of the impact is too long, it may make the rehabilitation less successful, but otherwise a satisfactory degree of rehabilitation can generally be achieved quite easily.	1

Table 9-5: Impacts due to Surface Water Runoff (During construction & Operation) - Significance rating			
Significance Rating with Mitigation - Negative Impact (S)	N x (E+D) x I x P ÷ ½(M+R)	**Negligible**	4.8
Significance Rating without Mitigation - Negative Impact (S)	N x (E+D) x I x P ÷ ½(M+R)	**Low**	12
Significance Rating -Positive Impact (S)	N x (E+D) x I x P x (H).		-

Management Actions

A comprehensive range of effective, proven mitigation measures will be implemented to ensure groundwater contamination is mitigated, which are in principle as follows:

- All hazardous substances to be stored within appropriately sized, impermeable, and roofed surfaces;
- Drip trays to be appropriately placed under vehicles that park over-night on bare soil surfaces.
- No cement mixing must be allowed to occur on bare surfaces.
- Erosion sensitive areas must be identified and regular monitoring undertaken to ensure once the impact occurs it is stabilised and rehabilitated immediately.

The various components of the power station are considered to be mostly environmentally friendly and do not necessarily pose a risk to groundwater environment. The solar facility could potentially increase the amount of aquifer recharge locally.

9.3.5. HERITAGE

Introduction

The Archaeological assessment initiated in 2012 is an extension of the initial assessment undertaken on the farm Konkoonsies in 2011. The general study area consists of some low outcrops, as well as some red dunes (Aeolian sands) covering parts of these outcrops. The open nature of the landscape made archaeological visibility relatively easy. The initial study on the first phase (10 MW Facility) in 2011 resulted in many archaeological sites to be recorded close to the hills and outcrops in the north-western part of the study area. The facility was therefore moved away from these areas as to not impact on any of these sites. The need for a heritage assessment as part of Konkoonsies II Solar facility EIA was due to the identification of an additional area not covered under the initial assessment.

The assessment conducted on the subject facility identified artefacts in similar areas compared with the 2011 study. It was noted by the specialist that very little archaeological materials are found in the flat areas away from the outcrops and ridges. Figure 9-3 indicates the locations where archaeological materials were observed/ recorded during the field assessment.

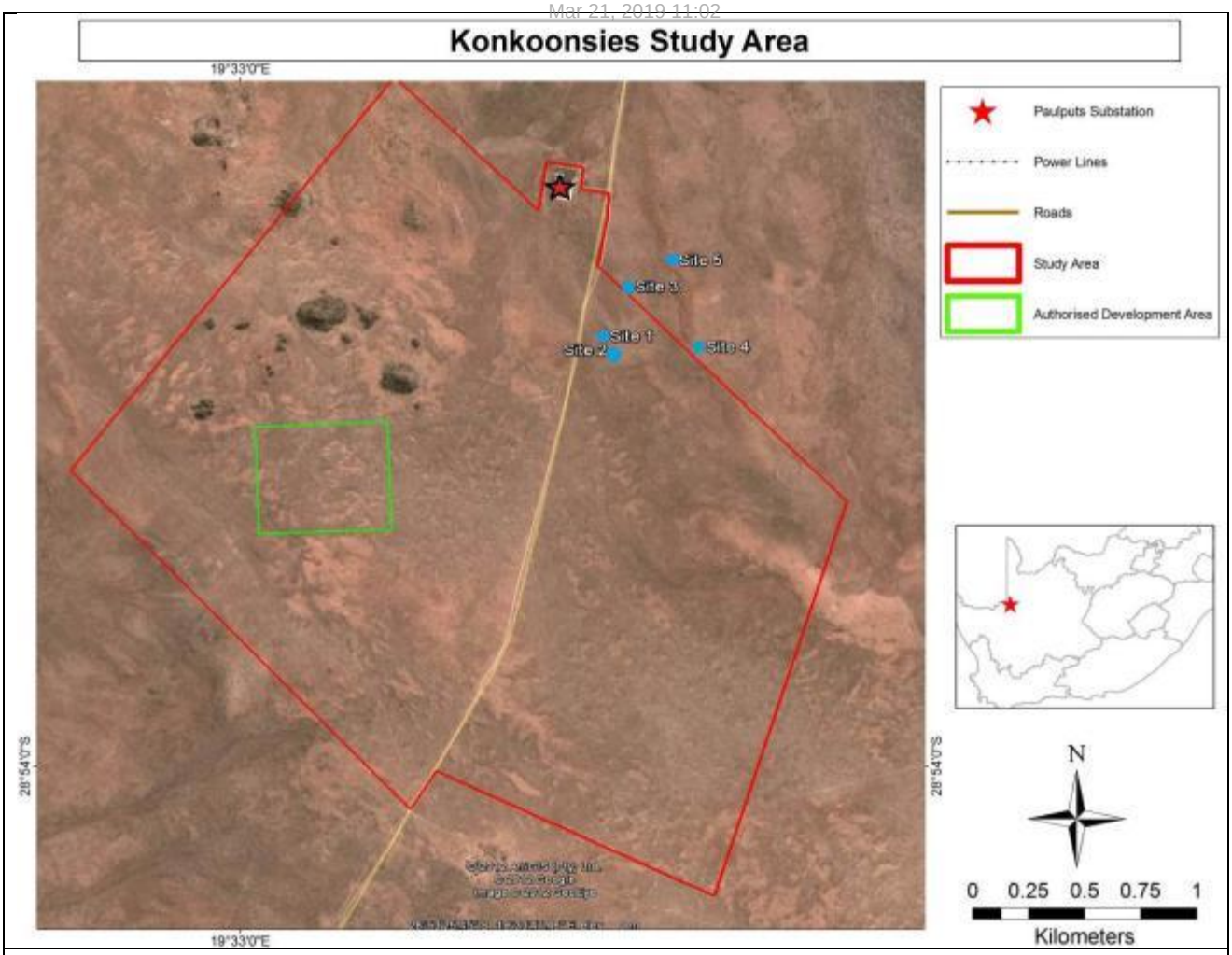


Figure 9-3: Distribution of Stone Age finds

Impact Discussion & Significance Assessment

The following section describes the artefacts found by the specialist and the significance of the finds. All the relevant finds during the assessment date to the Stone Age and included mainly scatterings of quartz (some formal and flaked tools), OES fragments (possible remains of containers/flasks used by SAN hunter gatherers) and a possible packed windbreak. All recorded artefacts were located close to or on top of the small outcrop and ridges covered by red dune sand to the most north-eastern extent of the study area (Figure 9-3). These areas will however be avoided by the proposed development and therefore no mitigation is therefore required. It was also noted by the specialist that the finds were sparsely distributed and isolated, with most falling outside the study area.

The chance of fossils being damaged by the proposed facility is fairly limited due to the fact that the foundations of the PV infrastructure will be mounted approximately 1 m into the ground. If fossils are encountered due to proposed development a professional palaeontologist must be consulted immediately. The appropriate action will then be recommended accordingly by the professional. It should be noted that all sedimentary deposits have the potential to preserve plants or animals in the form of fossilised materials. The major concern regarding potential impacts on the heritage resource are that construction activities might result in disturbance of surfaces/underground materials containing significant artefacts, resulting in the damage, alteration, destruction, collection and removal from their original position.

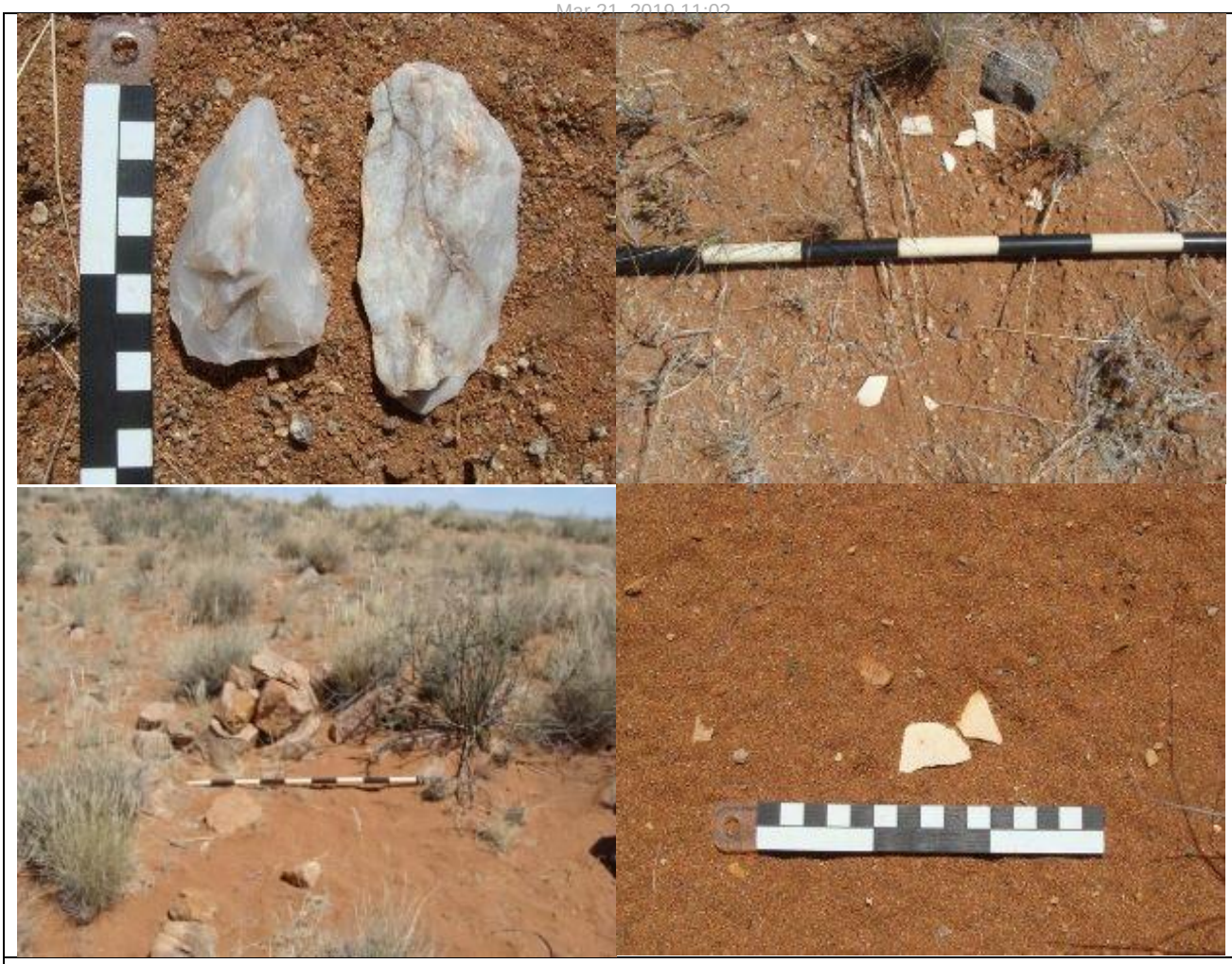


Figure 9-4: Photos taken of the artefacts. Left upper: Quartz point and flake found at site 2, right upper OES fragment (Ostrich eggshell) on site 1, left lower: Lower stone wall found on site 4, Lower right: OES fragment eroding out of the red dune sands found at site 5.

Table 9-6: Impacts of Archaeology during construction/operation (above and below ground) – Significance Rating		
Nature (N)	Negative impacts of construction/operation related to heritage on sensitive receptors	1
Extent (E)	Site: Within the vicinity of the development area of the study area	1
Duration (D)	Permanent: Loss of archaeological material due to excavation and land clearing associated mainly with construction period	5
Intensity (I)	Minor: Relatively significant archaeological materials found, mainly concentrated on the outcrop/ridges, however the development will avoid these areas. Therefore there will be a minor to negligible impact on archaeology of the area.	2
Probability (P)	Unlikely: The possibility of the impact occurring is very low, as noted by the specialist no significant archaeological materials were observed on flat areas away from outcrops and ridges.	1
Mitigation (M)	Well mitigated: The development will avoid ridges and outcrops to ensure that archaeological materials in	4

Table 9-6: Impacts of Archaeology during construction/operation (above and below ground) – Significance Rating			
	these areas remain undisturbed by the development.		
Enhancement (H)	N/A		
Reversibility (R)	Irreversible: Once archaeological material is lost it cannot be restored.		1
Significance Rating with Mitigation - Negative Impact (S)	N x (E+D) x I x P ÷ ½(M+R)	**Negligible**	4.8
Significance Rating without Mitigation - Negative Impact (S)	N x (E+D) x I x P ÷ ½(M+R)	**Low**	24
Significance Rating -Positive Impact (S)	N x (E+D) x I x P x (H).		-

Management Actions

As the proposed development will avoid any drainage systems, ridges and outcrops any archaeological sites, it is believed from an archaeological point of view that no sites will be negatively influenced by the proposed development and therefore no mitigation measures needs to be implemented. However the following mitigation measures should apply:

- The subterranean presence of archaeological and/or historical sites features or artefacts are always a distinct possibility. Care should therefore be taken during any development activities that if any of these are accidentally discovered, a qualified archaeologist be called in to investigate. In this case unmarked LSA burials are a possibility as well. The red sands are covering possible archaeological traces.
- All areas identified around the hills and outcrops where stone tolls scatters occur should be preserved; for this reason a buffer zone of 30m is required around outcrops and identified archaeological sites. No personal must be allowed access to these areas on site.
- ECO should be trained to identifying relevant archaeologist materials that could potentially be found on site by a suitable qualified archaeologist, and should also inform construction supervisors on what to look out when digging on the site.

9.3.6. SOIL AND AGRICULTURAL POTENTIAL

Introduction

A desktop soil assessment was undertaken by EScience Associates (Pty), in consultation with Prof. Andries Claassens (Soil Science and Plant Nutrition Consultant), in relation to the proposed establishment of PV solar power plant on the farm Konkoonises. The primary objective of the study was to determine the potential impacts of the proposed development on the land capability, land use, soils and agricultural potential of the subject site:

The study details the following:

- Soil form(s) present over the site, as well as the geographic distribution thereof over the development site;
- The size of the affected farm portions encompassing the development site;
- The locality of the development site;

- Potential land use alternatives for the site in question; and
- Impacts of the proposed change in land use on land capability and agricultural potential.

Impact Discussion & Significance Assessment

Due to the sandy to loamy soil characteristics of the study area, limited soil depths, and prevailing climatic conditions (i.e. average annual rainfall in the order of 130mm/year), the agricultural potential of the site is considered to be very low. The inferred cost associated with the preparation of site soils for crop production, as well as the installation of irrigation systems (due to relatively low rainfall in the area) render a change in land use for crop production as largely impractical. The potential loss of grazing land is not considered to be a significant issue as the area is not supportive of high stocking rates. Stocking rates in the region are typically in the order of approximately 30ha/large stock unit (LSU); where the 267ha of land encompassing the development site would typically only support approximately 10 head of cattle on a sustainable basis (extensive grazing production system). If one conservatively sets sale prices at R15 000 per head of cattle (assuming weaner to sale in one year on the pasture in question), the predicted annual turnover of the site is estimated at around R150 000 per annum; where this would be orders of magnitude lower than the income to potentially be derived from the development proposal through the construction phase and subsequent operation of the facility.

The project's impact on site soils is considered to be low, due to the erection of the PV facility. There are, however, some mitigation measures that would need to be implemented to prevent and contain erosion associated with soil disruptions during the construction phase. The impact is considered negligible when comparing it, for example, to coal mining on the Highveld which occurs on high agricultural soils to produce similar quantities of electricity (van der Waals, 2011). Apart from the access road and construction sites where the soil (environment) may be impacted on, the proposed development should not have a major influence on the soils on the rest of the farm. Because of the major areas consist of either Mispah or Glenrosa soil forms, the soil potential is low. The major use of the land type is therefore extensive grazing.

An assessment of the proposed project's potential impacts on land capability, land use, soils and agricultural potential concludes that there should be no discernible impacts on the aforementioned site as a result of the development of the proposed PV facility, and that the impacts associated with the proposed development are considered to be low, mostly as the site has a low agricultural potential. Due to the geology and climate the soil in the area is mostly shallow with a low carrying capacity for grazing. There are not really opportunities to change land use for agriculture. Any impact on the environment due to the proposed activity and the maintenance management in the area should be localized.

Table 9-7: Potential project impacts on current land capability/land-use (i.e. loss of extensive livestock grazing)– Significance Rating		
Nature (N)	Potentially negative impacts on land use as the area will be transformed, resulting in a loss in the potential land capability for grazing.	1
Extent (E)	Site: The impact will be isolated to the development footprint.	1
Duration (D)	Very long term: The proposed facility is permanent but could be removed.	5

Table 9-7: Potential project impacts on current land capability/land-use (i.e. loss of extensive livestock grazing)– Significance Rating			
Intensity (I)	Minor: The impact alters the environment in such a way that the natural processes or functions are hardly affected; the system does however, become more sensitive to other impacts .		2
Probability (P)	Unlikely: Improbable due to low baseline agricultural/grazing potential.		1
Mitigation (M)	None possible; disturbance is limited to immediate surroundings.		-
Enhancement (H)	N/A		-
Reversibility (R)	Mostly reversible: the impact can mostly be reversed, although if the duration of the impact is too long, it may make the rehabilitation less successful, but otherwise a satisfactory degree of rehabilitation can generally be achieved quite easily.		4
Significance Rating with Mitigation - Negative Impact (S)	N x (E+D) x I x P ÷ ½(M+R)	**Negligible**	6
Significance Rating without Mitigation - Negative Impact (S)	N x (E+D) x I x P ÷ ½(M+R)	**Negligible**	6
Significance Rating -Positive Impact (S)	N x (E+D) x I x P x (H).		-

Table 9-8: Potential project impacts in respect of potential for alternative land-use (crop production) – Significance Rating		
Nature (N)	Potentially negative impacts from the proposed project will result in a loss of area which could be used to cultivate crops.	1
Extent (E)	Site: The impact will be isolated to the development site.	1
Duration (D)	Very long term: The proposed facility is permanent but could be removed.	5
Intensity (I)	Minor: The impact alters the environment in such a way that the natural processes or functions are hardly affected; the system does however become more sensitive to other impacts. The nature of the underlying soils is of such a nature that it does not provide for productive agriculture.	2
Probability (P)	Unlikely: Improbable due to low baseline agricultural potential.	1
Mitigation (M)	None possible; disturbance is limited to immediate surroundings.	
Enhancement (H)	N/A	-
Reversibility (R)	Mostly reversible: the impact can mostly be reversed, although if the duration of the impact is too long, it	4

Table 9-8: Potential project impacts in respect of potential for alternative land-use (crop production) – Significance Rating			
	may make the rehabilitation less successful, but otherwise a satisfactory degree of rehabilitation can generally be achieved quite easily ,		
Significance Rating with Mitigation - Negative Impact (S)	N x (E+D) x I x P ÷ ½(M+R)	**Negligible**	6
Significance Rating without Mitigation - Negative Impact (S)	N x (E+D) x I x P ÷ ½(M+R)	**Negligible**	6
Significance Rating -Positive Impact (S)	N x (E+D) x I x P x (H).		-

Management Actions

The following recommendations must be implemented:

1. Erosion must be managed though adequate control and mitigation. Early identification of erosion-prone areas is essential.
2. Potential impact from hydrocarbon soil contamination such vehicle oil/fuel leaks, concrete mixing and oil spillage should be prevented by providing overnight vehicle with drip trays, ensuring that concrete mixing does not take place on bare soils, etc.
3. Ensure that soil is rehabilitated around the installed panels and associated infrastructure, as well re-vegetated with indigenous seed mix where applicable.

9.3.7. VISUAL

Introduction

The specialist Visual Impact Assessment (VIA) undertaken for the project (Appendix 7.3) took cognisance of the following principles and concepts underpinning Visual Input, according to guidelines for involving visual and aesthetic specialists in EIA processes:

- An awareness that 'visual' implies the full range of visual, aesthetic, cultural and spiritual aspects of the environment that contribute to the area's sense of place;
- The consideration of both the natural and the cultural landscape, and their inter-relationships;
- The identification of all scenic resources, protected areas and sites of special interest, together with their importance in the region;
- The nature and location of any cultural heritage sites, and areas of special or historical interest;
- An understanding of the landscape processes, including geological, vegetation and settlement patterns, which give the landscape its particular character or scenic attributes;
- The need to include both quantitative criteria, such as 'visibility', and qualitative criteria, such as landscape or townscape 'character';
- The need to include visual input as an integral part of the project planning and design process, so that the findings and recommended mitigation measures can inform the final design, and hopefully the quality of the project.

Importantly, background research in respect of informing the legislative context of the area with respect to visual impact was undertaken and revealed that:

- No listed or proclaimed sites, such as nature reserves, biosphere reserves, proclaimed scenic routes, national parks or proclaimed viewshed protection areas were identified in proximity to the proposed development terrain; and
- No scenic routes, special areas or proclaimed heritage sites are within proximity of the proposed development terrain.

Impact Discussion & Significance Assessment

The proposed development area was deemed by the relevant specialist to have a moderate scenic quality, predominantly because:

- The area consists of flat, outstretched plains
- The sense of place of the area is dominated by largely intact natural Nama-Karoo vegetation, showing signs of light grazing.
- Distribution of vegetation is sparse, with very few trees and shrubs.
- The colours found in the vegetation of the area are not conventionally beautiful. The area is very arid, and doesn't lend itself to instilling conventional perceptions of fertility. There are, however, very strong complementary colour pairs to be found in the combination of the saturated brown hues of soil combined with the blue hues of sky.
- The site is located directly adjacent to an already existing Paulputs substation, accompanied by the obligatory existing roads, servitudes and power lines associated with it.

An assessment of 'visual sensitivity' will vary with varying user types/receptors. Recreational sightseers, for example, may be highly sensitive to changes in visual quality. As the developments are centred around the gravel roads and the entrances to the Eskom sub-stations, it is inferred that the predominant type of viewers will be workers in the area and local commuters travelling to the Onseepkans border post. It is, however, inferred that occasional sightseers will be outnumbered by individuals who frequently travel on the road to farming areas and the Onseepkans border post.

Using the guidelines for VIA the expected level of impact was determined. The study area was identified as being an area of medium scenic, cultural or historical significance. It was determined by the specialist that a moderate visual impact is expected; however due to the low height of the installation, as well as its distance from the road, the expected level of impact can be reduced from 'moderate' to 'minimal'. The road to Onseepkans border post was used as the most important vantage point (mainly due to the fact this road is most frequently used); however, it displayed extremely low viewer frequencies. The fact that the viewer frequencies are very low ultimately diminishes the expected visual impact.

The visual impact was assessed mainly through the following deliverables:

- Viewshed analysis (Figure 9-5): A viewshed is an area dispersed over the topography and indicating the relative positions from where the development might be visible. This was used to determine the relative vantage point from where photographic audits were conducted.
- Vantage Point D (Figure 9-6) was modelled by means of photomontage, as this vantage point is where the proposed development would potentially be visible to the most viewers. This vantage point was considered the most important as limited viewers travel directly past the site and substation, with the exception of nearby landowners and substation maintenance staff.

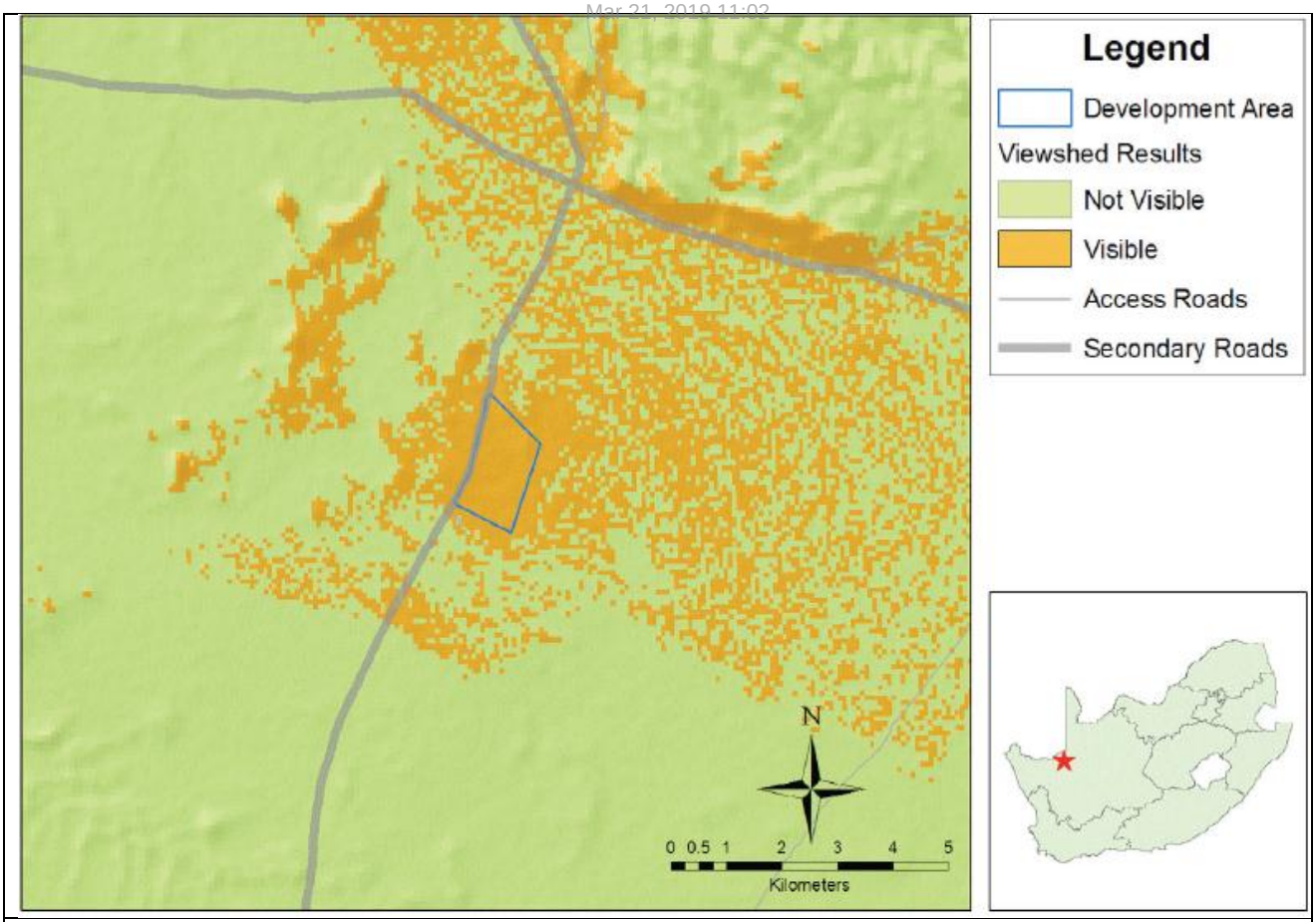


Figure 9-5: Rendered viewshed map of the study area (ESA, 2012)

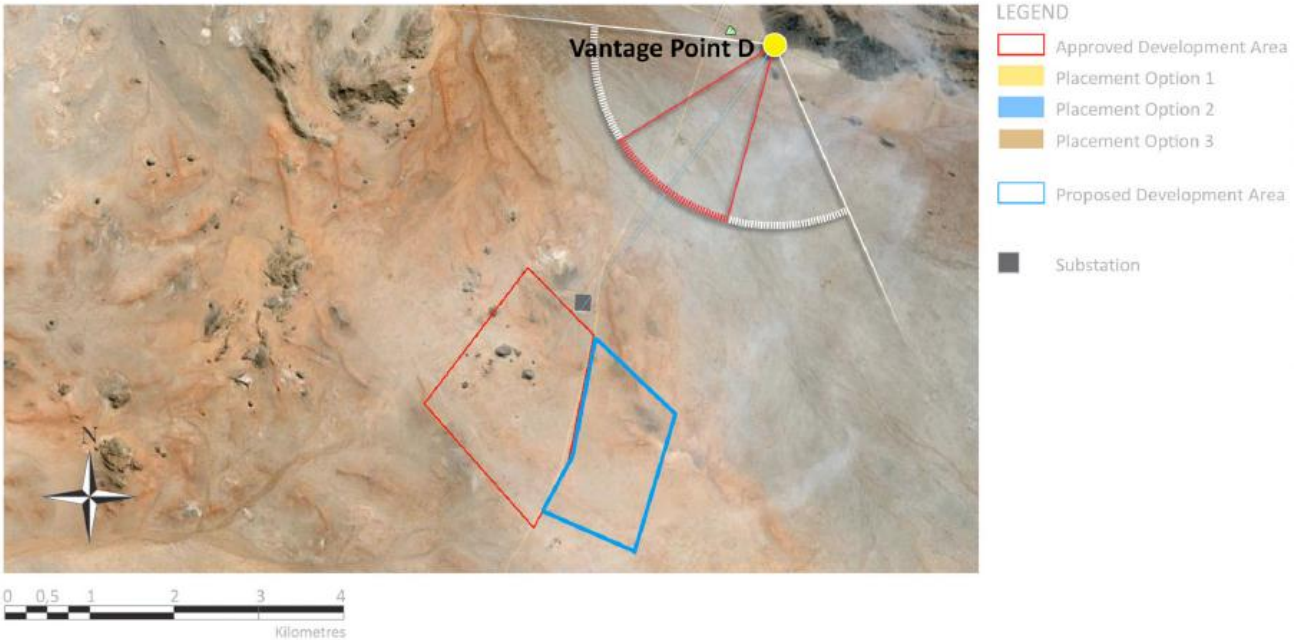


Figure 9-6: Vantage Point D (Onseepkans Road, 200 m east of the Paulputs substation)

Figure 9-7 provides view simulations for day time visual quality changes anticipated from Vantage Point D on visual receptors as a result of the development. The figure provides an idea of what the proposed project would look like from a ground level perspective if implemented.

The specialist VIA undertaken for the project concluded the following:

- "The existing scenic quality of the area indicates moderate scenic quality;
- The level of contrast the development will have in relation to its environment indicated a medium contrast ratio; with anticipated medium compatibility with the surrounding scenery.
- The existing cultural modifications and adjacent industrial activity surrounding the proposed development will constitute a potentially low contrast ratio with the environment;
- The development Visual Change Rating, where viewer sensitivity is not considered high.
- Due to its distance from Vantage Point D (4.2 km) it is anticipated to be minimally visible or not visible at all.

Table 9-9: Visual and Aesthetic Impact Significance Rating			
Nature (N)	Negative impact on visual character of the area		1
Extent (E)	Locally: Within the vicinity of the site and immediate surroundings		2
Duration (D)	Life of solar facility: Approximately 25 - 30 years		5
Intensity (I)	Low: Visual and scenic resources are not affected		2
Probability (P)	Definite: Distinct possibility that the impact will occur		4
Mitigation (M)	Unmitigated: No practical mitigation possible except painting options.		1
Enhancement (H)	N/A		-
Reversibility (R)	Entirely reversible at closure and decommissioning of the solar facility		4
Significance Rating with Mitigation - Negative Impact (S)	N x (E+D) x I x P ÷ ½(M+R)	**Moderate**	22.4
Significance Rating without Mitigation - Negative Impact (S)	N x (E+D) x I x P ÷ ½(M+R)	**Moderate**	22.4
Significance Rating -Positive Impact (S)	N x (E+D) x I x P x (H).		-

Management Actions

Due to the development's size, as well as its distance from identified sensitive receptors, no implementable or manageable management actions can be suggested that would be effective, other than painting auxiliary surface structures with non-reflective paint, in the same hue as the colour of the soil. In terms of painting the installation in muted colours, this is not recommended, since the installation's flat surfaces will serve to blend it into the landscape by reflecting the ambient sky colour. It was therefore in the opinion of the visual specialist that the proposed development can be developed without posing significant impact towards the identified sensitive receptors along the Onseepkans road. Similarly thus, it can be inferred that the proposed development would not have any discernable impacts on the tourism potential of the area, for the reasons stated above.

Pre Development View

Post Development View

Figure 9-7: Daytime pre- and post-development view simulations (Onseepkans Road, 200m east of the Paulputs substation)

9.3.8. TRAFFIC

Introduction

Impacts associated with traffic will mostly be concentrated during the construction phase of the project. These impacts are not considered to be significant in isolation; however they become more significant in combination with surrounding development if construction periods occur simultaneously. The main concern relating to traffic is as follows:

- Off-site accommodation of employees during the construction and daily transfers to the site; and
- Increase in vehicular traffic mainly during the construction phase.

Impact Discussion & Significance Assessment

A traffic assessment was commissioned by the proponent for the proposed development. This assessment is attached hereto under Appendix 7.7. The assessment aimed to quantify the anticipated increase in average daily traffic (ADT) on local and national roads that may be realised through project construction and subsequent operation, and to assess the potential significance thereof in relation to existing road design specifications.

During the constructional phase of the project, the envisaged traffic on the road will include delivery of material and equipment and transportation of personnel. Based on information obtained from similar size projects, the major components that are to be delivered to site and expected number of trips were determined as follows:

- photovoltaic panels - ±500 containers;
- structural elements for construction of the tables - ±160 truck loads; and
- inverters and other - ±60 containers.

The photovoltaic panels and inverters are to be imported from overseas and will be transported in standard containers, while the structural elements for construction of the tables will be transported from local fabrication plants. Since it is unlikely that adequate on site storage facilities will be provided for the storage of these major components, it is envisaged that these components will be delivered to site over a period of 12 months (i.e. during the latter 12 months of an anticipated 15 to 18 month construction phase). This implies that approximately 720 trips are to be made over a period of 12 months, this relates to an ADT of less than 2.

Once the columns are installed, construction of the tables and installation of the panels is a very labour intensive operation. Again, based on information obtained from similar size projects, the maximum expected number of personnel required to execute the work on site is estimated in the order of 400 people. It is assumed that 75% will be transported to site in 50 seater buses, 10% will drive to site in light vehicles, while the other 15% will be passengers. Unlike the labour intensive construction phase, the operational phase of the project will require a small maintenance team, who will travel to site on a daily basis.

During the constructional phase of the project, the envisaged traffic on the road will include delivery of material and equipment and transportation of personnel. The anticipated number of vehicles travelling to the Photovoltaic Power Plant during the construction phase of this project, is tabled below (Table 9-10), together with the envisaged increase in the average daily traffic (ADT).

Table 9-10: Anticipated Traffic Volumes Generated During the Construction Phase		
Vehicle Category	Personnel	Equipment and Material
Light vehicles (GVM < 3 500 kg)	40	
Medium vehicles (GVM 3 500 – 16 000 kg)	7	
Heavy vehicles (GVM > 16000 kg)		2
ADT (% light, medium, heavy)	49 (82%:14%:4%)	

During the operational phase of the project, it is envisaged that a small maintenance team will travel to site on a daily basis. It is assumed that 2 light vehicles and a small bus will be used to convey the staff to site. This would imply that the ADT on the roads to the site would increase by three.

Based on the aforementioned determination of ADT increase on local and national roads, the aforementioned assessment concluded that:

- The N14 is a National Road and the anticipated 0,5% increase in the average daily traffic (ADT) is insignificant. This is further attenuated due to the fact that the vehicles do not all arrive at site at the same time;
- The additional ADT of 49, on either roads R358 or R-1a (i.e. local roads), will result in an increase of more than 200%, might appear significantly high. However, the combined ADT on either of these roads is less than 100 vehicles per day; and
- The anticipated traffic loads on the roads in the area is significantly less that the design capacity of these roads. With this in mind, the traffic volumes contributed by the construction and operation phases of the Photovoltaic Power Plant on the existing traffic volumes are considered insignificant.

Table 9-11: Negative impacts on increased traffic and impacts on road surfaces (mainly during Construction) - Significance Rating		
Nature (N)	Negative impact on social character of the area	1
Extent (E)	Regionally: Within the local municipality	3
Duration (D)	Medium Term: The impact will mostly be associated with the construction phase and will only be approximately up to a year or two.	3
Intensity (I)	Minor: The impact on the road surfaces alters the environment in such way that natural process or functions are hardly affected; the system does however, become more sensitive to other impacts.	2
Probability (P)	Unlikely: the probability that the impact causes significant impacts on the road surface due to increase traffic volumes is considered low. The only potential concern is of safety due to increased traffic volumes mainly during the construction phase.	1
Mitigation (M)	Well mitigated: the impact can be mostly mitigated	4
Enhancement (H)	N/A	-
Reversibility (R)	Mostly reversible: the impact can be mostly reversed, although if the duration of the impact is too long, it may make the rehabilitation less successful, but otherwise a satisfactory degree of rehabilitation can generally be achieved quite easily.	4

Significance Rating with Mitigation - Negative Impact (S)	N x (E+D) x I x P ÷ ½(M+R)	**Negligible**	3
Significance Rating without Mitigation - Negative Impact (S)	N x (E+D) x I x P ÷ ½(M+R)	**Negligible**	4.8
Significance Rating -Positive Impact (S)	N x (E+D) x I x P x (H).		-

Management Actions

No mitigation is required, however if either the R-1a, R-2 or R358 road becomes very degraded corrective action would be required through liaison with the Namakwa District Municipality.

9.3.9. SOCIO-ECONOMICS

Introduction

Renewable power generation has various social and environmental advantages. PV power generation is considered a clean form of energy generation compared to conventional coal firing methods. It does not emit harmful pollutant to the environment. The project support national and intentional obligations made to reduce the countries carbon emissions to the atmosphere. The project would create work opportunities for local communities in an area of South Africa with limited economic development opportunities.

With regards to the effect of social impacts due to the proposed activity, it is very important not to assume the positives outweigh the negatives, as there are various negative impacts associated with the proposed PV development that need to be incorporated in the assessment of the socio-economic environment. The following negative impacts on the socio-economic situation are associated with the proposed development:

- Influx of job seekers to the area
- Impact of heavy vehicles, including safety, dust, damage to roads and noise
- Increase risk of stock theft, damage to farming infrastructure and poaching associated with construction workers on site.
- Risk to farmers' and workers' safety and security due to presence of construction workers.
- Loss of grazing land due to the development (Construction and Operation)

During operation and construction the following positive impacts are expected:

- Energy security to the country
- Climate change: Zero carbon emissions whilst producing clean, renewable energy.
- Job creation for local communities and South Africa in general during construction and operation.

The development proposal would also realise socio-economic benefits for the broader local community, as follows (Appendix 11 refers):

- the local community (the "Local Community") within 50km of the Konkoonsies II Solar Energy Facility (the "Project") will own 5% of the Project Company through a Local Community Trust, with the shareholding funded by the a local financing institution; and
- the Project Company will sponsor unique training programmes, with bursaries, for local people to train them in renewable energy engineering and environmental

monitoring with two leading Further Education Colleges (Boland College and False Bay College).

Impact Discussion & Significance Assessment

- Construction

The construction activities associated with establishment of the proposed facility will mainly be conducted by a single EPC contractor from South Africa. It is expected that approximately 100-200 construction workers will be employed. The construction phase is expected to take 1 - 2 years to complete, dependent of Eskom grid connection availability timeline. There will be some employment opportunities during construction - with the majority of construction labourers coming from the local areas. The opportunities available for the local communities will mostly be targeted at unemployed individuals for unskilled to semi-unskilled work, mostly due to the area's low population density, unemployment rate and low education levels. Locals with limited skills employed only as part of the construction phase should be provided with supportive training programmes as to become eligible for higher skill positions.

Construction staff will be housed in existing facilities in the area; therefore no temporary accommodation on the site will occur except in existing facilities. The construction activities of the proposed development could potentially impact on the daily movement and living patterns of the surrounding community. Due to the influx of construction workers to the area it would potentially increase the incidences of livestock theft and increase criminal activity.

- Operation

The proposed operation of the PV facility does not require large amount of employees. It is anticipated that many full time employees would be required during the operational phase of the project. The majority of these employees will be responsible for the maintenance of the facility. The subject project is encouraging even only on a small scale as it could potentially have quite significant economic spin-offs. The operational phase of the proposed project is not expected to have any direct negative impact on the surrounding property owners' movement and daily living patterns. The operational phase of the facility consists of limited vehicle movement to and from the site as well no associated health risk.

- Decommissioning

The project is planned to be decommissioned in approximately 20-25 years. If this facility is indeed decommissioned it would result in all the jobs to be lost, as well as much needed income to survive. This would also have associated indirect impacts on the local area workforce, businesses and SMMEs.

Table 9-12: Negative impacts on Socio Economics (mainly during construction) - Significance Rating		
Nature (N)	Negative impact on social character of the area	1
Extent (E)	Locally: Within the vicinity of the site and immediate surroundings.	2
Duration (D)	Medium Terms: Most negative impact on the social character of the area will be during the construction phase of the development, as the increase in employees to the area would have associated negative impacts as discussed above.	3
Intensity (I)	Moderate: The social environment is altered, but	3

	functions and processes continue, albeit in a modified way, the system has been damaged and is no longer what it used to be, there are however still remaining functions; the system will probably decline further without positive intervention.		
Probability (P)	Definite: Distinct possibility that the impact will occur. The proposed development will have an impact in the sense that it will change the movement and living patterns, mostly during construction. The negative impact associated with the operational phase is expected to be almost negligible.		4
Mitigation (M)	Slightly mitigated: a small reduction in the impact is likely		2
Enhancement (H)	N/A		-
Reversibility (R)	Slightly reversible: Once the impacts have occurred it will not be easily reversed		2
Significance Rating with Mitigation - Negative Impact (S)	N x (E+D) x I x P ÷ ½(M+R)	**Low**	12
Significance Rating without Mitigation - Negative Impact (S)	N x (E+D) x I x P ÷ ½(M+R)	**Moderate**	16
Significance Rating -Positive Impact (S)	N x (E+D) x I x P x (H).		-

Table 9-13: Positive Impact on Socio Economics of the facility- Significance Rating		
Nature (N)	Negative impact on visual character of the area	-1/4
Extent (E)	Nationally: The proposed project is of national significance as it reduces our dependence on fossil fuels and increases power generation from renewable sources.	5
Duration (D)	Life of solar facility: Approximately 25 - 30 years	5
Intensity (I)	Minor: The solar facility on a national scale has minor influence; however on local scale it has the potential to have major contribution. On a national scale the cumulative impact in combination with all the proposed renewable plants has the potential to have significant contribution to the country.	2
Probability (P)	Very Likely: The impact will probably occur but it is not certain.	3
Mitigation (M)	N/A	-
Enhancement (H)	Well-enhanced: The social benefit can be substantially enhanced to reach a far greater number of receptors. Through community development programmes, capacity building, community trust establishment, etc., the positive impact can be greatly enhanced on a local/regional scale.	4
Reversibility (R)	Moderately Reversible: At closure and decommissioning of the solar facility the social benefits would remain,	3

	however the sustainability of the development would have not been realised.		
Significance Rating with Mitigation - Negative Impact (S)	N x (E+D) x I x P ÷ ½(M+R)		
Significance Rating without Mitigation - Negative Impact (S)	N x (E+D) x I x P ÷ ½(M+R)		
Significance Rating -Positive Impact (S)	N x (E+D) x I x P x (H).	Moderate	-60

Management Actions

It recommended that:

- Unskilled labour (local sub-contractor or directly) be employed from around the study area as to enhance the social benefit to the local population. The proponent must verify local residence status before employment.
- Biotherm Energy implements a skills transfer and capacity building programme.
- No informal settlements must be allowed close to the site.
- Once construction starts security personnel must be permanently stationed on site.
- Employees must be provided with sufficient ablution facilities and transport to the site.
- Construction workers and permanent employees should wear uniforms, PPE and name tags to be easily identifiable.

9.3.10. CUMULATIVE IMPACTS

A cumulative impact is an instance where that occurs as a result of the addition of many similar smaller impacts. These smaller impacts may occur from similar or very different developments and individually they may each be within the assimilative capacity of the environment, but together they reach a threshold that can then cause serious damage. At the time of writing this EIA there are no existing similar facilities in close proximity to the site. A CSP installation is planned on the adjacent farm. The cumulative impact of these projects is not considered significant due to the natural environment remaining intact.

The proposed facility will, in combination with the existing Paulputs substation and various transmission lines intersecting the site, add to the impact associated with these. However this impact is not in the opinion of the environmental specialist considered to be significant.

10. CONCLUSIONS AND EAP RECOMMENDATIONS

BioTherm Energy (Pty) Ltd is proposing to develop a commercial photo-voltaic (PV) solar power facility on Portion 6 of the farm Konkoonsies 91 approximately 36 km's north- west of the town of Pofadder in the Northern Cape Province. The proposed development will be referred to as the Konkoonsies II PV Solar Energy Facility. The Konkoonsies I solar facility is located within the area assessed as part of the environmental assessment and has recently reached financial close (DEA Ref: 12/12/20/2098/1) and will begin construction so as to reach commercial operations by the end of December 2013.

The proposed project would entail the development of a Photo-voltaic (PV) solar power plant up to 267 hectares in extent with a generation capacity of up to 119 MW, covering the entire feasible area. The final capacity would be dependent on the continuing development of photovoltaic technologies, as more efficient modules may become available by the time that the project would begin construction. The envisaged generation capacity is, however, expected to range between 75 – 100 MW. The development footprint can however not exceed 267 hectares; the generation capacity may vary based on the availability of more efficient PV panels. The IPP Procurement programme currently allows for a maximum export capacity of 75 MW for solar PV projects. However, the available allocation will determine if the site is to be developed in phases as a reduction the maximum allocation will allow several smaller plants to be constructed. It should also be noted that the proposed planned transmission line from the facility to the Paulputs substation on portion 4 of the farm Scuit-Klip has been included as part of this assessment (See Figure 10-1 & Appendix 1).

The EIA was commissioned to determine the areas available for construction of the PV facility, taking all environmental aspects into consideration, as to determine the actual feasible area for development. By integrating all the relative specialist assessments commissioned, a site development / layout plan was developed (Figure 10-1 & Appendix 1). The plan identifies areas on the proposed site that are considered to be "no go" areas, and where no development should occur. Furthermore, certain areas within the proposed study area were identified, which are considered to be most feasible from an environmental point of view. Accordingly, of the 531 hectares assessed as part of this study, only 267 hectares have been proposed for authorisation and for development. This area can accommodate approximately 119 MW of electricity for delivery into the national electrical grid.

The Environmental Impact Report presented a comprehensive assessment of the anticipated environmental impacts over the full life-cycle of the proposed Konkoonsies II PV facility on Portion 6 of the farm Konkoonsies 19. Table 10-1 contains a summary of the environmental impact assessment significance rating. The project could potentially result in direct and indirect negative impacts of significance in the absence of appropriate environmental management solutions. The environmental assessment practitioner (EAP) however, believes that appropriate/feasible mitigation is readily available to the proponent that would effectively reduce the significance of potentially negative impacts to within acceptable levels. These impacts and mitigation measures that were assessed as part of the detailed Environmental assessment report (EIR) have been incorporated into this draft EMPr (Appendix 8). This draft EMPr, once approved by the DEA, will be the Konkoonsies II PV Solar Energy Facility's formal plan to manage the development and associated environment in an appropriate and responsible manner.

Renewable power generation has various social and environmental advantages such as:

- Clean form of energy compared to conventional coal firing methods. PV power generation does not emit any harmful pollutants to the atmosphere.
- The project has global significance as it reduces carbon dioxide released into the atmosphere
- Local communities' skills development, employment creation as well as capacity building benefits gets created by the proposed development in an area of South Africa with limited economic development opportunities

It is the EAP's opinion that the EIA process to date has been undertaken correctly and within the bounds of the applicable regulatory environment. It is, therefore, recommended that the EIA Report be accepted by the Department of Environment Affairs (DEA). Furthermore, it is the EAP's opinion that the respective applications be viewed favourably by the Competent Authority, provided that the proposed mitigation and conditions put forward in the EIA and associated EMPr are adhered to and made legally binding to the Proponent (i.e. Biotherm Energy); where the positive project impacts are deemed significant and negative project impacts can be mitigated to the extent that no significant, or residual, environmental damage will result through project approval(s).

The following conditions would be required to be included within an authorisation issued:

- All sensitive areas identified in Figure 10-1 should be avoided by the proposed development and no un-authorised access to these areas should be allowed.
- All mitigation measures detailed within this report, specialist reports (Appendix 7) and draft EMPr (Appendix 8) must be implemented.
- This EMPr must be made binding to the project company as well all contractors.
- All required and relevant permits must be submitted to the relevant competent authorities.
- The EMPr (Appendix 8) is seen as a living document and should be updated as determined/required.
- An Environmental Control Officer (ECO) must be appointed to monitor compliance with the attached EMPr for the entire life of the facility.

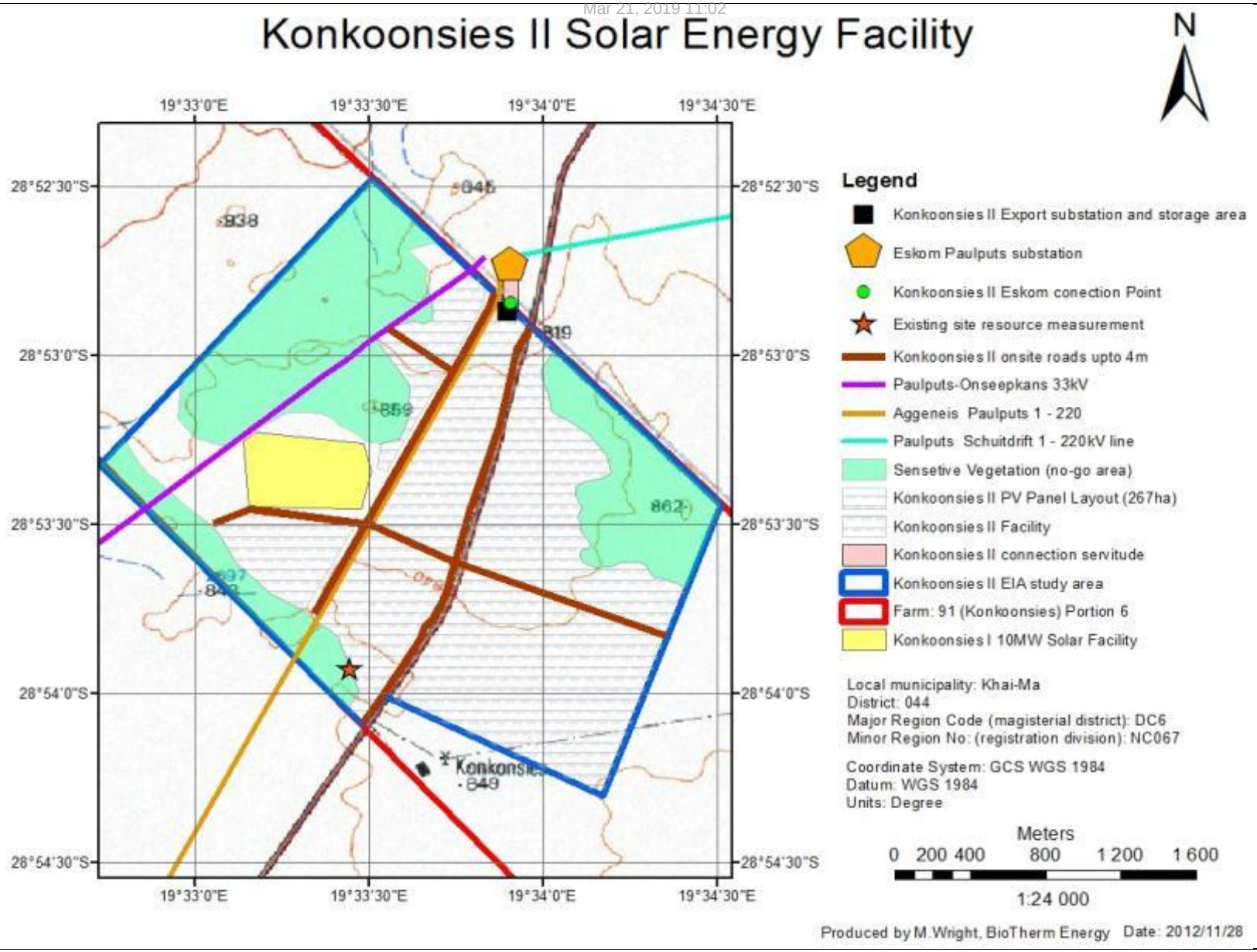


Figure 10-1: Proposed Konkoonsies PV solar expansion topological layout plan.

10.1. SUMMARY OF IMPACTS

The EIA process determined the significance of each identified significant impacts, the table below provides a summary of all the impacts assessed and their relative significance.

Table 10-1: Tabular Summary of Impact Assessment

Aspect	Impact Significance (No mitigation)	Impact Significance (mitigation)
Construction & Operation		
Fauna & Flora	Moderate (-)	Low (-)
Waste Generation	Low (-)	Low (-)
Ground/Surface water		
• Ground and Surface Water Quality	Moderate (-)	Low (-)
• Surface Water Runoff (During construction & Operation	Low (-)	Negligible (-)
Heritage	Low (-)	Negligible (-)
Soil & Agricultural Potential		
• Impacts on current land capability/land-use	Negligible (-)	Negligible (-)
• impacts in respect of potential for alternative land-use	Negligible (-)	Negligible (-)
Visual	Moderate (-)	Moderate (-)
Traffic	Negligible (-)	Negligible (-)
Socio Economic		
• Negative impacts on Socio Economics (mainly during Construction)	Moderate (-)	Low (-)
• **Positive** Impact on Socio Economics	**Moderate (+)**	**Moderate (+)**

Table 10-2: Final Significance Scoring

Final score (S)	Impact significance	
0 – 10	Negligible	the impact should cause no real damage to the environment, except where it has the opportunity to contribute to cumulative impacts
10 – 20	Low	the impact will be noticeable but should be localized or occur over a limited time period and not cause permanent or unacceptable changes; it should be addressed in an EMP and managed appropriately
20 – 50	Moderate	the impact is significant and will affect the integrity of the environment; effort must be made to mitigate and reverse this impact; in addition the project benefits must be shown to outweigh the impact
50 – 100	High	the impact will affect the environment to such an extent that permanent damage is likely and recovery will be slow and difficult; the impact is unacceptable without real mitigation or reversal plans; project benefits must be proven to be very substantial; the approval of the project will be in jeopardy if this impact cannot be addressed

Table 10-2: Final Significance Scoring		
Final score (S)	**Impact significance**	
100 – 200	Severe	the impact will result in large, permanent and severe impacts, such as local species extinctions, minor human migrations or local economic collapses; even projects with major benefits may not go ahead with this level of impact; project alternatives that are substantially different should be looked at, otherwise the project should not be approved

11. LIMITATION AND ASSUMPTIONS OF THE ASSESSMENT

The EIA was undertaken successfully, including the following limitation and assumptions:

- No alternative site was assessed as part of this EIA and only the optimal generation capacity within the identified areas was determined.
- The cumulative impact on similar development in the area cannot be accurately assessed as various EIA are undertaken in the area, however actual development of these facilities depend on allocation by the DoE. The project was therefore very project specific.
- Information provided by BioTherm Energy to the EAPs was correct and valid at the time it was provided.
- Connection to the national grid is dependent on Eskom, however different options have been identified within this report, please refer to section 4.3.

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APPENDIX 1: PV POWER GENERATION FACILITY COMPLEX LAYOUT PLAN, LOCALITY MAPS

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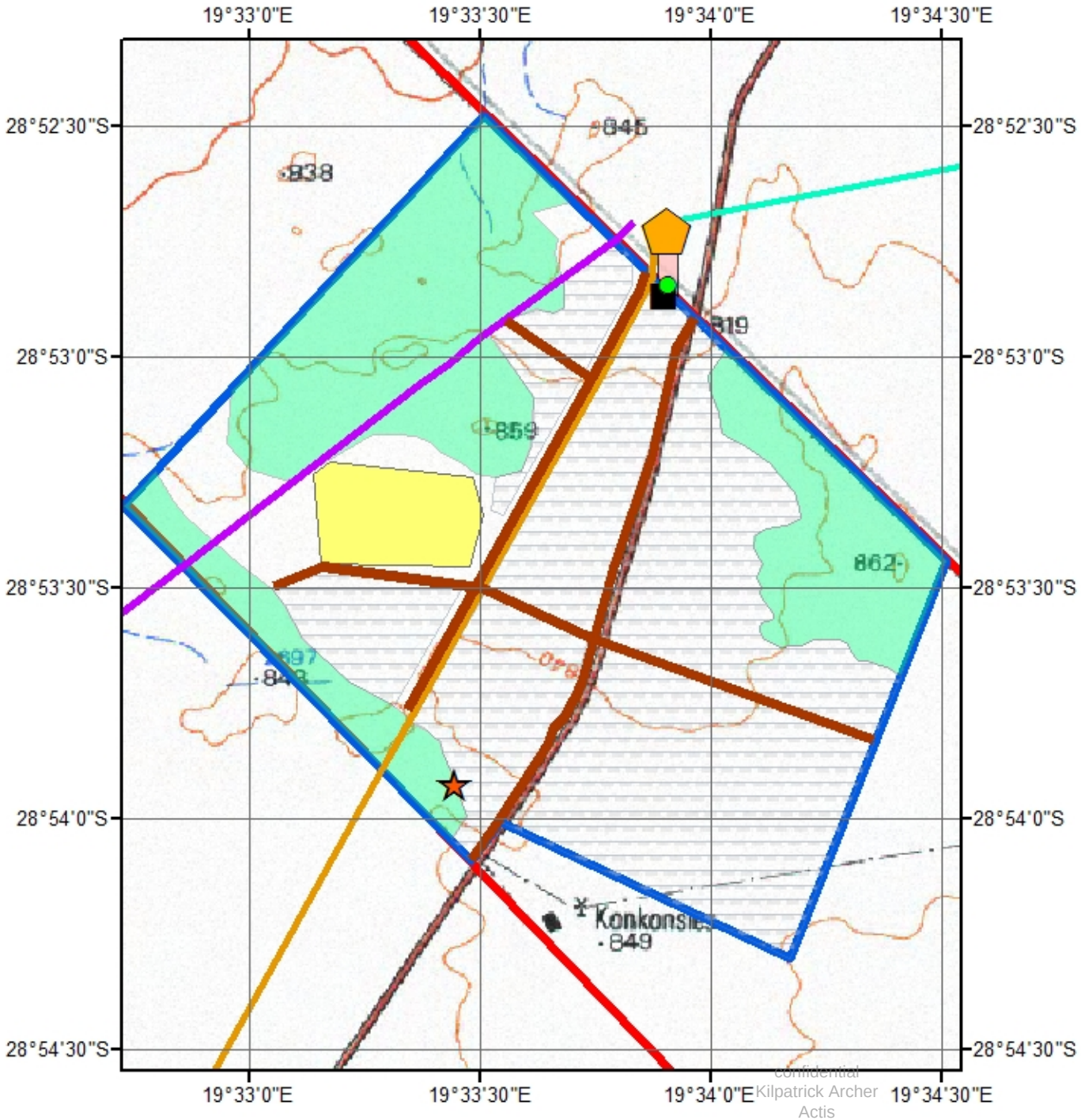
Konkoonsies II Solar Energy Facility



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Legend

- Konkoonsies II Export substation and storage area
- Eskom Paulputs substation
- Konkoonsies II Eskom conection Point
- Existing site resource measurement
- Konkoonsies II onsite roads upto 4m
- Paulputs-Onseepkans 33kV
- Aggeneis Paulputs 1 - 220
- Paulputs Schuitdrift 1 - 220kV line
- Sensetive Vegetation (no-go area)
- Konkoonsies II PV Panel Layout (267ha)
- Konkoonsies II Facility
- Konkoonsies II connection servitude
- Konkoonsies II EIA study area
- Farm: 91 (Konkoonsies) Portion 6
- Konkoonsies I 10MW Solar Facility

Local municipality: Khai-Ma
District: 044
Major Region Code (magisterial district): DC6
Minor Region No: (registration division): NC067

Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

Meters
0 200 400 800 1 200 1 600

1:24 000

Produced by M.Wright, BioTherm Energy Date: 2012/11/28

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Farm Konkoonsies 91 - Study Area Locality

19°27'0"E 19°30'0"E 19°33'0"E 19°36'0"E 19°39'0"E

28°48'0"S 28°51'0"S 28°54'0"S 28°57'0"S 29°0'0"S

Study Area

Authorised Development Area

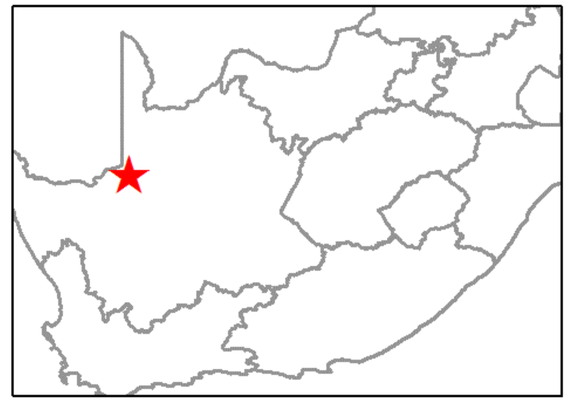
Roads

All Other Roads

Secondary Road

Main Road

National Route



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0 2 4 6 8

Kilometers

Farm Konkoonsies 91 - Study Area Locality

19°27'0"E 19°30'0"E 19°33'0"E 19°36'0"E 19°39'0"E

28°48'0"S
28°51'0"S
28°54'0"S
28°57'0"S
29°0'0"S

N14

Study Area

Authorised Development Area

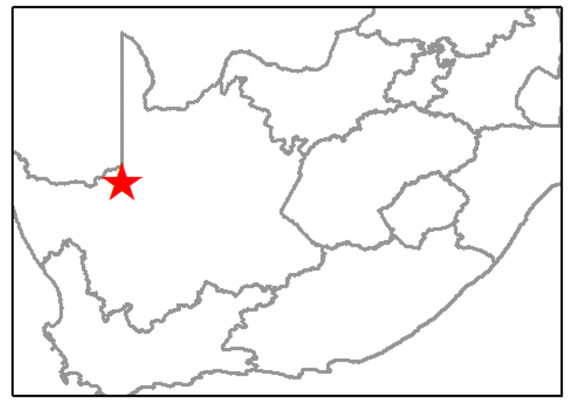
Roads

All Other Roads

Secondary Road

Main Road

National Route



N

0 1 2 4 6 8

Kilometers

Farm Konkoonsies 91 - Regional Topography

19°27'0"E 19°30'0"E 19°33'0"E 19°36'0"E 19°39'0"E

28°48'0"S
28°51'0"S
28°54'0"S
28°57'0"S
29°0'0"S

N14

Study Area

Authorised Development Area

Roads

All Other Roads

Secondary Road

Main Road

National Route

Elevation (m)

High : 1081

Low : 410

N

0 2 4 6 8

Kilometers

Farm Konkoonsies 91 - Regional Topography

19°27'0"E 19°30'0"E 19°33'0"E 19°36'0"E 19°39'0"E

28°48'0"S 28°51'0"S 28°54'0"S 28°57'0"S 29°0'0"S

20m Contours

Study Area

Authorised Development Area

Roads

All Other Roads

Secondary Road

Main Road

National Route

Elevation (m)

High : 1081

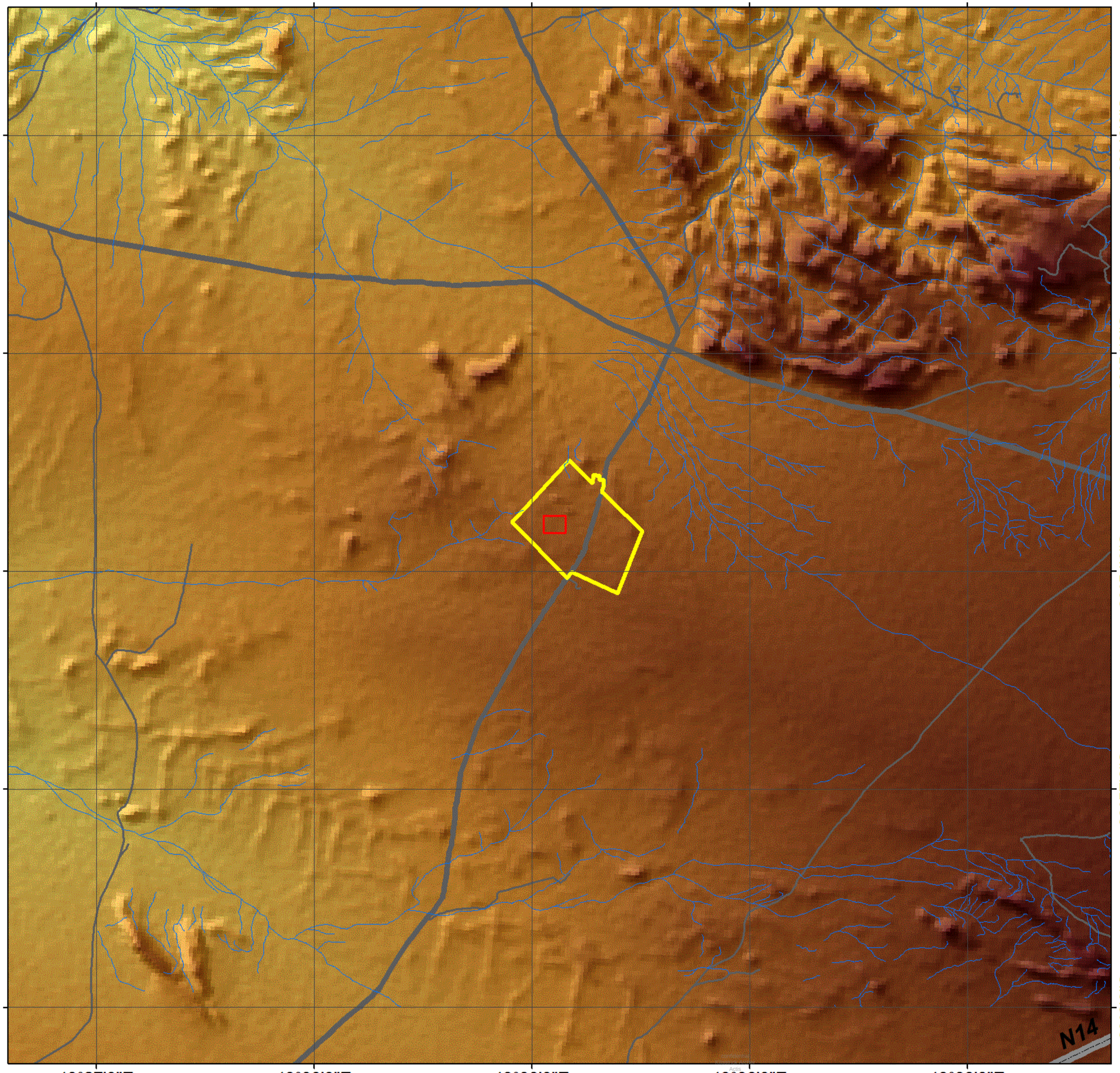
Low : 410

N

0 1 2 4 6 8

Kilometers

Farm Konkoonsies 91 - Natural Drainage



Non-Perennial Streams

Study Area

Authorised Development Area

Roads

All Other Roads

Secondary Road

Main Road

National Route

Elevation (m)

High : 1081

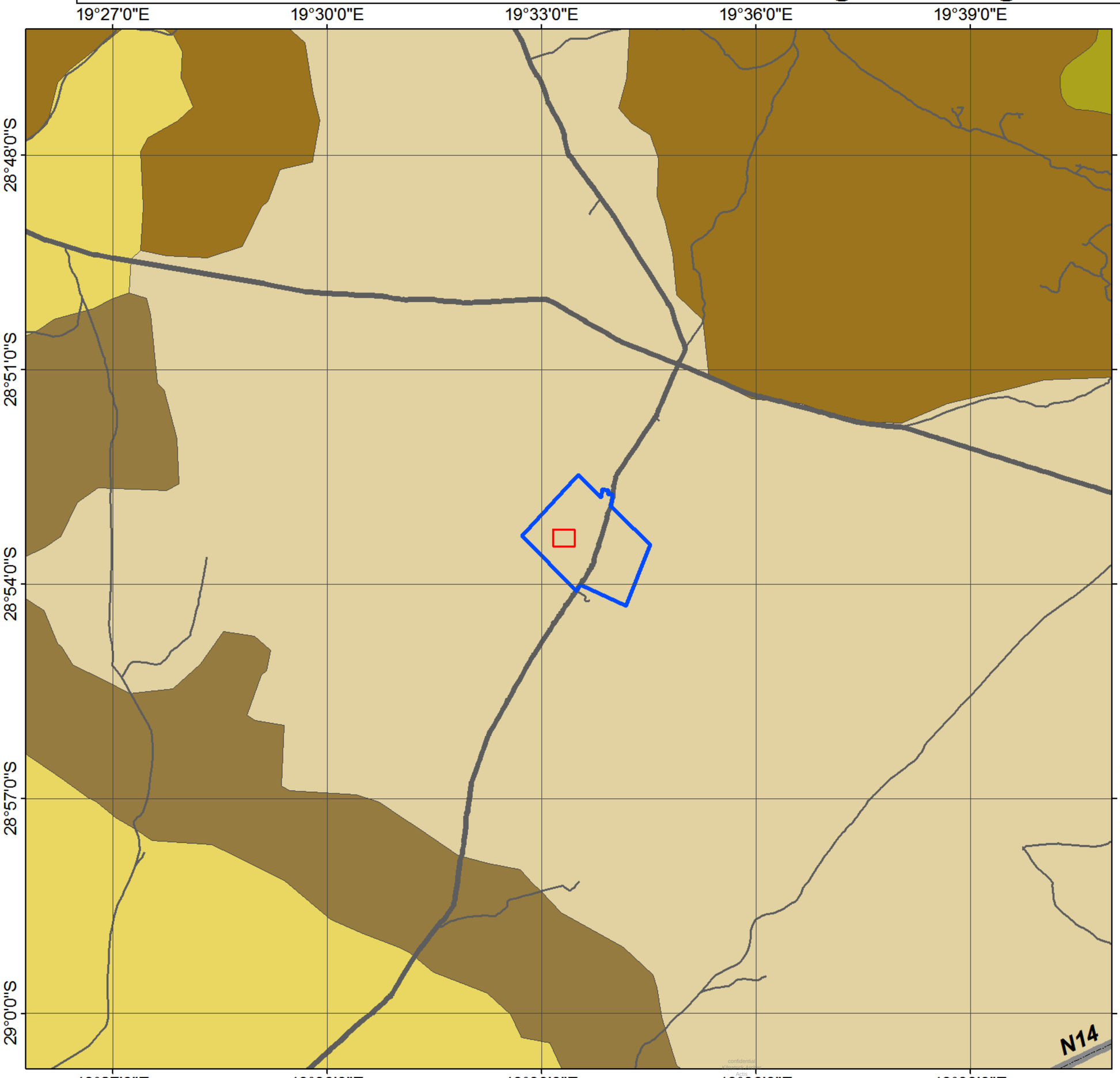
Low : 410

N

0 1 2 4 6 8

Kilometers

Farm Konkoonsies 91 - Regional Vegetation



Study Area

Authorised Development Area

Vegetation

Blouputs Karroid Thornveld

Bushmanland Arid Grassland

Bushmanland Sandy Grassland

Einiqua Plains Desert

Lower Gariep Broken Veld

Roads

All Other Roads

Secondary Road

Main Road

National Route

N

0 1 2 4 6 8

Kilometers

Farm Konkoonsies 91 - Regional Geology

19°27'0"E 19°30'0"E 19°33'0"E 19°36'0"E 19°39'0"E

28°48'0"S
28°51'0"S
28°54'0"S
28°57'0"S
29°0'0"S

N14

Study Area

Authorised Development Area

Roads

All Other Roads

Secondary Road

Main Road

National Route

Geological Class

Donkieboud Granite Gneiss

Hom Sbgrp, Bushmanland Grp

Karoo Dolerite Sui

Nakanas Fm, Bushmanland Grp

Quaternary System

Schuitdrift Gneiss

Stalhoek Cplx

Stolzenfels Enderbite

N

0 1 2 4 6 8

Kilometers

APPENDIX 2: AUTHORITY CORRESPONDENCE, KONKOONSIES PV SOLAR FACILITY 1 ENVIRONMENTAL AUTHORISATION, WATER AND AVAILABLE WATER AND SERVICE PROVISION FROM THE KHAI MA LOCAL MUNICIPALITY

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Kilpatrick Archer
Actis
Mar 21, 2019 11:02

environmental affairs
Department:
Environmental Affairs
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NEAS Reference: DEA/EIA/0000529/2011
DEA Reference: 12/12/20/2443
Enquiries: Nyiko Ngoveni
Tel: 012 395 1694 /1768 **Fax:** 012 320 7539 **E-mail:** nngoveni@environment.gov.za

Brian Gander
Escience Associates (Pty) Ltd
PO Box 2950
SAXONWORLD
2132

Fax: 086 512 2366
Tel: 011 728 2683

PER FACSIMILE / MAIL

Dear Sir/Madam

ACKNOWLEDGEMENT OF RECEIPT AND ACCEPTANCE OF NEW APPLICATION FOR ENVIRONMENTAL AUTHORISATION (SCOPING/EIA PROCESS) FOR PROPOSED 100MW PHOTOVOLTAIC SOLAR POWER GENERATION PLANT ON THE FARMKONKOONSIES NEAR POFADDER IN NORTHERN CAPE

The Department confirms having received the following documents for environmental authorisation for the abovementioned project from you: Application Form (on 12 September 2011) and original signed Application form, amending the listed activities applied for to be authorised (R545 no 18 to be R545 no 8) and amending the contact details of the Applicant (Bio Therm), the proof that the landowner has received the notification letter that was sent through an email on 6 September 2011, a project schedule and EAP Declaration of Interest(17 November 2011).You have submitted these documents to comply with the Environmental Impact Assessment Regulations, 2010. The Application is accepted.

Please include both reference numbers (NEAS Reference and DEA Reference), as listed above, on all documents and correspondence submitted to the Department.

Please note that *one hard copy and one electronic copy (saved on CD/DVD) of draft reports*, and *five hard copies and one electronic copy of final reports* must be submitted to the Department.

In addition, please consider the following during compilation of reports for this application for environmental authorisation:

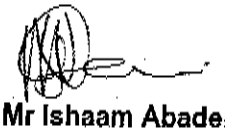
- All applicable Departmental Guidelines must be considered throughout the application process. These can be downloaded from the Department's website: www.environment.gov.za, Environmental Impact Management button, listed under "EIA Administration": Integrated Environmental Management Information Series link. These include, but are not limited to, the following topics: Scoping, Environmental Impact Reporting, Stakeholder Engagement, Specialist Studies, Impact Significance, Cumulative Effects Assessments, Alternatives in EIA and Environmental Management Plans.
- Please be advised that in terms of the EIA Regulations and NEMA the investigation of alternatives is mandatory. Alternatives must therefore be identified, investigated to determine if they are feasible and reasonable. It is also mandatory to investigate and assess the option of not proceeding with the proposed activity (the "no-go" option).
- Refer to the attached annexure for specific requirements for the submission of applications for environmental authorisation for solar power generation facilities.
- Should water, solid waste removal, effluent discharge, stormwater management and electricity services be provided by the municipality, you are requested to provide this office with written proof that the municipality has sufficient capacity to provide the necessary services to the proposed development. Confirmation of the availability of services from the service providers must be provided together with the reports to be submitted.
- In the reports to be submitted it must clearly be demonstrated in which way the proposed development will meet the requirements of sustainable development. You must also consider energy efficient technologies and water saving devices and technologies for the proposed development. This could include measures such as the recycling of waste, the use of low voltage or compact fluorescent lights instead of incandescent globes, maximising the use of solar heating, the use of dual flush toilets and low-flow shower heads and taps, the management of storm water, the capture and use of rainwater from gutters and roofs, the use of locally indigenous vegetation during landscaping and the training of staff to implement good housekeeping techniques.

- The applicant/EAP is required to inform this Department in writing upon submission of any draft report, of the contact details of the relevant State Departments (that administer laws relating to a matter affecting the environment) to whom copies of the draft report were submitted for comment. Upon receipt of this confirmation, this Department will in accordance with Section 24O(2) & (3) of the National Environmental Management Act, 1998 (Act 107 of 1998) inform the relevant State Departments of the commencement date of the 40 day commenting period, or 60 days in the case of the Department of Water Affairs for waste management activities which also require a licence in terms of the National Water Act, 1998 (Act 36 of 1998).
- Should it be necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999), please submit the necessary application to SAHRA or the relevant provincial heritage agency and submit proof thereof with the Basic Assessment Report/Environmental Impact Assessment Report. The relevant heritage agency should also be involved during the public participation process and have the opportunity to comment on all the reports to be submitted to this Department.

In terms of regulation 67 of the EIA Regulations, 2010 this application will lapse if the applicant (or the EAP on behalf of the applicant) fails to comply with a requirement in terms of the Regulations for a period of six months after having submitted the application, unless the reasons for failure have been communicated to and accepted by this Department.

You are hereby reminded that the activity may not commence prior to an environmental authorisation being granted by the Department.

Yours sincerely



Mr Ishaam Abader
Deputy Director-General: Environmental Quality and Protection
Department of Environmental Affairs
Letter signed by: Ms Nyiko Nkosi
Designation: Environmental Officer: Environmental Impact Evaluation
Date: 23/11/2011

CC:	Mr Werner Engelbrecht	BioTherm Energy (Pty) Ltd	Tel: 011 367 4600	Fax: 086 554 5503
	Tshlo Makaundi	Northern Cape DE &NC	Tel: 053 807 7464	Fax: 053 831 3530
	Willem Andre	Khai Ma Municipality	Tel: 027 712 8000	Fax: 027 712 8040

INFORMATION REQUIRED FOR SOLAR ENERGY FACILITIES

1. General site information

The following general site information is required:

- Descriptions of all affected farm portions
- 21 digit Surveyor General codes of all affected farm portions
- Copies of deeds of all affected farm portions
- Photos of areas that give a visual perspective of all parts of the site
- Photographs from sensitive visual receptors (tourism routes, tourism facilities, etc.)
- Solar plant design specifications including:
  - Type of technology
  - Structure height
  - Surface area to be covered (including associated infrastructure such as roads)
  - Structure orientation
  - Laydown area dimensions (construction period and thereafter)
  - Generation capacity
- Generation capacity of the facility as a whole at delivery points

This information must be indicated on the first page of any Scoping or EIA document. It is also advised that it be double checked as there are too many mistakes in the applications that have been received that take too much time from authorities to correct.

2. Site maps and GIS information

Site maps and GIS information should include at least the following:

- All maps/information layers must also be provided in ESRI Shapefile format
- All affected farm portions must be indicated
- The exact site of the application must be indicated (the areas that will be occupied by the application)
- A status quo map/layer must be provided that includes the following:
  - Current use of land on the site including:
    - Buildings and other structures
    - Agricultural fields
    - Grazing areas
    - Natural vegetation areas (natural veld not cultivated for the preceding 10 years) with an indication of the vegetation quality as well as fine scale mapping in respect of Critical Biodiversity Areas and Ecological Support Areas
    - Critically endangered and endangered vegetation areas that occur on the site
    - Bare areas which may be susceptible to soil erosion
    - Cultural historical sites and elements
  - Rivers, streams and water courses
  - Ridgelines and 20m continuous contours with height references in the GIS database
  - Fountains, boreholes, dams (in-stream as well as off-stream) and reservoirs

- High potential agricultural areas as defined by the Department of Agriculture, Forestry and Fisheries
- Buffer zones (also where it is dictated by elements outside the site):
  - 500m from any irrigated agricultural land
  - 1km from residential areas
- Indicate isolated residential, tourism facilities on or within 1km of the site

- A slope analysis map/layer that include the following slope ranges:
  - Less than 8% slope
  - between 8% and 12% slope
  - between 12%and 14% slope
  - steeper than 18 % slope
- A map/layer that indicate locations of birds and bats including roosting and foraging areas (specialist input required)
- A site development proposal map(s)/layer(s) that indicate:
  - Positions of solar facilities
  - Foundation footprint
  - Permanent laydown area footprint
  - Construction period laydown footprint
  - Internal roads indicating width (construction period width and operation period width) and with numbered sections between the other site elements which they serve (to make commenting on sections possible)
  - River, stream and water crossing of roads and cables indicating the type of bridging structures that will be used
  - Substation(s) and/or transformer(s) sites including their entire footprint.
  - Cable routes and trench dimensions (where they are not along internal roads)
  - Connection routes to the distribution/transmission network (the connection must form part of the EIA even if the construction and maintenance thereof will be done by another entity such as ESKOM)
  - Cut and fill areas along roads and at substation/transformer sites indicating the expected volume of each cut and fill
  - Borrow pits
  - Spoil heaps (temporary for topsoil and subsoil and permanently for excess material)
  - Buildings including accommodation

With the above information authorities will be able to assess the strategic and site impacts of applications.

3. Regional map and GIS information

The regional map and GIS information should include at least the following:

- All maps/information layers must also be provided in ESRI Shapefile format
- The map/layer must cover an area of 20km around the site
- Indicate the following:
  - roads including their types (tarred or gravel) and category (national, provincial, local or private)
  - Railway lines and stations
  - Industrial areas
  - Harbours and airports
  - Electricity transmission and distribution lines and substations

- Pipelines
- Waters sources to be utilised during the construction and operational phases
- A visibility assessment of the areas from where the facility will be visible
- Critical Biodiversity Areas and Ecological Support Areas
- Critically Endangered and Endangered vegetation areas
- Agricultural fields
- Irrigated areas
- An indication of new road or changes and upgrades that must be done to existing roads in order to get equipment onto the site including cut and fill areas and crossings of rivers and streams

4. Important stakeholders

Amongst other important stakeholders, comments from the National Department of Agriculture, Forestry and Fisheries must be obtained and submitted to the Department. Request for comment must be submitted to:

Mrs. Anneliza Collett
Directorate: Land Use & Soil Management
Department of Agriculture, Forestry & Fisheries
Tel: 012 - 319 7508
Fax: 012 - 329 5938
e-mail: AnnelizaC@nda.agric.za
www.agis.agric.za

In addition, comments must be requested from Eskom (Mr Kevin Leask or Mr Ronald Marais (011) 8008111) regarding grid connectivity and capacity.

B. AGRICULTURE STUDY REQUIREMENTS

- Detailed soil assessment of the site in question, incorporating a radius of 50 m surrounding the site, on a scale of 1:10 000 or finer. The soil assessment should include the following:
  - Identification of the soil forms present on site
  - The size of the area where a particular soil form is found
  - GPS readings of soil survey points
  - The depth of the soil at each survey point
  - Soil colour
  - Limiting factors
  - Clay content
  - Slope of the site
  - A detailed map indicating the locality of the soil forms within the specified area,
  - Size of the site
- Exact locality of the site
- Current activities on the site, developments, buildings
- Surrounding developments / land uses and activities in a radius of 500 m of the site
- Access routes and the condition thereof
- Current status of the land (including erosion, vegetation and a degradation assessment)

- Possible land use options for the site
- Water availability, source and quality (if available)
- Detailed descriptions of why agriculture should or should not be the land use of choice
- Impact of the change of land use on the surrounding area
- A shape file containing the soil forms and relevant attribute data as depicted on the map

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NEAS Reference: DEA/EIA/0000529/2011
DEA Reference: 12/12/20/2443
Enquiries: Mmatlala Rabothata
Tel: 012 395 1768 **Fax:** 012 320 7539 **E-mail:** mrabothata@environment.gov.za

Brian Gander
Escience Associates (Pty) Ltd
PO Box 2950
SAXONWORLD
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Fax: 086 512 2366
Tel: 011 728 2683

PER FACSIMILE / MAIL

Dear Sir/Madam

ACKNOWLEDGEMENT OF RECEIPT OF APPLICATION FOR ENVIRONMENTAL AUTHORISATION (SCOPING/EIA PROCESS) FOR PROPOSED 100MW PHOTOVOLTAIC SOLAR POWER GENERATION PLANT ON THE FARM KONKOONSIES AND CONNECT INTO SUBSTATION ON THE FARM SCUIT-KLIP NEAR POFADDER IN NORTHERN CAPE

The Department confirms having received the amended Application Form for the above-mentioned project on 14 June 2012.

You are hereby reminded that the activity may not commence prior to an environmental authorisation being granted by the Department.

Yours sincerely

Mr Ishaam Abader
Deputy Director-General: Legal, Authorisations, Compliance and Enforcement
Department of Environmental Affairs
Letter signed by: Ms Nyiko Nkosi
Designation: Environmental Officer: Integrated Environmental Authorisations
Date: 04/07/2012

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NEAS Ref: DEA/EIA/0000529/2011
Reference: 12/12/20/2443
Enquiries: Linda Poll-Jonker
Telephone: 012-395-1767 **Fax:** 012-320-7539 **E-mail:** lpoll-jonker@environment.gov.za

Mr Brian Gardner
Escience Associates (Pty) Ltd
PO Box 2950
SAXONWOLD
2132

Fax no: 086 512 2366

PER FACSIMILE / MAIL

Dear Mr Gardner

REJECTION OF FINAL SCOPING REPORT: PROPOSED CONSTRUCTION OF A 100MW PV SOLAR PLANT ON THE FARM KONKOONSIES WITH A CONNECTION TO THE SUBSTATION ON THE FARM SCUIT-KLIP NEAR POFADDER IN THE NORTHERN CAPE

The application form dated November 2011 and Final Scoping Report (FSR) dated June 2012 have reference.

The Department has reviewed the FSR This review brought to light issues that need attention and clarification by you so that an informed decision regarding the abovementioned application can be made. The Department therefore, in terms of sub regulation 30(1)(c) of the Environmental Impact Assessment Regulations, 2010, rejects the FSR and request the submission of the following additional information:

1. The project description fails to describe the project in terms of activities applied for. Please describe the project infrastructure in terms of yielding capacities and thresholds such that it is with the activities applied for. In order to make an informed decision on the FSR, the Department requires a preliminary lay-out plan that indicates the position of all the listed activities applied for on the property as required by sub-regulation 28(1)(d) of GN R.543

2. The FSR does not indicate where and for how long the Draft SR and FSR was available for public comment.

3. The FSR does not contain any proof that the Draft SR was sent to the relevant authorities and organs of state. The SANPARKS, Eskom and the SKA project office must also be included in the list of organs of state that receive reports for comment.

4. The FSR contains copies of an e-mail and a registered post register as proof that all the key stakeholders received written notification as required by sub-regulation 54(2)(b) of GN R.543. There is however no indication of the status of the recipients of the e-mail and letters as a key stakeholder. Please provide the Department with a list of the names and contact details of all the key stake holders that received written notification of the project.

5. The Plan of Study is insufficient and must include the following:
   - Palaeontological study
   - Focus of biodiversity assessment should not only be on mammals and birds but also on reptiles.

The above requested information must be provided to the Department before a decision can be reached regarding the Scoping Report received.

The applicant is hereby reminded to comply with the requirements of regulation 67 of GN R.543 with regard to the time period allowed for complying with the requirements of the regulations, and GN R.543(56) with regard to the allowance of a comment period for interested and affected parties on all reports submitted to the competent authority for decision-making. The reports referred to are listed in GN R.543, sub regulation 56(3).

The Department awaits the requested information before further processing the above application.

You are hereby reminded of Section 24F of the National Environmental Management Act, Act No 107 of 1998, as amended, that no activity may commence prior to an environmental authorisation being granted by the Department.

Yours faithfully

Fatima Rawjee

Mr Mark Gordon
Chief Director: Integrated Environmental Authorisations
Department of Environmental Affairs
Letter signed by: Ms Fatima Rawjee
Designation: Acting Director: Integrated Environmental Authorisations
Date: 21/08/2012

CC:	Mr Werner Engelbrecht	Biotherm Energy (Pty) Ltd	Tel: 011 367 4600	Fax: 086 544 5503
	Tsholo Makaudi	NDENC	Tel: 053 807 7464	Fax: 053 807 7464
	Mr Willem Andre	Khai Ma Local Municipality	Tel: 027 712 8000	Fax: 027 712 8040

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Enquiries: Linda Poll-Jonker
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Brian Gardener
Escience Associate (Pty) Ltd
PO Box 2950
Saxonwold
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Fax: 086 5994687

PER FACSIMILE / MAIL

Dear Sir/Madam

ACKNOWLEDGEMENT OF RECEIPT OF DRAFT AMENDED SCOPING REPORT FOR THE PROPOSED PHOTO-VOLTAIC SOLAR POWER GENERATION PLANT ON THE FARM KONKOONSIES CLOSE TO POFADDER IN THE NORTHERN CAPE

The Department confirms having received the draft amended Scoping Report for the above-mentioned project on 6 September 2012.

You are hereby reminded that the activity may not commence prior to an environmental authorisation being granted by the Department.

Yours sincerely

Mr Mark Gordon
Chief Director: Integrated Environmental Authorisations
Department of Environmental Affairs
Letter signed by: Ms Nyiko Nkosi
Designation: Environmental Officer: Integrated Environmental Authorisations
Date: 20/09/2012

environmental affairs

Department:
Environmental Affairs
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Mr Roelof Letter
Escience Associates (Pty) Ltd
PO Box 2950
SAXON WOLD
2132

Fax: 086 599 4687

PER FACSIMILE / MAIL

Dear Mr Letter

ACKNOWLEDGEMENT OF RECEIPT OF FINAL AMENDED SCOPING REPORT FOR THE PROPOSED PHOTO-VOLTAIC SOLAR POWER GENERATION PLANT ON THE FARM KONKOONSIES CLOSE TO POFADDER IN THE NORTHERN CAPE PROVINCE

The Department confirms having received the final amended Scoping Report for the above-mentioned project on 23 October 2012.

You are hereby reminded that the activity may not commence prior to an environmental authorisation being granted by the Department.

Yours sincerely

Mr Mark Gordon
Chief Director: Integrated Environmental Authorisations
Department of Environmental Affairs
Letter signed by: Ms Nyiko Nkosi
Designation: Environmental Officer: Integrated Environmental Authorisations
Date: 09/11/2012

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NEAS Reference: DEA/EIA/0000529/2011
DEA Reference: 14/12/16/3/3/2/2443 (12/12/20/2443)
Enquiries: Ms Mpho Monyai
Telephone: 012-310-3938 **Fax:** 012-320-7539 **E-mail:** mmonyai@environment.gov.za

Mr Brian Gardner
Escience Associates (Pty) Ltd
PO Box 2950
SAXONWOLD
2132

Fax no: 086 512 2366

PER FACSIMILE / MAIL

Dear Mr Gardner

APPLICATION FOR ENVIRONMENTAL AUTHORISATION: PROPOSED CONSTRUCTION OF A 100MW PV SOLAR PLANT ON THE FARM KONKOONSIES WITH A CONNECTION TO THE SUBSTATION ON THE FARM SCUIT-KLIP NEAR POFADDER IN THE NORTHERN CAPE

The Amended Final Scoping Report (FSR) and Plan of Study for Environmental Impact Assessment dated October 2012 and received by the Department on 23 October 2012 refer.

The Department has evaluated the submitted FSR and the Plan of Study for Environmental Impact Assessment dated October 2012 and is satisfied that the documents comply with the minimum requirements of the Environmental Impact Assessment (EIA) Regulations, 2010. The FSR is hereby accepted by the Department in terms of regulation 30(1) (a) of the EIA Regulations, 2010.

You may proceed with the environmental impact assessment process in accordance with the tasks contemplated in the Plan of Study for Environmental Impact Assessment as required in terms of the EIA Regulations, 2010.

Please ensure that comments from all relevant stakeholders are submitted to the Department with the Final Environmental Impact Report (EIR). This includes but is not limited to Department Agriculture, Forestry and Fisheries (Northern Cape), Department of Water Affair (DWA Northern Cape) Director: Water Sector Regulation and Use, Northern Cape Department of Environment and Nature Conservation (DENC), Namakwa District Municipality, Khai Ma Local Municipality and Eskom. Proof of correspondence with the various stakeholders must be included in the Final EIR. Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments.

The EAP must, in order to give effect to regulation 56(2), give registered interested and affected parties access to, and an opportunity to comment on the report in writing before submitting the final environmental impact assessment report to the Department.

1. In addition, the following amendments and additional information are required for the EIR:
   1.1. Details of the future plans for the site and infrastructure after decommissioning in 20-30 years and the possibility of upgrading the proposed infrastructure to more advanced technologies.
   1.2. The total footprint of the proposed development should be indicated. Exact locations of the PV panels, power lines, roads and other associated infrastructure should be mapped at an appropriate scale.
   1.3. Should a Water Use License be required, proof of application for a license needs to be submitted.
   1.4. Possible impacts and effects of the development on the agricultural potential of the area.
   1.5. The EIR should include information on the following:
      - Environmental costs vs. benefits of the solar farm facility;
      - Financial implications to tourism in the area; and
      - Economic viability of the facility to the surrounding area and how the local community will benefit.
   1.6. A copy of the final site layout plan. All available biodiversity information must be used in the finalisation of the layout plan. Existing infrastructure must be used as far as possible e.g. roads. The layout plan must indicate the following:
      - PV positions and its associated infrastructure;
      - Foundation footprint;
      - Internal roads indicating width (construction period width and operation period width) and with numbered sections between the other site elements which they serve (to make commenting on sections possible);
      - Wetlands, drainage lines, rivers, stream and water crossing of roads and cables indicating the type of bridging structures that will be used;
      - The location of heritage sites that will be affected by the facility and associated infrastructure;
      - Sub-station(s) and/or transformer(s) sites including their entire footprint;
      - Connection routes (including pylon positions) to the distribution/transmission network;
      - All existing infrastructure on the site, especially roads;
      - Environmental sensitive features and buffer areas.
      - Buildings, including accommodation; and
      - All "no-go" areas.
   1.7. An environmental sensitivity map indicating environmental sensitive areas and features identified during the EIA process.
   1.8. A map combining the final layout plan superimposed on the environmental sensitivity map.

2. The Environmental Management Programme (EMPr) to be submitted as part of the EIR must include the following:

   2.1. All recommendations and mitigation measures recorded in the EIR.
   2.2. The final site layout plan.
   2.3. Measures as dictated by the final site lay-out plan and micro-siting.
   2.4. An environmental sensitivity map indicating environmental sensitive areas and features identified during the EIA process.
   2.5. An alien invasive management plan to be implemented during construction and operation of the facility. The plan must include mitigation measures to reduce the invasion of alien

species and ensure that the continuous monitoring and removal of alien species is undertaken.

2.6. A plant rescue and protection plan which allows for the maximum transplant of conservation important species from areas to be transformed. This plan must be compiled by a vegetation specialist familiar with the site and be implemented prior to commencement of the construction phase.

2.7. A re-vegetation and habitat rehabilitation plan to be implemented during the construction and operation of the facility. Restoration must be undertaken as soon as possible after completion of construction activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.

2.8. An open space management plan to be implemented during the construction and operation of the facility.

2.9. A traffic management plan for the site access roads to ensure that no hazards would results from the increased truck traffic and that traffic flow would not be adversely impacted. This plan must include measures to minimize impacts on local commuters e.g. limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time and avoid using roads through densely populated built-up areas so as not to disturb existing retail and commercial operations.

2.10. A transportation plan for the transport of PV components, main assembly cranes and other large pieces of equipment.

2.11. A storm water management plan to be implemented during the construction and operation of the facility. The plan must ensure compliance with applicable regulations and prevent off-site migration of contaminated storm water or increased soil erosion. The plan must include the construction of appropriate design measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures must promote the dissipation of storm water run-off.

2.12. An erosion management plan for monitoring and rehabilitating erosion events associated with the facility. Appropriate erosion mitigation must form part of this plan to prevent and reduce the risk of any potential erosion.

2.13. An effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage. This must include precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or storm water systems.

2.14. Measures to protect hydrological features such as streams, rivers, pans, wetlands, dams and their catchments, and other environmental sensitive areas from construction impacts including the direct or indirect spillage of pollutants.

2.15. Please note that the aspects; impacts; mitigation measures; time periods of actions; and responsible persons of the EMPr (requirements of regulation 33 (c – h) must be packaged into a tabular form for ease of auditing and enforcement.

3. <u>The following specialist study must be undertaken and must be included in the final EIR:</u>

3.1. Visual Impact Assessment;

3.2. Soils and Agricultural Potential Assessment;

3.3. Traffic Impact Assessment;

3.4. Delineation of drainage lines and suitable buffer zones;

3.5. Detailed biodiversity (Fauna and flora) assessment study must be conducted as soon as possible as required by DAFF and their comments must be considered when conducting the survey.

4. Application form

The amended Final SR indicated that activity 11 of GN 544 does not apply to this project as all potential activities were identified and no water course would be impacted on by the proposed and all the activities of the proposed development would stay well outside 32 meters of any drainage lines. Please ensure that reflected in the application form and that activities that are applied for are specific and can be linked to the development activity or infrastructure in the project description. Please amend the application form and re-submit together with the final EIR.

The applicant is hereby reminded to comply with the requirements of regulation 67 with regard to the time period allowed for complying with the requirements of the Regulations, and regulations 56 and 57 with regard to the allowance of a comment period for interested and affected parties on all reports submitted to the competent authority for decision-making. The reports referred to are listed in regulation 56(3a-3h).

Please ensure that the Final EIR includes at least one A3 regional map of the area and the locality maps included in the final EIR illustrate the different proposed alignments and above ground storage of fuel. The maps must be of acceptable quality and as a minimum, have the following attributes:

- Maps are relatable to one another;
- Cardinal points;
- Co-ordinates;
- Legible legends;
- Indicate alternatives;
- Latest land cover;
- Vegetation types of the study area; and
- A3 size locality map.

Further, it must be reiterated that, should an application for Environmental Authorisation be subject to the provisions of Chapter II, Section 38 of the National Heritage Resources Act, Act 25 of 1999, then this Department will not be able to make nor issue a decision in terms of your application for Environmental Authorisation pending a letter from the pertinent heritage authority categorically stating that the application fulfils the requirements of the relevant heritage resources authority as described in Chapter II, Section 38(8) of the National Heritage Resources Act, Act 25 of 1999.

You are requested to submit five (5) copies of the Environmental Impact Report (EIR) to the Department as per regulation 34(1)(b) of the EIA Regulations, 2010. Please submit at least two electronic copy (CD/DVD) of the complete final report with two hard copy documents.

You are hereby reminded of Section 24F of the National Environmental Management Act, Act No 107 of 1998, as amended, that no activity may commence prior to an environmental authorisation being granted by the Department.

Yours sincerely

Fatima Rawjee.

Mr Mark Gordon
Chief Director: Integrated Environmental Authorisations
Department of Environmental Affairs
Letter signed by: Ms Fatima Rawjee
Designation: Director: Integrated Environmental Authorisations
Date: 25/07/2013.

CC:	Mr Werner Engelbrecht	Biotherm Energy (Pty) Ltd	Tel: 011 367 4600	Fax: 086 544 5503
	Tshlo Makaudi	NDENC	Tel: 053 807 7464	Fax: 053 807 7464
	Mr Willem Andre	Khai Ma Local Municipality	Tel: 027 712 8000	Fax: 027 712 8040

APPENDIX 3: TECHNOLOGY DESCRIPTION, FOUNDATION DESIGNS FROM AURORA POWER SOLUTIONS

KONKOONSIES PV SOLAR PROJECT INFORMATION

·	Name of the developer:	**Biotherm Energy**
·	Size of the project:	**75MW per project phase**
·	Location of the project:	**The project is located on the farm Konkoonsies 91 the Northern Cape**
·	Land rights:	**A land use agreement has been signed with the landowner**
·	Type of technology:	**Solar PV Panels – mono or poly crystalline, ground mounted with an option to use CPV technology.**
·	Inverter technology:	**High frequency switched IGBT powered converter using a string or central inverter layout with reactive power control.**
·	Tracking;	**Option to use tracking for PV, dual axis tracking for CPV**
·	Services Provision:	**At this stage, it is still to be decided, but the options are:** • **Electricity - Eskom** • **Water – Municipality or other water services provider and ground water abstraction** • **Sewerage and waste - Municipality**
·	Grid connection:	**Connection will be to the Paulputs substation. The substation may have to be extended. Connection voltage to the grid may be up to above 275kV**

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Each PV plants is expected to have a power generating capacity of 75MVA (electrical, peak). The plant is made of up the following broad components:

- PV panel array
- Wiring to central inverters
- Connection to grid
- Balance of plant

PV Array

This is an array of photo-voltaic panels covering approximately 150 hectares for a in spatial extent for a 75MW plant. The panels are mounted on metal structures which are fixed into the ground either through a concrete foundation, a deep seated screw or piles. A 75MW plant will have in the region of 300000 panels. The exact number of panels in a plant is dependent on the power rating of the panel selected. An example of a panel from Solar World is 1675mmx1001mm in size. The panel mounting method will determine the height of the panels above ground. A typical mounting designmay have panels at a height of approximately 1m from the ground at the lower end and 3m at the higher end depending on the angle of tilt (approximately 30° in South Africa – dependent on latitude at which site is located).

Array details:

- distances between panel rows – approximately 7m
- height of panels above ground – 1m at the lower end and 3m at the high end
- arrangement of panels – 5m buffer from fence, 5m access road in between the rows
- panels have a junction box located below the rows where all connections between rows meet up. Underground cables run from this box to the inverter/transformer house at 400V DC.

Wiring to Central Inverters

Sections of the PV field are wired to central inverters which can have a range of rated power with examples of 500kW to 1250kW each. The inverter is a pulse width mode inverter that converts DC current to AC current at grid frequency. Each inverter as a size of approximately 3m x 2.5m x 1m for the 500kW model. Output voltage is 480-1000Vac. Central inverters will be housed in a small brick building 6m long x3m wide x 3 m high or have their own waterproof housing for outdoor use.

A second option is to use string inverters. In this case smaller inverters are used and connected to a set of strings. Here the inverters are externally mounted under the panels. This option is recommended for smaller plants.

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Civil works

The main civil works are:

- Terrain levelling – selection of flat surfaces to reduce amount of work required.
- Access and inside roads/paths – already existing paths to be used were possible, turning circle of trucks to be taken into consideration, use of roads /paths minimal when plant is in operation.
- Trenching – all DC and AC wiring within the PV plant must be buried underground. The cable trenches will be approximately 600mm deep and 400mm wide and backfilled with sand. Manhole covers will be placed every 40m or each direction change. A concrete slab will be laced where vehicles pass over the cable trenches.
- Foundations – concrete foundations for panels may be cast or holes drilled into the ground for supporting a deep seated screw depending on the mounting method to be used

Connection to grid

The grid connection requires transformation of the voltage from the 480-1000V inverter output to medium voltages ranging from 22,000V to 132kV. The inverter output is stepped up to this voltage via transformers. Underground cables will be routed a central AC bus bar in a small substation located within the confines of the PV plant. Transmission cables to the grid from the plant can either be via overhead or underground transmission lines. Further stepping up of the voltage may be required for connection to the grid and this may either be in a newly built substation or an existing Eskom substation

Guard House/Control room/ Mini Substation

A brick building approximately 100m² in area will be required. The guard house will include a toilet and a kitchen. The control room will house the electrical switchgear, monitoring equipment and security equipment for the PV plant. A mini substation located behind the building will be required and this will be the point from which transmission lines will be routed to the grid via either underground cables (connecting directly to a substation) or overhead cables (tying into overhead grid cables or directly into a substation)

Tracking (optional)

Tracking comprises of one (single axis) or two (dual –axis) motors and a sun sensor used to track the sun. The motors usually contain gears and moving parts that will need greasing from time to time.

The cheapest method which also requires less maintenance and has a low fault ratio is using fixed tilt panels. In this method the panels are tilted at the most optical angle for maximum collection of the suns rays. The angle of tilt is determined by the latitude at which the site is located and in South Africa the panels will be north facing and tilted at and angle of between 30 and 33 degrees.

Security fence

The entire facility will have a perimeter fence. Due to the nature and value of the components in the plant this fence will have perimeter sensor to detect any breaches. One method can be optic fibre which runs on the fence and if broken will sound an alarm. An alternative method would be where the fibre is buried and trenches and is triggered when stepped on. Other security features will include CCTV cameras motion sensors and flood lights.

Buffer area

A buffer area will be maintained between the perimeter fence and the plant infrastructure. This area will be a distance of 5m between the fence and any equipment in the plant.

(Please note: Figures used here are examples only and final designs will be prepared which will have more accurate numbers specific to each site when an EPC contractor has been appointed)

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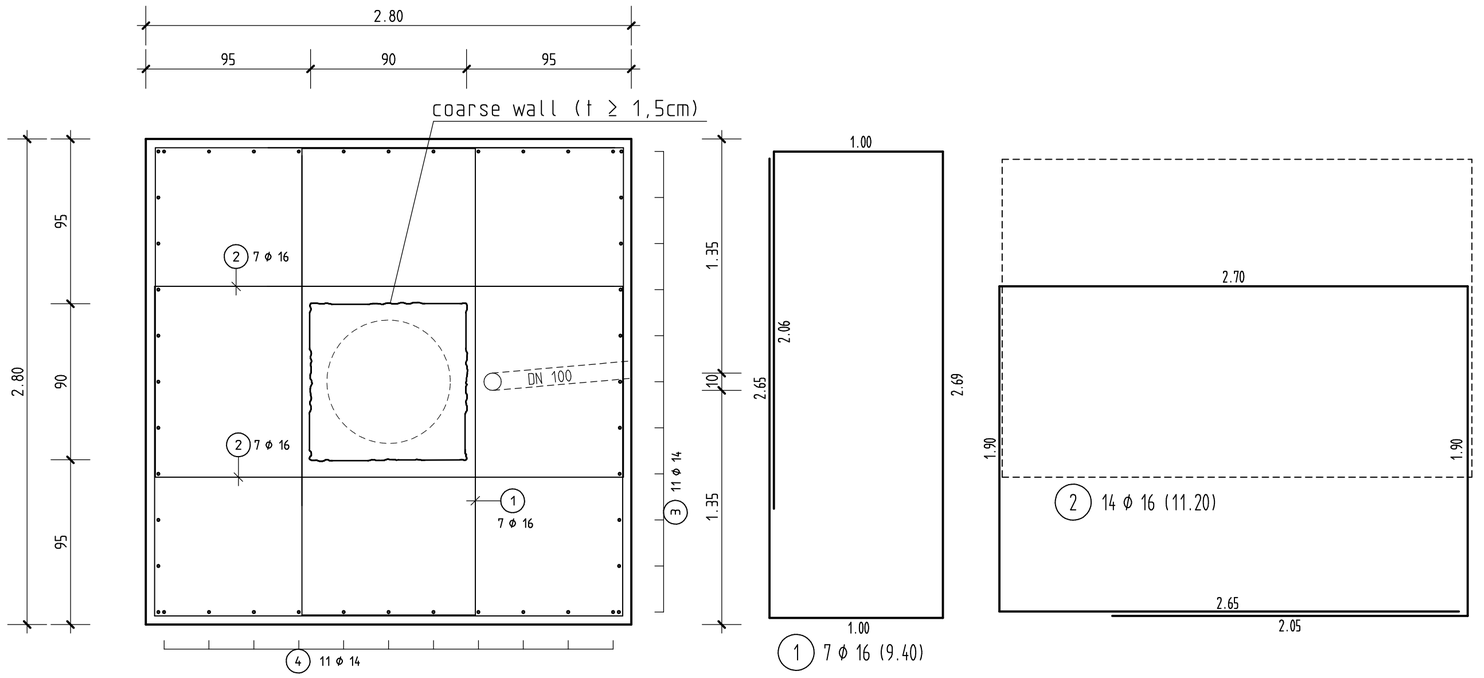
1x spot footing, for a solar-mast Typ "Cosma"

plan view
scale=1:25

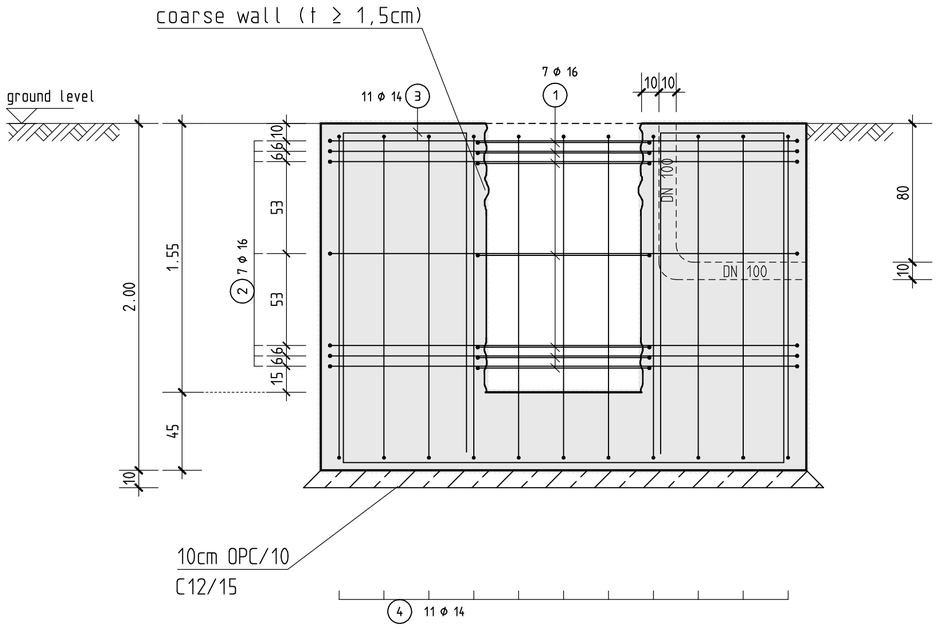


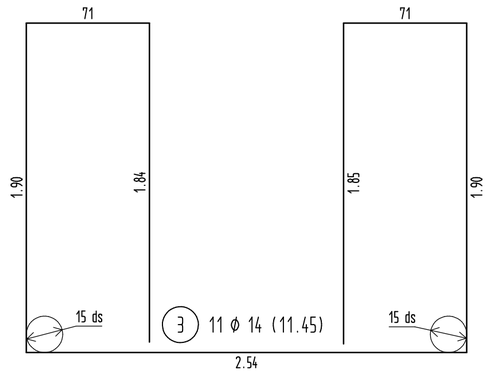
Structurat concrete grade shall be C25 (fcu= 25N/mm² after 28days).
SRC (BS 4027) shall be used for the foundations.
Min. Cement content: 300kg/m³
Max. free water/cement ratio: 0,55 (but not less than 0,42)
Max. fresh concrete temperature: 30°Celsius
Max aggregate size: 20mm

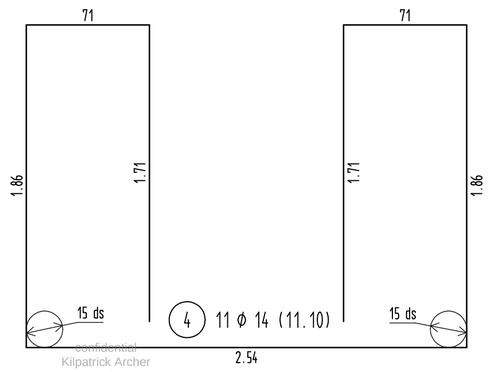
Blinding concrete shall be OPC/10 10cm under all foundations.
ground bearing slabs and ground beams

max. soil pressure = 150KN/m²

section view
scale=1:25







building material

part	challenge	concrete overlaid rebars
fundation	XC2 XF1	5,00cm

concrete grade
C25/30
(DIN EN 206-1 / BS 4027)

rebar steel: 500S (500B MPa high yield BS 4449)
500M (500A MPa BS 4493)

Index	des.	date	modification
d			
c			
b			
a	Nu.	30.05.11	anchoring depth changed

Wiesler & Jakob Bauingenieure
Ingenieurbüro für Tragwerksplanung
Kirchstr. 12, D-79219 Staufen, Germany
Tel. 0049/7633/5000-56 Fax 0049/7633/5000-58

client: Soitec Solar GmbH
Bötzinger Str. 31, D-79111 Freiburg, Germany

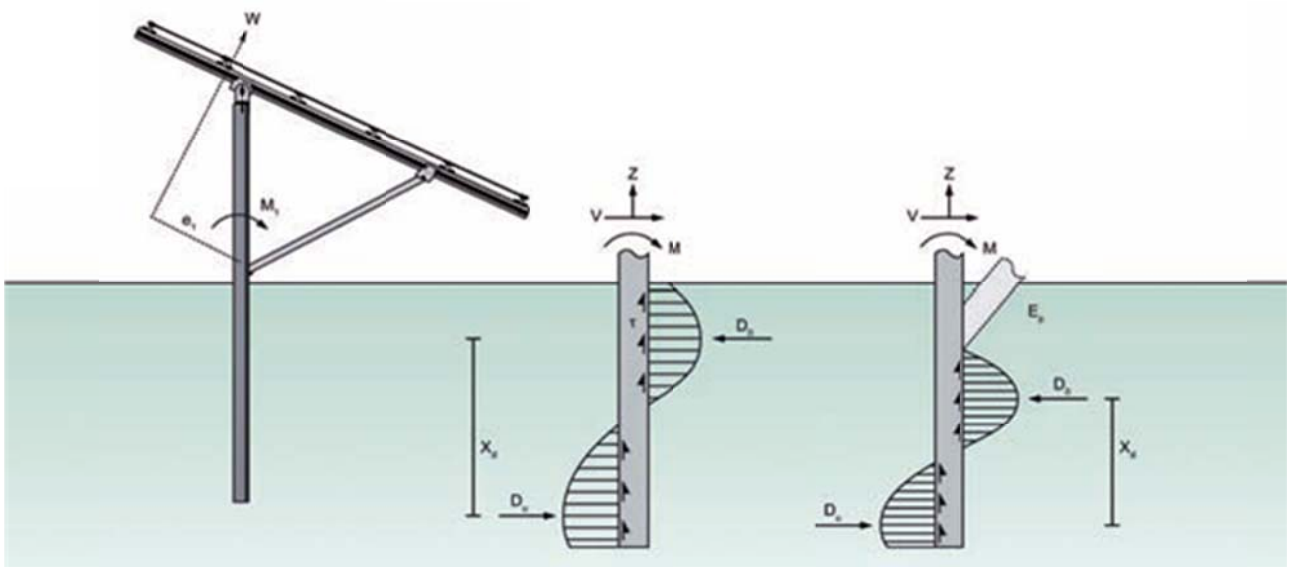
Project-Nr.: 2011-24

building: 1x spot footing, for a solar-mast Typ "Cosma"
Touwsrivier, ZA

sheet size: A2
scale: 1:25
des.: 26.05.2011 Nußbaumer

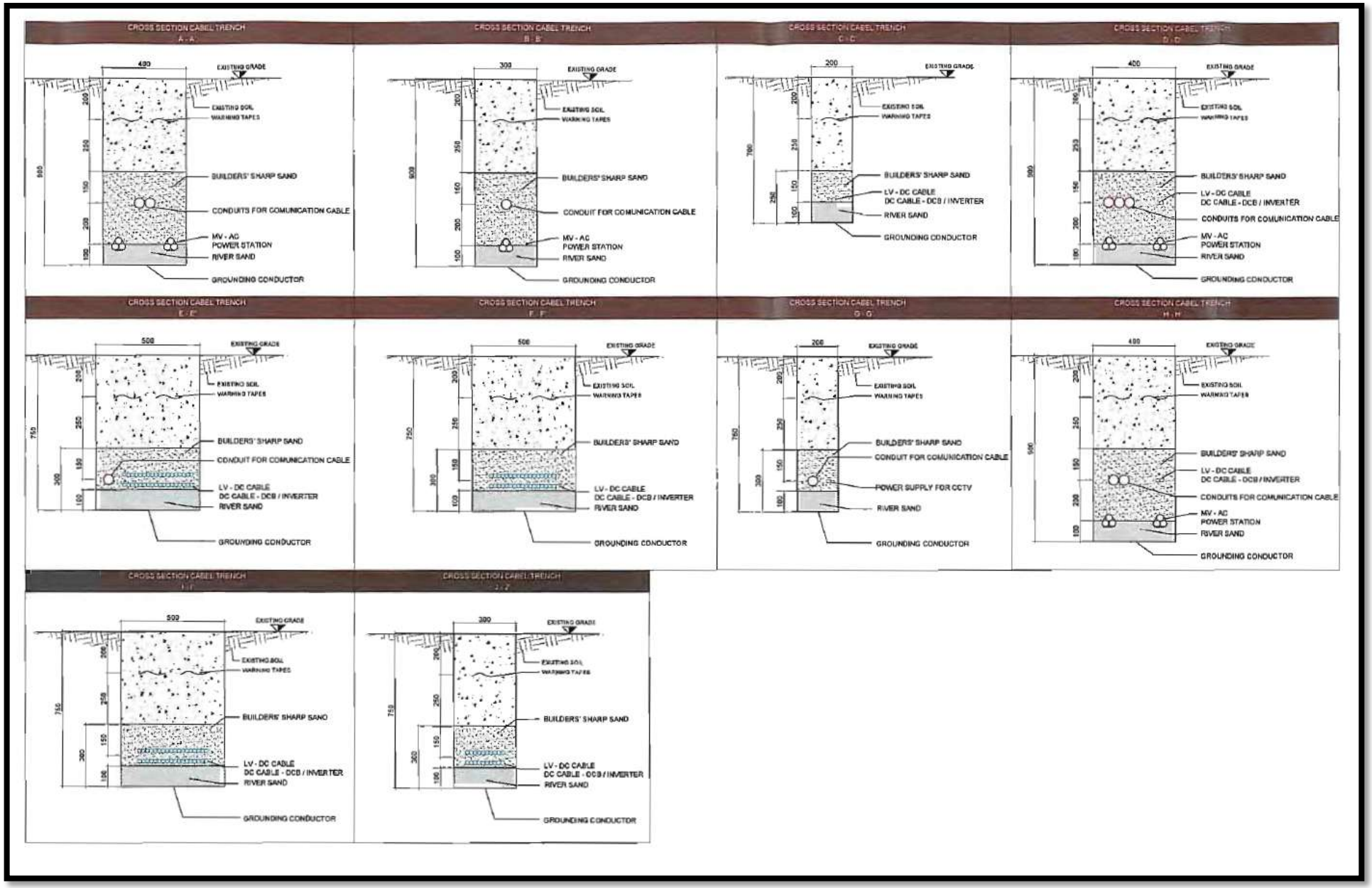
component part: spot footing

Drawing Nr.: 1a



Material	astening elements, bolts: Stainless steel 304 and 316
	rofiles (rails): Aluminium alloy 6105 T5
	igh life-expectancy, high residual value, no disposal costs
	ile driven support posts: Steel, hot-dip galvanized with a G235 process
	asy plant re-powering due to modular design
Logistics	uick and simple mounting
	laximum level of prefabrication prior to shipment
Construction	an be installed on uneven terrain
	imple adjustment options
	ost optimized configurations for framed and unframed modules

Accessories	:able channels, cable ducts
	:omponents for potential equalization/grounding
	:lamps for every type of module
	astening systems for large laminate modules (OptiBond system)
Calculations	00% code compliant designs for any locality
	hird-party structural PE, stamped drawings and calculations
	ıdividual system structural calculations based on geotechnical report
	ıdividual system design calculations based on regional load values
	esign loads according to IBC 2006 or 2009 in U.S. and the Ontario XX in Canada.
	atented profile geometries with optimum material utilization
	erification of all construction components based on FEM-calculation
	arth quake simulation, optional
Available Third- Party Services	eotechnical soil investigation and analysis
	amming of foundations
	ptional: rack mounting
	ptional: complete module mounting
	PC services
	PA formation
Terrain maintenance	imple terrain maintenance due to single support
	pecification of module height above ground possible
Grounding, Potential equalization	xtension with caution/product lighting outward lightning protection systems possible
	omponents for the internal potential equalization



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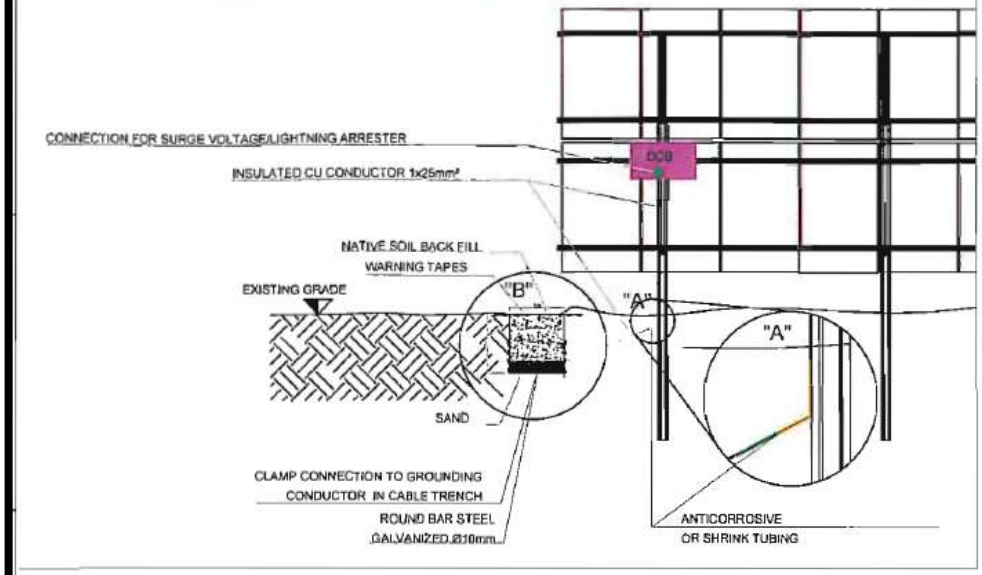
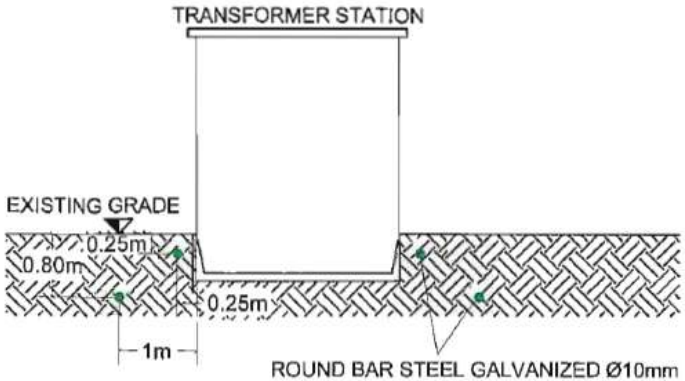
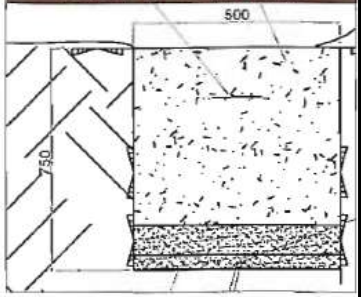
ARRAY GROUNDING
FRONT VIEW - SCALE 1:75



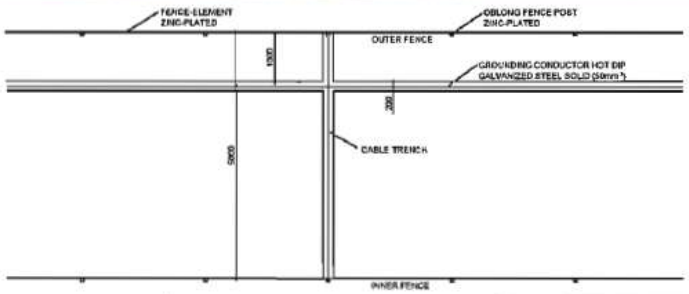
TRANSFORMER STATION GROUNDING
LATERAL VIEW - SCALE 1:75



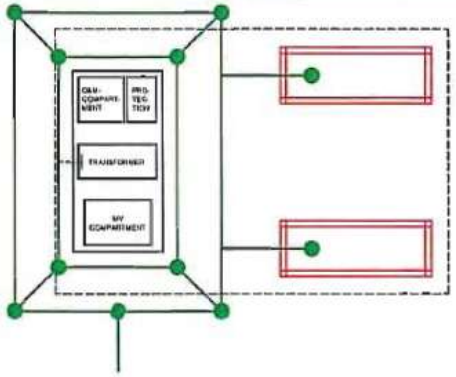
CABLE TRENCH
DETAIL "B" - SCALE 1:20



GROUNDING INNER/OUTER FENCE
PLAN VIEW - NOT TO SCALE

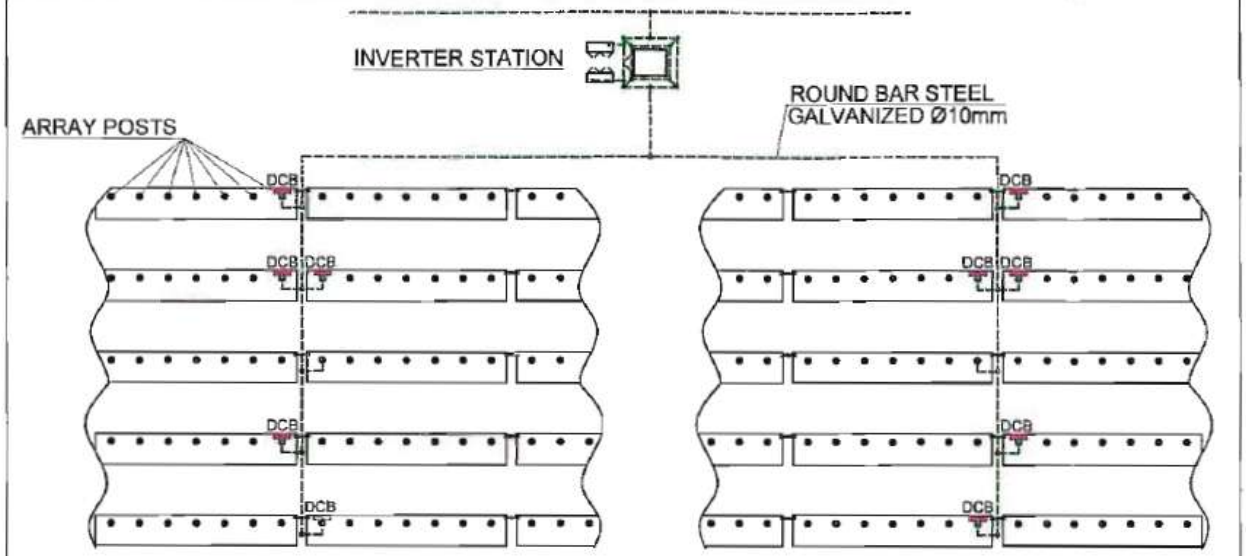


TRANSFORMER STATION GROUNDING
TOP VIEW - SCALE 1:100



CONNECTION BETWEEN MODULE FIELD GROUNDING
AND INVERTER GROUNDING
ROUND BAR STEEL GALVANIZED Ø10mm

GROUNDING SYSTEM
TOP VIEW - SCALE 1:600



NOTES:

1) All buried grounding connections must have anticorrosion bandages

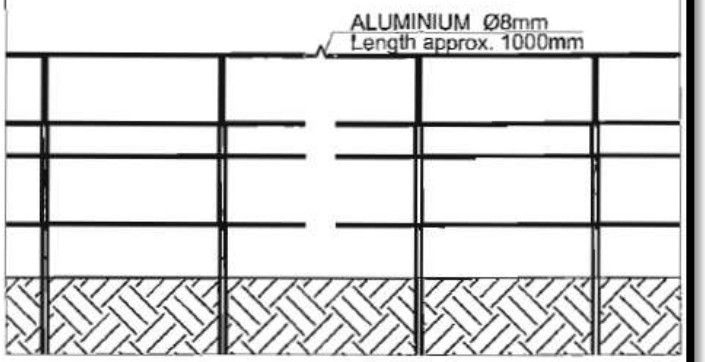
2) The grounding connection from post to grounding conductor in trench runs in parallel to the flexible conduit

3) If both end posts are connected to the ground grid in the trench no ground jumper is needed between the arrays

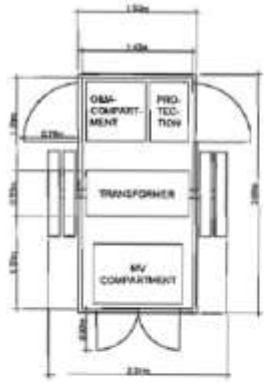
LEGEND
ABOVE GROUND
UNDERGROUND
DC COMBINER BOX

GROUNDING JUMPER BETWEEN ARRAYS
LATERAL VIEW - SCALE 1:100

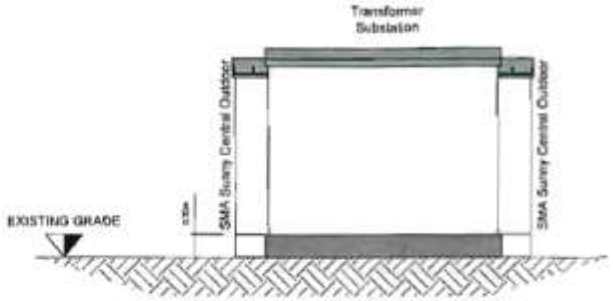
GROUNDING JUMPER WITH EXPANSION
BEND UPRIGHT AT TOP CROSS BEAM



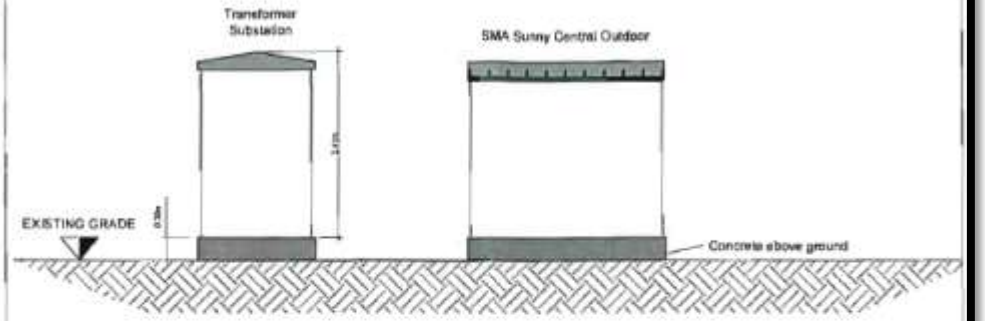
TRANSFORMER STATION OVERALL LAYOUT
SCALE 1:50



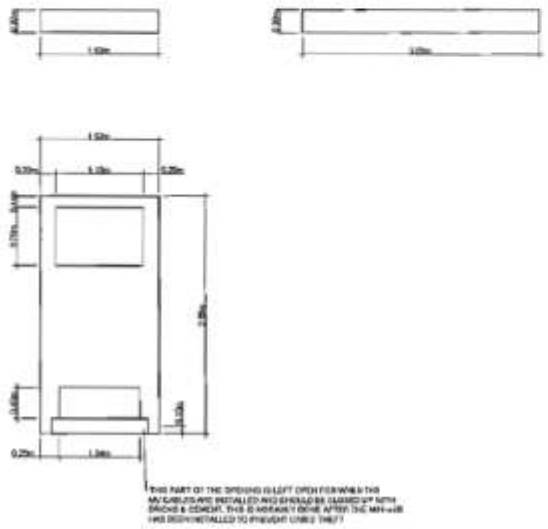
TOTAL SUBSTATION CONCEPT - SIDE VIEW
SCALE 1:50



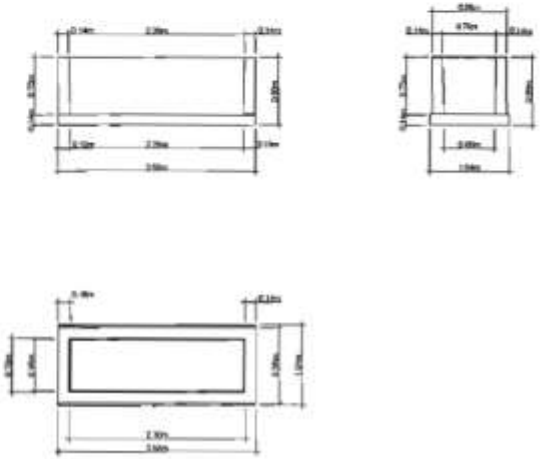
TOTAL SUBSTATION CONCEPT - FRONT VIEW
SCALE 1:50



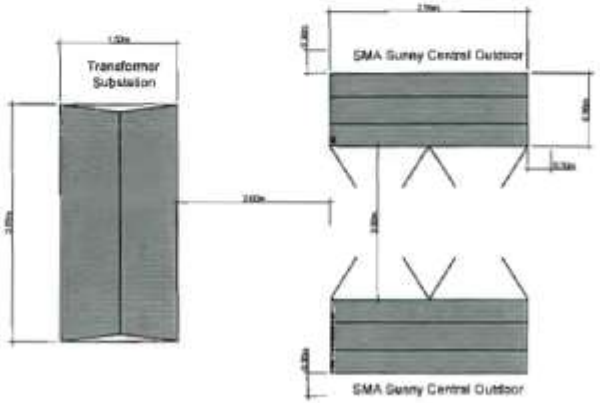
TRANSFORMER STATION FOUNDATION - PLAN VIEW, SIDE VIEWS
SCALE 1:50

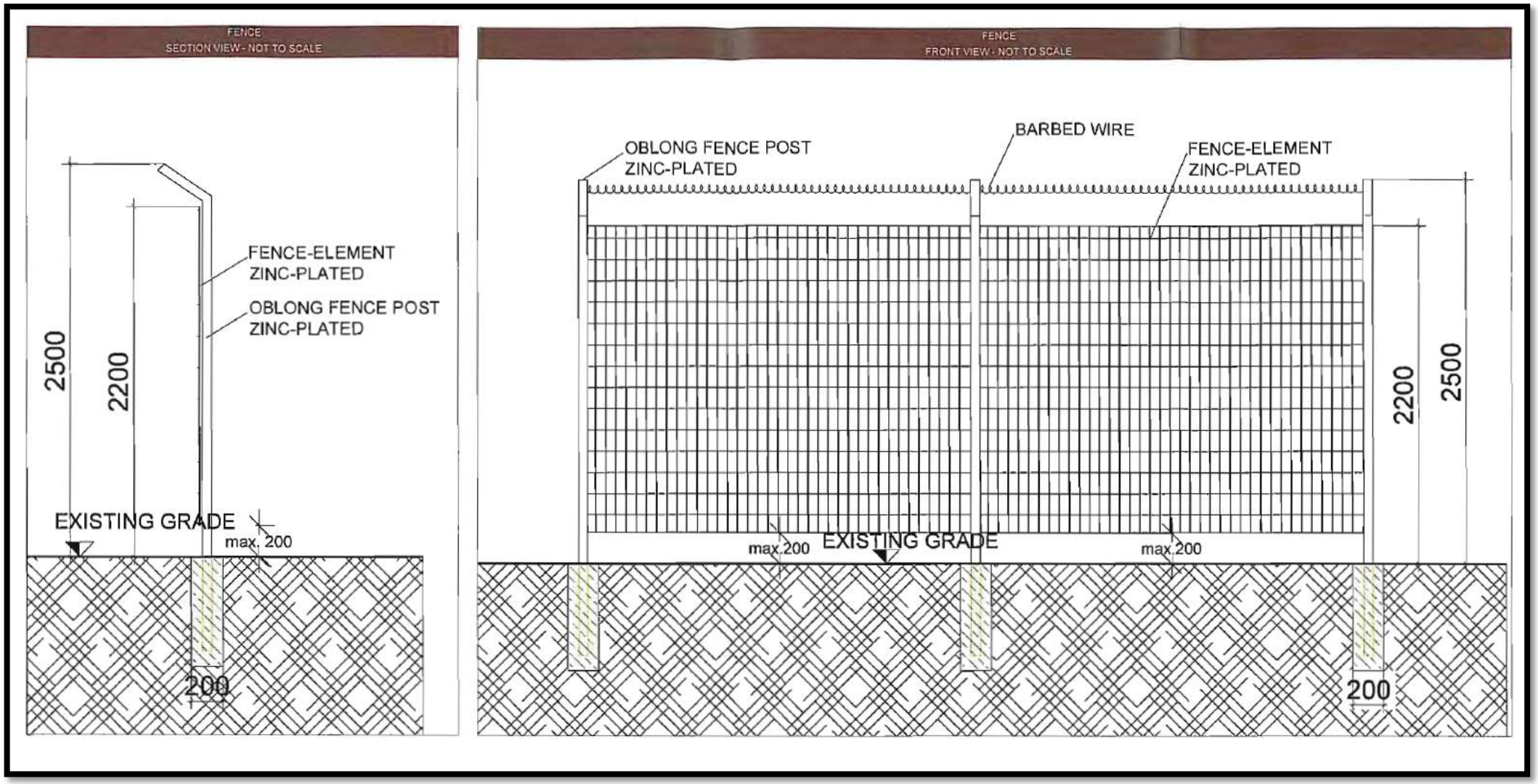


SCALE 1:50



TOTAL SUBSTATION CONCEPT - TOP VIEW
SCALE 1:50





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APPENDIX 4: PORTION 6 OF THE FARM KONKOONSIES 91 TITLE DEEDS

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Mar 21, 2019 11:02

22

15488

12 Jan S de Villiers e
Jan S de Villiers

17933 1978

CANCELLED
GEKANSELLEER
1-29-1978

REGISTRAR,
REGISTRATEUR.

BC 17932 197

CANCELLED
GEKANSELLEER

REGISTRAR
REGISTRATEUR.

VERBIND
MORTGAGED
1-11-1967
Fol.
P.R. Bk.

Aktekantoor,
Deeds Office,
Kaapstad.
Cape Town.

VERBIND
MORTGAGED
15-3-1968
Fol.
P.R. Bk.

VIR VERDERE ENDOSSEMENTE SIEN
FOR FURTHER ENDORSEMENTS SEE

VERBIND
MORTGAGED
13-7-1967
(met preferensie
(with preference
P.R. Bk.
P.R. Bk.

CANCELLED
GEKANSELLEER
REGISTRAR
REGISTRATEUR

1-11-1967

SOUTH AFRICA
SUID-AFRIKA
TWENTY RAND
R20
R2
50c

Transportakte

Kragtens 'n Prokurasie

15488

SONNENBERG, HOFFMANN & GALOMBIK,
Prokureurs, Notarisse en
Transportbesorgers.
KORTMARKSTRAAT 54
KAAPSTAD.

Opgestel deur

Aktebesorger.

1967

FOR FURTHER ENDORSEMENTS SEE
VIR VERDERE ENDOSSEMENTE SIEN

Sy dit bekend aan wie dit mag aangaan

Dat LOUIS SIMON FRIEDMAN voor my, Registrateur van Aktes, te Kaapstad, verskyn het, behoorlik daartoe gemagtig kragtens 'n Prokurasie onderteken te POFADDER

op die 12de dag van September 19 66
deur

WILLIAM HENRY SMITH

(gebore op 28 September 1925)

- Blanke Groep -

DIE GROOTTE VAN BINNEGEMELDE EIENDOM IS
THE EXTENT OF THE WITHINMENTIONED PROPERTY
OMSKRYF IN METRIEKE MATE IS
DESCRIBED IN METRIC MEASURES IS
HEKTAAR/METERS*
HECTARE(S)/METRES
1713-1210
ASST. REGISTRAR OF DEEDS.
ASST.-REGISTRATEUR VAN AKTES.
-3-6-1970

watter Prokurasie in die teenwoordigheid van getuie volgens wet onderteken, hede aan my getoon is; en die Komparant het verklaar dat sy Prinsipaal werklik

en wettiglik verkoop het op 30 Mei 1966 en dat hy, die gesegde Komparant, in sy hoedanigheid voormeld, deur hierdie akte, sedeer en transporteer in volle en vrye eiendom aan en ten behoewe van :-

PETRUS JACOBUS VAN DEN HEEVER

(gebore op 7 Januarie 1929)

- Blanke Groep -

Sy Erfgename, Eksekuteure, administrateure of Gemagtigdes:

SEKER stuk opgehefte erfpaggrond toegeken onder Wet No. 40 van 1895 synde Gedeelte 6 ('n Gedeelte van Gedeelte 2) van die plaas KONKOONSIES geleë in die Afdeling Kenhardt;

GEREGISTREER ten gunste van F.D.J. Brand kragtens Transportakte Nr. 7927 gedateer 13 Junie 1944 en tans gehou deur die Komparant se prinsipaal kragtens Transportakte No.2942 gedateer 5 Februarie 1965;

1713,0640
570
1210

GROOT : TWEEDUISEND DESIMAAL NUL SES SES VYF (2000.0665) MORGE

SOOS VOLLEDIGER SAL BLYK uit die aangehegte Kaart No. 6253/66

A. ONDERHEWIG aan die voorwaardes waarna verwys word in gemelde Akte van Transport No. 7927 gedateer 13 Junie 1944.

B. ONDERHEWIG VERDER aan die voorwaardes in Grondbrief gedateer 16 Maart 1911 (Kenhardt Erfpagbriewe Boekdeel 6 No.8) vervat, Nos. VI, VII en VIII waarvan soos volg lui :-

"VI. That all rights to gold, silver and precious stones found or discovered at any time on or in the said land, shall be reserved to the Crown, together with a right of ingress to and egress from any mines or works undertaken for mining or prospecting purposes by any person or persons authorised by the Minister;

BC 17931 /1978
CANCELLED
GEKANSELLEER 1-09-1978
REGISTRAR.
REGISTRATEUR
28-6-1978
Asst. Registrar / Asst. Registrateur
BIND
RGAGE

but/.....

BLADSY/PAGE 5

ENDOSSEMENT OP / ENDORSEMENT ON T15488 / 1967

EIENDOM/PROPERTY GED. 6 VAN DIE PLAAS KONKOONSIES NO. 91

LANDBANK

MAR. B 17617 /78

BC 8991/78

GEKANSELLEER / CANCELLED

REGISTRATEUR/REGISTRAR

1993-09-17

VERBIND / MORTGAGED 1-09-1978

vir / for R 18 200,00

Aktekantoor, Deeds Office, Kaapstad. Cape Town.

Asst.-Registrateur/Asst. Registrar

Afstand van vruggebruik gedoen t.g.v. verbandhouer.

AANGESIEN DIE PROSPEKTEERDER VAN NOTARIËLE AKTE NR. 39/1972 WAARNA IN ENDOSSEMENT GEDATEER 7.8.1972 VERWYS WORD, SY REG OM DAARDIE KONTRAK TE BEËINDIG UITGEOEFEN HET, IS DIE KONTRAK NOU GEKANSELLEER.

AANSOEK EN TOESTEMMING GELIASEER BY

BC 17933/78

AKTEKANTOOR KAAPSTAD

1-09-1978

ASST. REGISTRATEUR

VIR ENDOSSEMENTE KYK BLADSY / FOR ENDORSEMENTS SEE PAGE 6

BLADSY/PAGE 6

ENDOSSEMENT OP
ENDORSEMENT ON T15488/1967

EIENDOM/PROPERTY Ged. 6 in God
van Ged. 8) van die Plaas
Kanoonsies nr. 91 afd.
Kenhardt.

BC 52969/2008

GEKANSELLEER
CANCELLED

REGISTRATEUR/REGISTRAR

02 JUL 2008

Landbank M.A.E.

B 36142/1983

VERBIND
MORTGAGED 1983-09-16

vir
for R32 100,00

P.R. Bk. Fol
P.R. Bk. Fol

Aktekantoor,
Deeds Office,
Kaapstad.
Cape Town.

Asst. Registrateur/Asst. Registrar.

Landbank

B 24971/86

VERBIND
MORTGAGED 1986-06-18

vir
for R 118 800,00

P.R. Bk.
P.R. Bk.

Aktekantoor,
Deeds Office,
Kaapstad.
Cape Town.

Asst. Registrateur/Asst. Registrar.

BC 52970/08

GEKANSELLEER
CANCELLED

REGISTRATEUR/REGISTRAR

02 JUL 2008

Landbank

VERBIND MORTGAGED

VIR
FOR R 260 000,00

(5) B 56634/96

20 08 96

BC

GEKANSELLEER
CANCELLED

REGISTRATEUR/REGISTRAR

04 12 98

Vir endossement sien bl. 7.

DIE BINNEGEMELDE EIENDOM IS ONDERHEWIG AAN 'N KRAGLYNSERWITUUT TEN GUNSTE VAN **ESKOM** MET BYKOMENDE REGTE	THE WITHINMENTIONED PROPERTY IS SUBJECT TO A POWERLINE SERVITUDE IN FAVOUR OF **ESKOM** WITH ANCILLIARY RIGHTS
K 1049/2001 S	
2001-12-05	REGISTRATEUR/REGISTRAR

DIE BINNEGEMELDE EIENDOM IS ONDERHEWIG AAN 'N KRAGLYNSERWITUUT TEN GUNSTE VAN **ESKOM** MET BYKOMENDE REGTE	THE WITHINMENTIONED PROPERTY IS SUBJECT TO A POWERLINE SERVITUDE IN FAVOUR OF **ESKOM** WITH ANCILLIARY RIGHTS
K 1050/2001 S	
2001-12-05	REGISTRATEUR/REGISTRAR

ENDOSSEMENT KRAGTENS ARTIKEL 45 (1) VAN WET 47 VAN 1937	ENDORSEMENT BY VIRTUE OF SECTION 45 (1) OF ACT 47 OF 1937
ELOODINA MARIA VAN DEN HEEVER UNMARRIED (3410080001 08 2	
WAT IN GEMEENSKAP VAN GOED GETROUD WAS MET	WHO WAS MARRIED IN COMMUNITY OF PROPERTY TO THE LATE:
J. U. VAN DEN HEEVER	
IS GEREGTIG OM MET BINNEGEMELDE EIENDOM TE HANDEL ONDERHEWIG AAN TESTAMENTÊRE VOORWAARDES	IS ENTITLED TO DEAL WITH THE WITHINMENTIONED PROPERTY SUBJECT TO TESTAMENTARY CONDITIONS
T 044802/08	
02 JUL 2008	REGISTRATEUR/REGISTRAR

½ share *

* Excl. comm. of apptg.

but subject always to the provisions of any law for the time being regulating the prospecting andmining for precious stones and minerals.

VII. That the land hereby granted shall be subject to all such duties and regulations as either are already or shall in future be established respecting lands granted on similar tenure.

VIII. That the proprietor shall allow the public travelling along any of the roads running over the land hereby granted the right to pass over and graze their loose cattle, horses, sheep and goats, to an extent not exceeding four hundred yards on each side of any such road."

REGISTRATEUR VAN AKTES

WES-ALWE/.....

DIE GROND HIERIN BESKRYWE
THE LAND DESCRIBED HEREIN .....
IS GEREGISTREER IN WOES- EN DIE TOEKOMS AS
IS REGISTERED IN AND VUST IN FUTURE
BESKRYWE WOORDE
DESCRIBED AS Lyst 6 Gedvangd.
Van die Plaan Konkoonsie
AKTEKANTOOR
DEEDS REGISTRY
KAAPSTAD,
CAPE TOWN
7-8-1978
HOOF REGISTRASIEBEAMPTE
CHIEF REGISTRATION OFFICER

39/1972

AKTEKANTOOR,
KAAPSTAD.
DEEDS REGISTRY,
CAPE TOWN. - 7 -8- 1972

Weshalwe die Komparant afstand gedoen het van alle eiendoms- en ander regte wat die gesegde Transportgewer tot op hede op gemelde vaste eiendom gehad het en gevolglik ook erken het dat die gesegde Transportgewer daarvan heeltemal onteien is, en geen eiendoms- en ander regte daarop besit nie; en dat, kragtens hierdie Akte, die gesegde Transportnemer Sy Erfgename, Eksekuteure, Administrateure of Gemagtigdes tans is en voortaan op die volle eiendomsregte daarop geregtig sal wees, ooreenkomstig plaaslike gebruik; onder voorbehoud nogtans van die Regte van die Staat; en eindelik erken het dat sy Prinsipaal die gehele koopsom op bevredigende wyse ontvang of verseker het ten bedrae van die som van

TIENDUISEND RAND (R10,000)

Ten Getuie waarvan ek, die gesegde Registrateur van Aktes, tesame met die Komparant, q.q. hierdie Akte onderteken en met die Ampseël laat bekragtig het.

Aldus verrig ten kantore van die Registrateur van Aktes, te Kaapstad, Kaap die Goeie Hoop, op die 13de dag van die Maand JULIE in die jaar Neëntienhonderd- ~~Soo en sestig (1966)~~ Sewe-en-sestig (1967)

q.q. sy Prinsipaal/ale

In my teenwoordigheid

Registrateur van Aktes.

Geregistreer in die register van Laan

Honderd Boek Folio 291/81

Verantwoordelike Klerk.

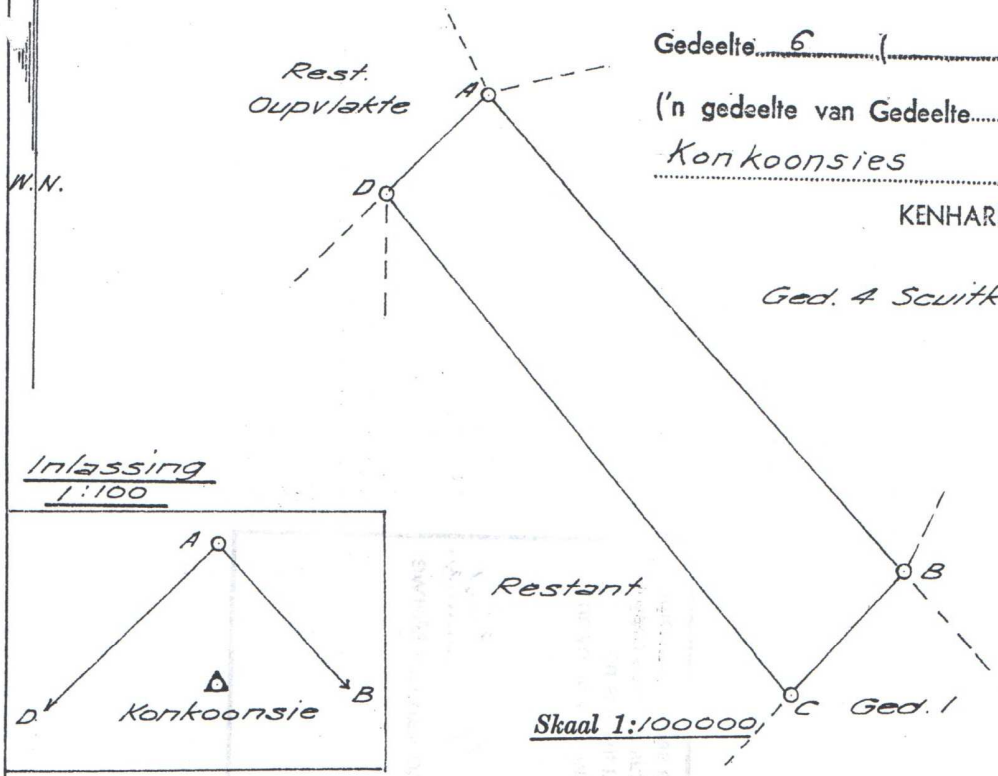
L.G. No.
6253/66
Goedgekeur.

J Fuure
Landmeter-generaal.
22-9-1966

SYE Kaapse Voet		RIGTINGS	KO-ORDINATE Stelsel L°19°x		AMP. BEN.
		Konstant	-100000·0	+10100000·0	
AB	26368·0	317.59.21	A - 67119·4	+ 41307·0	
BC	7072·7	41.57.41	B - 84766·8	+ 60898·9	
CD	26912·9	140.15.59	C - 80037·8	+ 66158·1	
DA	5968·1	225.53.08	D - 62834·6	+ 45461·4	
		Konkoonsie	Δ - 67119·3	+ 41312·9	
		Konkoonsie S.	Δ - 78120·6	+ 81644·2	

Beskrywing van Bakens.

A. 4'x 4' klipstapel.
B. Swaar spoorstaafpaal (draadpaal) 4' hoog.
C. } Ysterpaal en klipstapel.
D. }
A. en D. met aanduidingspenne.



Gedeelte 6 (.....)
('n gedeelte van Gedeelte 2) van die plaas
Konkoonsies Nr. 91
KENHARDT

Ged. 4 Scuitklip

Inlassing
1:100

Skaal 1:100000

Die figuur A.B.C.D.

stel voor 2000·0665 morg grond, synde

Gedeelte 6 ('n gedeelte van Gedeelte 2)

van die plaas Konkoonsies

geleë in die

Administratiewe Distrik Kenhardt Provinsie Kaap die Goeie Hoop

Opgemeet in Jan.-Febr. 1964 deur ~~my~~ ons
Junie 1966

J.J.L. Louwrens
J.H. Hunter
Landmeters.

Hierdie kaart is geheg aan Transportakte No. 15088

gedateer 13-7-1967

t.g.v. P.J. van den Heever

Die oorspronklike kaart is No. 2109/43

~~Transport/Grondbrief~~ No. 1944.159.7927

Lêer No. S\15752
M.S. No. E 1667/66
G1-8
Komp. ~~G1.788, F1.2~~
~~Alg. Plan~~

APPENDIX 5: PUBLIC PARTICIPATION REPORT

confidential
Kilpatrick Archer
Actis
Mar 21, 2019 11:02

APPENDIX 5.1 – PROOF OF SITE NOTICE

Site notice on Konkoonsies site boundary fence 1

Site notice on Konkoonsies site boundary fence Paulputs substation

Site notice on Konkoonsies site boundary fence at Paulputs substation

confidential
Kilpatrick Archer
Actis
Mar 21, 2019 11:02

NOTIFICATION OF SCOPING & ENVIRONMENTAL IMPACT ASSESSMENT AS WELL BASIC ASSESSMENT PROCESSES FOR THE PROPOSED INSTALLATION OF PHOTO-VOLTAIC SOLAR POWER GENERATION PLANTS AT TWO LOCATIONS IN THE NORTHERN CAPE, SOUTH AFRICA

NOTICE is given in terms of Regulation 54 of the regulations gazetted in Government Notice No. R543 promulgated under 24(5), 24M and 44 of the National Environmental Management Act, 1998 (NEMA) (Act No. 107 of 1998) to all interested and affected parties (I&APs) that BioTherm Energy (Pty) Ltd (in partnership with Aurora Power Solutions) proposes to assess the potential to install photo-voltaic solar power generation facilities at 2 different sites in the Northern Cape.

The proposed project would include activities identified in terms of the NEMA 2010 EIA Amendment Regulations (R543) of 18 June 2010. There are listed activities which will be triggered by the projects in terms of GN. R. 544 and GN R545, promulgated under Section 24(5) of the National Environmental Management Act (Act 107 of 1998), which requires that a detailed Basic Assessment (BA) and Scoping and EIA (S&EIA) processes must be undertaken to assess the potential impacts thereof on the environment.

BioTherm Energy is proposing to investigate the feasibility of a 100 MW photo-voltaic facility on farm Konkoonsies and a 300 MW photo-voltaic facility on farm Kleinzwart Bast, therefore according to GN R545 (Listing Notice 2); S&EIA process is required for the 100MW and 300MW photo-voltaic solar facilities.

Site 1: Kleinzwart Bast: Approx 36km's south west of Kenhardt, (S 29^0 29'40" and E 20^0 47'20")
Site 2: Konkoonsies: Approx 32 km's north- east of Pofadder, (S 28^0 52'55" and E 19^0 33'53")

Name of proponent: BioTherm Energy (Pty) Ltd (in partnership with Aurora Power Solutions)
Environmental Assessment Practitioner: EScience Associates (Pty) Ltd

In terms of the requirements of the EIA Regulations, all stakeholders and other interested and affected parties (I&APs) must be provided with opportunities to participate in the EIA process. This would include the opportunity to attend briefing meetings, review all reports generated and/or submit comments during the BA and S&EIA process. To make sure that you are identified as an interested and/or affected party, please submit your name, contact information and interest in the project to the contact person given below, by Monday 24 April 2012. This will ensure that you are continuously informed of progress with the processes, availability of reports for review etc. Any other queries with respect to these projects can also be directed to the person below.

Contact: **Roelof Letter**
EScience Associates (Pty) Ltd
Tel: +27 (0)11 718 6380
Fax: +27 (0)865 994 687
E-mail: roelof@escience.co.za

EScience Associates (Pty) Ltd

Site notice wording

APPENDIX 5.2 – WRITTEN NOTICES ISSUED TO IDENTIFIED I&AP'S

Roelof Letter

From:	Brian Gardner
Sent:	16 March 2012 02:30 PM
To:	hub@siyanda.gov.za; fpr@siyanda.gov.za; info@namakwa-dm.gov.za; willema@namakwa-dm.gov.za; brandb@kaigarib.co.za; davyj@kheis.co.za; lesley@khaima.gov.za; enquiries@agrinc.gov.za; jandup1@telkomsa.net; oberholster@webmail.co.za; se@museumsnc.co.za; spothil@gmail.com; sahranc@iafrica.com; conradb@dwaf.gov.za; snydersl@dwaf.gov.za; northerncapetourism@telkomsa.net; kheismun@lantic.net; straussf@kaigarib.co.za; north.western@eskom.co.za; pngidi@environment.gov.za; tgnvisser@telkomsa.net; latrivier@lantic.net; sonderhuis@gmail.com; pienaar.magda@gmail.com; gabriel_viljoen@yahoo.com; mazwir@dwa.gov.za; AbrahamsA@dwa.gov.za; conradb@dwaf.gov.za; snydersl@dwaf.gov.za; AnnelizaC@nda.agric.za; tmakaudi@half.ncape.gov.za; north.western@eskom.co.za; se@museumsnc.co.za; spothil@gmail.com; sahranc@iafrica.com; jsinthumulel@ncpg.gov.za; dBruinER@eskom.co.za; cebekhulum@dwa.gov.za; abbotth@dwa.gov.za; tmaswime@environment.gov.za; mgalimberti@sahra.org.za
Cc:	'Simon Haw'; tonderai munthumbira; Roelof Letter; Brian Gardner
Subject:	BIOS: Invitation to comment and register as an Interested and Affected Party: PV Solar Power plants in the Northern Cape
Attachments:	BIOS draft BID both sites 20120314 1415 BG.pdf
Importance:	High

Dear Sir/Madam,

You and/or your organisation has been identified as a potential Interested Party / Stakeholder to participate in the Environmental Impact Assessment and Basic Assessment Processes for the proposed development of solar power (photovoltaic) generation plants on the Farms Konkoonsies near Pofadder and Klein Zwart Bast near Kenhardt. The development of these solar power generation plants require a full Scoping and EIA process to be undertaken.

Please find attached an introductory Background Information Document (BID) for your information and comment. Please feel free to forward this information to any other persons/organisations who you feel may be interested. If you would like to register as an Interested and affected party and give comments (if any), please do so by Tuesday 17 April 2012.

Please do not hesitate to contact me if you have any questions with regards to these projects.

Kind regards,

Brian Gardner

EScience Associates (Pty) Ltd
E-mail: brian@escience.co.za
Web: www.escience.co.za
PO Box 2950, Saxonwold, 2132
9 Victoria Street, Oaklands, Johannesburg, 2192
Tel: +27 (0)11 718 6380

Email sent on 13 February 2012 to originally identified list of I&AP's

List of REGISTERED LETTERS
Lys van GEREGISTREERDE BRIEWE
(with an insurance option/met 'n versekeringsopsie)

Post Office

Full tracking and tracing/Volledige volg en spoor

Name and address of sender:
Naam en adres van afsender:
ESCIENCE ASSOCIATES (PTY) LTD
PO BOX 2950
SAXONWOLD 2132

Enquiries/Navrae
Toll-free number
Tolvry nommer
0800 111 502

No	Name and address of addressee / Naam en adres van geadresseerde	Insured amount / Versekerde bedrag	Insurance fee / Versekeringsgeld	Postage / Posgeld	Service fee / Diensgeld	Affix Track and Trace customer copy / Plak Volg-en-Spoor-kliëntafskrif
1	NICHOLAS BRAND PO Box 81, Potadder 8890					REGISTERED LETTER RD 744 501 923 ZA CUSTOMER COPY
2	FANIE VD HEEVER PO Box 59, Potadder, 8890					REGISTERED LETTER RD 744 501 937 ZA CUSTOMER COPY
3	DRIES VAN ZYL PO Box 89, Potadder 8890					RD 744 501 945 ZA CUSTOMER COPY
4	BEN BUYSEN PO Box 85, KENHARDT 8900					RD 744 501 954 ZA CUSTOMER COPY
5	JOUBERT VAN DER WESTHUIZEN PO Box 93 KENHARDT, 8900					REGISTERED LETTER RD 744 501 968 ZA CUSTOMER COPY
6	NICO KIRSTEIN PO Box 64 Keimoes 8860					REGISTERED LETTER RD 744 501 985 ZA CUSTOMER COPY
7	MS. KOKOANO SHUPING PO Box 24, UPINGTON, 8467					REGISTERED LETTER RD 744 501 971 ZA CUSTOMER COPY
8						
9						
10						
	Total / Totaal	R	R	R	R	

Number of letters posted / Getal briewe gepos: 7

Signature of client / Handtekening van kliënt:

Signature of accepting officer / Handtekening van aanneembeampte:

Date stamp
NORWOOD
16
4
2192
Datumstempel

The value of the contents of these letters is as indicated and compensation is not payable if not received unconditionally. Compensation is limited to R100,00. No compensation is payable without documentary proof. Optional insurance of up to R 2000,00 is available and applies to domestic registered letters only.

Die waarde van die inhoud van hierdie briewe is soos aangedui en vergoeding sal nie betaal word vir 'n brief wat sonder voorbehoud ontvang word nie. Vergoeding is beperk tot R100,00. Geen vergoeding is sonder dokumentêre bewys betaalbaar nie. Opsionele versekering van tot R2000.00 is beskikbaar en is slegs op binnelandse geregistreerde briewe van toepassing.

701248

Proof of sending BID via post to those IAPs who do not have email addresses.

APPENDIX 5.3 – PROOF OF NEWSPAPER ADVERTISEMENTS

14-MAR-2012 17:03 From: To:0865122366 Page:1/2

16 MAART 2012 DIE GEMSBOK BLADSY 19

Ekonomiese Ontwikkeling en Toerisme byeenkoms was 'n groot mislukking

Een van our lesers wat die vergadering vol verwagting bygewoon het, het hierdie foto's en opmerkings aan die Gemsbok gestuur:

"Dergerry se sinvolle voorsoonkappe vir die groot en oortuwing in die Noord-Kaapse Provinsie, wat die hoofdilig van die uitnodiging op die byeenkoms.

Daarny is daar met groot verwagting uitgesien na die provinsiale byeenkoms van die Departement van Ekonomiese Ontwikkeling en Toerisme wat op Woensdag 7 Maart 2012 by Boesdale gehou is.

Die Aiken Huis Munisipaliteit en die Departement het dit gesamentlik gereël. Die volgende uitstallers was teenwoordig wees, maar slegs enkeles het oppdrag en ander is nie een gesien nie: Khula Sedis, IDC, CIDB, NDA, DTI, ABSA, FNB, NYDA, EB Sitara Trust en Mynhardts.

Teen elfuur het slegs twaalf mense opgedaag tussen aanpraam wat gewag het vir besoekers. Die wat wel gekom het, het onwrigsaam gevang op 'n vervelsoming, 'n inskrywingstelling of enigens slaweis. Die beloofde tuikoomie het nie ook gekom nie en 'n fantastiese geleentheid vir groei en verkiskopping is verloor.

Aanstellings by Rietfontein Kliniek

Gemeenskap se noodkreet beantwoord

RIETFONTEIN: "Met my onlangse besoek aan Rietfontein Kliniek, was ek verras met die uitgebreide personeelkorps en geen wat by die kliniek hoors," skryf Maris Kocks in 'n brief aan die Gemsbok.

Na die onlangse berig in die Gemsbok oor die personeel tekort by die kliniek is twee verpleegsters aangestel, waarvan een 'n permanente aanstelling is, en die ander op kontrakbasis.

Die personeel is nou soos volg: vier verpleegsters, 'n assistent verpleegster en dokter Reits van die Aiken kliniek wat ook hier uitvalg, terwyl daar heroutwerk van die Aiken Hospitaal gedoen word. Alle kinderwelsyn van Aiken word nou deur Rietfontein se kliniek gedoen. Die respektief sal nou beter bemoei word as die verpleegpersoneel nie ook nou kwalifiseer tyd van hulle pasiente en families kan gee.

Hierdie aanstellings het die verkiesbeding van senior Besluit en capac Philander aanbeveel voorgestel.

Boonop is daar ook nog vier ambulans personeel by die kliniek aangestel. Op die oomblik is daar net een ambulans, maar daar word gelo dat die nuk ook binnekort aandag sal geniet.

"Ek is van mening dat die gesondheidsdiens van Siyanda distrik, baar arme noop hulde het, sodat die aanstellings kon realiseer en dat Meer as inwoners die gehalte gesondheidsorg kan kry waarop hulle geregtig is," meen Kocks.

"Wanneer was die Gemsbok dat bestuur en die gewerkskrokke verslag te doen oor die groot verkeer war daardie twee goeie verpleegsters moes dra en die eindelykse traak-sty-nie-agtgeheel van die Departement van Gesondheid Noupoort hoe daarin. Gemsbok, vir julle bemoeienis in ons gemeenskappe en om die stemmetjie stemme tot een probleem te vertel," skryf Kocks.

KENNISGEWINGS

NOTICE OF ENVIRONMENTAL IMPACT ASSESSMENT PROCESS
PUBLIC PARTICIPATION PROCESS PROPOSED
PHOTOVOLTAIC (PV) SOLAR FACILITY ON A SITE NORTH-EAST OF UPINGTON, NORTHERN CAPE PROVINCE
DEA Ref No. 12/12/20/2169

African Rainbow Energy (Pty) Ltd has submitted an application for authorisation to the Nigerian Department of Environmental Affairs (DEA Ref No. 12/12/20/2169) for the construction of a plant on a site northeast of Upington, Northern Cape Province.

You are duly notified that the Department has granted Rainbow Energy (Pty) Ltd authorisation for this project. The environmental authorisation (dated 06 March 2012) and conditions for authorisation, as well as reasons for the decision can be requested from Savannah Environmental at info@savannahSA.com or downloaded off the website www.savannahSA.com.

Your attention is drawn to Chapter 7 of the EIA Regulations which regulates appeal procedures. Should you wish to appeal any aspect of the decision by DEA, you must lodge a notice of intention with the Minister within twenty (20) days of the date of the decision (i.e. by 26 March 2012). A copy of the official appeal form can be obtained from the following person at the Department:

- Mr TH Zwane, Senior Legal Administration Officer (Appeals). Tel (012) 399 9365. TZwane@environment.gov.za

Please note that you must submit your appeal via fax (012) 320 7561; or by post to Private Bag X447, Pretoria, 0001. Please note that appeals should not be addressed to the consultant (Savannah Environmental or Sustainable Futures).

Savannah Environmental (Pty) Ltd
PO Box 148, Sunninghill, 2157
Tel: +27 (0)11 234 6621
Fax: +27 (0)86 684 0547
Email: john@savannahsa.com
Website: www.savannahSA.com

BioTherm Energy

NOTIFICATION OF SCOPING & ENVIRONMENTAL IMPACT ASSESSMENT AS WELL BASIC ASSESSMENT PROCESSES FOR THE PROPOSED INSTALLATION OF PHOTO-VOLTAIC SOLAR POWER GENERATION PLANTS AT TWO LOCATIONS IN THE NORTHERN CAPE, SOUTH AFRICA

NOTICE is given in terms of Regulation 54 of the regulations gazetted in Government Notice No. [illegible] promulgated under [illegible] of the National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended and effective (the NEMA) that BioTherm Energy (Pty) Ltd proposes to develop the following (multi) photovoltaic solar power generation facilities on a consortium site in the Northern Cape.

The proposed project would include activities identified in terms of the NEMA 2010 EIA Amendment Regulations (R543) of 18 June 2010. These are listed activities which will be triggered by the projects in terms of GN. R. 544 and GN R545, published under Section 24(5) of the National Environmental Management Act (Act 107 of 1998), which requires that a detailed Basic Assessment (BA) and Scoping and EIA (S&EIA) processes must be undertaken to assess the potential impacts related to the development.

BioTherm Energy is proposing to investigate the feasibility of establishing two 10 MW photo-voltaic solar power generation facilities on farms Klipfontein and Klipdrift East, as well investigate the possibility of a 150 MW photo-voltaic facility on farm Klipfontein and a 300 MW photo-voltaic facility on farm Klipdrift East. Depending on the final layout, 344 housing nodes to the processes are required for the 10 MW photo-voltaic facilities and an area of the entire (using Alpha 3) 2,5 km² is required for the 150MW and 300MW photo-voltaic solar facilities. The Basic assessment processes and Scoping and EIA processes on each site will be running concurrently.

Site 1: Klipdrift East: Approx 28km's south west of Kgetlengrivier, (K 29° 23' 43" and E 23° 47' 28")

Site 2: Klipfontein: Approx 28 km's north- east of Postmasburg, (S 28° 18' 55" and E 23° 20' 22")

National Department of Environmental Affairs reference numbers for these projects are to be obtained from Ecoserve Associates contact person below on request.

Name of proponent: BioTherm Energy (Pty) Ltd
Environmental Assessment Practitioner: Ecoserve Associates (Pty) Ltd

In terms of the requirements of the EIA Regulations, all stakeholders and other interested and affected parties (I&APs) must be provided with opportunities to participate in the EIA process. They must include the opportunity to attend scoping meetings, review all reports generated and/or comment, during the BA and S&EIA process. To make sure that you are identified as an interested and/or affected party, please submit your name, contact information and interest in the project to the contact person given below, by Friday 13 April 2012. This will ensure that you are continuously informed of progress with the processes, availability of reports for review etc. Any other queries with respect to these projects can also be directed to the person below.

Contact: Roelof Lotter
Ecoserve Associates (Pty) Ltd
Tel: +27 (0)11 716 6340
Fax: +27 (0)86 543 5568
E-mail: roelof@ecoserve.co.za

Ecoserve Associates (Pty) Ltd

INTERMEDIÊRE SKOOL ORANJE-OEWER

Vakante Pos: Graad 4-Departementeel

Vakke : Afrikaans Graad 4
Lewensoriëntering Graad 4
Sosiale Wetenskappe Graad 4

Pos beskikbaar: 10 April 2012

Sluitingsdatums: Dinsdag 20 Maart 2012

e-pos CV na oranjeoewer@telkomsa.net of faksimilee dit by 08 001. Vir navrae asseer Mev GD van Wyk by 054 209 0547 tydens skoolure.

NAMAQUALAND DIAMOND FUND TRUST

In a registered trust in terms of the Trust and Property Control Act of 1988

PROPOSAL FOR THE AUDIT SERVICES OF THE NAMAQUALAND DIAMOND FUND TRUST

The Board of Trustees of the Namaqualand Diamond Fund Trust has decided in terms of audit arrangements, in terms of duly developed an invitation to suitably advanced to appointed audit firms to submit proposals for consideration at statutory audit of the Trust.

Furthermore in Rich Representation of interest in the organisational objectives of the Namaqualand Diamond Fund Trust the proposed have to accompany opening away letters.

BACKGROUND OF THE COMPANY
The Namaqualand Diamond Fund Trust is a registered trust in terms of the Trust and Property Control Of 1988 and pursuant to it's trust deed requires an annual statutory audit to be carried on the financial affairs of the Trust.

PROPOSAL CALL REQUIREMENTS
It is requested the proposal are made up a minimum the following paragraph:

1. Background of the company, which include experience in auditing a trust or similar organisations
2. PDI status of the firm
3. Services offered (will be initialled in the Engagement letter with successful firm)
4. Proposed fee structure for audit services (Audit Budget)
5. Proposed fee structure for other services
6. Proposed working program to carry out the audit is number and level of staff proposed to carry out the audit

TIMING OF PROPOSAL
The proposal should be submitted to Namaqualand Diamond Fund Trust for attention of The Manager not later than 30 March 2012 at the following address:

NAMAQUALAND DIAMOND FUND TRUST PO BOX XXX, SPRINGBOK, 8240 TEL NO 027-718 1060

NAMAKWALANDSE DIAMANTFONDSTRUST

'n Trust geregistreer in terme van Die Wet op Behoer op Trustgeld, 1988 (Wet 57 van 1988)

VOORSTEL VAN OUDITDIENSTE VIR DIE NAMAKWALAND DIAMANTFONDSTRUST

Die Raad van Trustees van die gemeldeerde Diamantfondstrust het besluit om die aanstelling van die Trustee van die Trust in hoedanigheid te koom. In terme van die besluit word hiermee 'n uitnodiging gedoen aan vennootskappe/firmas om voorstelle te lê ten einde in aanmerking te kom vir aanstelling vir die outydse oudit van die Trust.

Verder dat geen diensvoorstel bemagtiging is tydens aanvaarding van die voorstelle van die Namakwalandse Diamantfondstrust vereis, en wil die voorstel deurdat voorstelle aangestuur "BRIEF" moet aanvaar.

AANSPREEKBARE VAN DIE MAATSKAPPY
Die Namakwalandse Diamantfondstrust is 'n Trust geregistreer in terme van die Wet op Beheer op Trustgeld, 1988 (Wet 57 van 1988) en met vennootskap as die Trustees verlang na organisasie in posisie sedi m.b.t. die inhoude pligte van die Trust.

VOORSTELLE VEREISTES
Dit word verlang van vennootskappe outdienste en en minste die volgende minimum vereistes in hulle voorstel neiging van hulle:

1. Agtergrond van die maatskappy, wat kan insluit enige ondervinding in die oudit van 'n trust of soortgelyke organisasie
2. PDF status van die Outdirma
3. Dienste wat gebied kan word
4. Voorgestelde foodstuktuur vir outdienste
5. Voorgestelde foodstuktuur vir ander dienste
6. Voorgestelde hulpsame uitvoerings by uitvoering van oudit, o.a. die aantal en vlak en hoeveelheid van die outdienspersoneel om oudit uit te voer.

SLUITINGSDATUM VIR VOORSTEL
Die voorstel moet skydlan word by die Hoofbestuurder Diamantfondstrust op die Aandag van die Bestuurder op/voor 30 Maart 2012 by die volgende adres:

NAMAKWALANDSE DIAMANTFONDSTRUST, POSBUS 614, SPRINGBOK 8240, TEL 027-718 1060

Proof of advertising in Die Gemsbok Newspaper on 14 March 2012

NOTIFICATION OF SCOPING & ENVIRONMENTAL IMPACT ASSESSMENT AS WELL BASIC ASSESSMENT PROCESSES FOR THE PROPOSED INSTALLATION OF PHOTO-VOLTAIC SOLAR POWER GENERATION PLANTS AT TWO LOCATIONS IN THE NORTHERN CAPE, SOUTH AFRICA

NOTICE is given in terms of Regulation 54 of the regulations gazetted in Government Notice No. R543 promulgated under 24(5), 24M and 44 of the National Environmental Management Act, 1998 (NEMA) (Act No. 107 of 1998) to all interested and affected parties (I&APs) that BioTherm Energy (Pty) Ltd proposes to assess the potential to install photo-voltaic solar power generation facilities at 2 different sites in the Northern Cape.

The proposed project would include activities identified in terms of the NEMA 2010 EIA Amendment Regulations (R543) of 18 June 2010. There are listed activities which will be triggered by the projects in terms of GN. R. 544 and GN R545, promulgated under Section 24(5) of the National Environmental Management Act (Act 107 of 1998), which requires that a detailed Basic Assessment (BA) and Scoping and EIA (S&EIA) processes must be undertaken to assess the potential impacts thereof on the environment.

BioTherm Energy is proposing to investigate the feasibility of establishing two 19 MW photo-voltaic solar power generation facilities on farms Konkoonsies and Kleinzwart Bast; as well investigate the possibility of a 100 MW photo-voltaic facility on farm Konkoonsies and a 300 MW photo-voltaic facility on farm Kleinzwart Bast, therefore according to GN. R. 544 (Listing Notice 1); BA processes are required for both 19 MW photo-voltaic facilities and in terms of GN R545 (Listing Notice 2); S&EIA process is required for the 100MW and 300MW photo-voltaic solar facilities. The Basic assessment processes and Scoping and EIA processes on each site will be running concurrently.

Site 1: Kleinzwart Bast: Approx 36km's south west of Kenhardt, (S 29^0 29'40" and E 20^0 47'20")
Site 2: Konkoonsies: Approx 32 km's north- east of Pofadder, (S 28^0 52'55" and E 19^0 33'53")

National Department of Environmental Affairs reference numbers for these projects can be obtained from EScience Associates contact person below on request.

Name of proponent: BioTherm Energy (Pty) Ltd
Environmental Assessment Practitioner: EScience Associates (Pty) Ltd

In terms of the requirements of the EIA Regulations, all stakeholders and other interested and affected parties (I&APs) must be provided with opportunities to participate in the EIA process. This would include the opportunity to attend briefing meetings, review all reports generated and/or submit comments during the BA and S&EIA process. To make sure that you are identified as an interested and/or affected party, please submit your name, contact information and interest in the project to the contact person given below, by Friday 17 April 2012. This will ensure that you are continuously informed of progress with the processes, availability of reports for review etc. Any other queries with respect to these projects can also be directed to the person below.

Contact: **Roelof Letter**
EScience Associates (Pty) Ltd
Tel: +27 (0)11 718 6380
Fax: +27 (0)86 512 2366
E-mail: roelof@escience.co.za

EScience Associates (Pty) Ltd

Newspaper advert wording

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Kilpatrick Archer
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Mar 21, 2019 11:02

APPENDIX 5.4 – COPY OF THE REGISTER OF I&APS

REGISTER OF INITIALLY IDENTIFIED I&AP'S

Name	Surname	Organisation
Teboho	Zide	Zyde Investments (Pty) Ltd
Sarel	Yssel	South African National Parks (Planning and Environment)
Lee	Muller	In-Toto solutions
Magda	Pienaar	AS Viljoen & Seuns Boerdery (Edms) Bpk
Gabriel	Viljoen	AS Viljoen & Seuns Boerdery (Edms) Bpk
Louise	Hugo	Thope For Life (NGO) for Khai-mai municipality near Pofadder
James	Seenokwanyane	
Nicholas	Brand	Konkoonsies surrounding landowner
Dries	van Zyl	Konkoonsies surrounding landowner
Gerrit	Visser	Konkoonsies surrounding landowner
Raquel (Nosie)	Mazwi	DWA Northern Cape Deputy director
Masilo	Ramapkakela	Field service centre manager (Eskom Northern Cape)
Julius	Thys	Kheis Municipality
Willem	Andre	Namakwa District Municipality (Env Health)
LJ	Snyders	DWAF (Regional director)
Bettie	Conradie	DWAF

REGISTER OF I&AP'S WHO OFFICIALLY REGISTERED FOR THE PROCESS

Name	Surname	Organisation
Teboho	Zide	Zyde Investments (Pty) Ltd
Sarel	Yssel	South African National Parks (Planning and Environment)
Lee	Muller	In-Toto solutions
Magda	Pienaar	AS Viljoen & Seuns Boerdery (Edms) Bpk
Gabriel	Viljoen	AS Viljoen & Seuns Boerdery (Edms) Bpk
Louise	Hugo	Thope For Life (NGO) for Khai-mai municipality near Pofadder
James	Seenokwanyane	
Tshlo Makaudi		Northern Cape Department of Environment and Nature Conservation
Masilo	Ramapkakela	Field service centre manager (Eskom Northern Cape)
Suzanne	Erasmaus	WESSA NC
Tania	Anderson	WESSA NC
Elizabeth	Manong	SAHRA (NC)
Kathy	Smuts	SAHRA
MJ	Sinthumule	Heritage Northern Cape
Rene	De Bruin	Eskom Snr Supervisor land rights - Northwestern region
Christopher	Cebekhulu	DWA Northern Cape
Henry	Abbott	DWA Northern Cape

COMMUNICATIONS TO AND FROM I&AP'S

A there were no registration on the proposed project the availability of the draft scoping report was send to all initial identified I&Ap for comment. A commenting period was given from 23 April 2012 to the 23 May 2012.

Roelof Letter

From: Roelof Letter
Sent: 23 April 2012 10:11 PM
To: Roelof Letter (Roelof@escience.co.za)
Cc: 'sarely@sanparks.org'; 'muller@in-toto.co.za'; 'pienaar.magda@gmail.com'; 'gabriel_viljoen@yahoo.com'; 'oberholster@webmail.co.za'; 'louisehope4life@gmail.com'; 'mjsenokwanyane@gmail.com'; 'vries@khalma.gov.za'; 'mazwir@dwa.gov.za'; 'north.western@eskom.co.za'; 'straussf@kalgarlb.co.za'; 'kheismun@lantic.net'; 'willema@namakwa-dm.gov.za'; 'fpr@siyanda.gov.za'; 'snydersl@dwaf.gov.za'; 'conradb@dwaf.gov.za'; 'enquiries@agrinc.gov.za'; 'zide@zyde.co.za'; 'Kevin.leask@eskom.co.za'; 'ronald.marais@eskom.co.za'; 'MashuduMa@daff.gov.za'; 'ThokoB@daff.gov.za'
Subject: FW: APSP - Draft Scoping Report Comment - proposed Photo-Voltaic Solar Power Generation Plant on the Farm KleinZwart Bast close to Kenhardt in the Northern Cape
Attachments: image001.jpg

Importance: High

Dear Stakeholders

Notice is hereby given that the **draft Scoping Report (SR)** for the proposed **Photo-Voltaic Solar Power Generation Plant on the Farm KleinZwart Bast close to Kenhardt in the Northern Cape** is **available for public comment from Monday the 23th of April 2012**. Please follow the link to our website where you can download electronic copies of the report and appendices: http://www.escience.co.za/Pro_Environmental%20Impact%20Assessments.php (Please note the project is listed under Ref: APSP on the website no. 25). Note that a 30-day comment period is available from **Monday 23 April until Wednesday 23 May 2012**. A copy of the report can also be requested from the Environmental Assessment Practitioner's office at 9 Victoria Street, Oaklands, Johannesburg.

Please feel free to forward this information to any other persons / organisations who may be interested. Any comments on the report, or further queries regarding this matter, can be directed to me at the contact details below. ESA would like to thank you for your participation in the EIA process to date and look forward to receipt of your comments on the draft Scoping Report.

If you require any additional information please don't hesitate to contact me in this regard.

Kind regards,

Roelof Letter

EScience Associates (Pty) Ltd
E-mail: roelof@escience.co.za
Web: www.escience.co.za
PO Box 2950, Saxonwold, 2132
9 Victoria Street, Oaklands, Johannesburg, 2192
Tel: +27 (0)11 718 6380
Fax: 0865 994 687
Cell: +27 (0) 83 562 6455

The final scoping report was send to all initial identified I&Ap for comment. A commenting period was given from 14 June 2012 to the 14 July 2012.

RE: BIOS - Final Scoping Report Comment - proposed Photo-Voltaic Solar Power Generation Plant on the Farm KONKOONSIES close to Pofadder in the Northern Cape

Roelof Letter

This message was sent with High importance.

Sent: Thu 2012/06/14 05:33 PM

To: Roelof Letter

Cc: 'jandup1@telkomsa.net'; 'oberholster@webmail.co.za'; 'se@museumsnc.co.za'; 'spothil@gmail.com'; 'sahranc@iafrica.com'; 'conradb@dwaf.gov.za'; 'snydersl@dwaf.gov.za'; 'northerncapetourism@telkomsa.net'; 'kheismun@lantic.net'; 'straussf@kaigarib.co.za'; 'north.western@eskom.co.za'; 'pngidi@environment.gov.za'; 'tgnvisser@telkomsa.net'; 'latrivier@lantic.net'; 'sonderhuis@gmail.com'; 'pienaar.magda@gmail.com'; 'gabriel_viljoen@yahoo.com'; 'dngxanga@siyanda.gov.za'; 'admin@kaigarib.co.za'; 'tourism@northerncape.org.za'; 'envhelp@eskom.co.za'; 'vries@khaima.gov.za'; 'mazwir@dwa.gov.za'; 'north.western@eskom.co.za'; 'straussf@kaigarib.co.za'; 'kheismun@lantic.net'; 'willema@namakwa-dm.gov.za'; 'fpr@siyanda.gov.za'; 'snydersl@dwaf.gov.z

Message BIOS final Scoping Report Konkoonsies.pdf (1 MB)

Dear Stakeholder

Notice is hereby given that the **final Scoping Report (SR)** for the proposed **Photo-Voltaic Solar Power Generation Plant on the Farm Konkoonsies close to Pofadder in the Northern Cape** is **available for public comment from Thursday the 14h of June 2012**.

The **Final Scoping Report** for the above mentioned project have been submitted to the Department of Environmental Affairs (DEA), along with requisite specialist assessments necessary to fully inform the process. Also a low resolution copy of the Final Scoping Report is attached hereto for your reference . Due to the size of the file, the appendices to the report have been omitted, if you require these appendices please send such a request and we will be happy t supply to you this. Please forward your comments directly to Mr Takalani Maswime of the Department of Environmental Affairs (Private Bag X447 Pretoria 0001) as well provide us with your comment before 14th July 2012 at the latest, as per the 30 days comment period stipulated in the EIA regulations, 2010.

Please feel free to forward this information to any other persons / organisations who may be interested. Any comments on the report, or further queries regarding this matter, can be directed to me at the contact details below. ESA would like to thank you for your participation in the EIA process to date and loo forward to receipt of your comments on the Final Report.

If you require any additional information please don't hesitate to contact me in this regard.

Kind regards,

Roelof Letter

EScience Associates (Pty) Ltd
E-mail: roelof@escience.co.za
Web: www.escience.co.za
PO Box 2950, Saxonwold, 2132
9 Victoria Street, Oaklands, Johannesburg, 2192
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VAT No: 473 025 4416
Reg No: 2009/014472/07

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Actis
Mar 21, 2019 11:02

1.1 APPENDIX 4.5: LIST OF GOVERNMENT DEPARTMENTS AND REPRESENTATIVES

The following governmental departments were sent the hardcopies/ electronic copies of the draft and final scoping report. The draft and final amended scoping report will also be submitted to these parties via hard and electronic copies.

Northern Cape Department Agriculture, Forestry and Fisheries (DAFF)	Mrs. Jacoline Mans	054 338 5839	JacolineMa@nda.agric.za
Northern Cape Department of Environment and Nature Conservation	Mr. Tshlo Makaundi	053 807 7464	tmakaudi@ncpg.gov.za
Department of Water Affairs (DWA)	Mr. A Abrahams & S.c. Cloete	053 830 8802	AbrahamsA@dwa.gov.za & cloetes@dwa.gov.za
Khai Ma Local Municipality	Mr A. Richards (Changed to Mr. Thabo Molete)	054 933 1000	munman@khaima.gov.za
Namakwa District Municipality	Mr. W. Andre (Changed to Mr. Immanuel Smith)	027 712 8000	ismith@namakwa-dm.gov.za

COPIES OF LETTERS SEND TO THE RELEVANT PARTIES REGARDING THE DRAFT SCOPING REPORT

DENC

Northern Cape Department of Environment and Nature Conservation (DENC)

The Director
Northern Cape Department of Environment and Nature Conservation
90 Long Street
Kimberley
8300

Tel: (053) 807 7464
Fax: (053) 831 3530

20 APRIL 2012

ATTENTION: MR. TSHLO MAKAUNDI

RE: Submission of Draft Scoping Report for Your Review and Comment - Proposed Photo-voltaic Solar Power Generation Plant on the Farm Konkoonsies close to Pofadder in the Northern Cape (NEAS REF: DEA/ EIA/ 0000529/ 2011 & DEA REF: 12/ 12/ 20/ 2443).

Dear MR. TSHLO MAKAUNDI

Please find attached to this letter one (1) hard copy of the Draft Scoping Report, and one (1) CD which contain electronic copies of the reports.

Please provide us with your comment on the 30thMay 2012 at the latest, as per the 40 days comment period stipulated in the EIA regulations, 2010.

If there is any further information that you require, please do not hesitate to contact me.

YOURS FAITHFULLY,

ROELOF LETTER
ENVIRONMENTAL ASSESSMENT PRACTITIONER
FOR: ESCIENCE ASSOCIATES (PTY) LTD

ESCIENCE ASSOCIATES (PTY) LTD

POSTAL ADDRESS
PO Box 2950
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PHYSICAL ADDRESS
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TELEPHONE
+27 11 7186380

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WEBSITE
www.escience.co.za

EMAIL
roelof@escience.co.za

DAFF

Department Agriculture, Forestry and Fisheries (DAFF)

Chief Forester
Louise Vale Weg
Upington
880

Tel: 054 338 5839
Fax: 054 334 0030

20 APRIL 2012

ATTENTION: Mrs. Jacoline Mans

RE: Submission of Draft Scoping Report for Your Review and Comment - Proposed Photo-voltaic Solar Power Generation Plant on the Farm Konkoonsies close to Pofadder in the Northern Cape (NEAS REF: DEA/ EIA/ 0000529/ 2011 & DEA REF: 12/ 12/ 20/ 2443).

Dear Mrs. Jacoline Mans

Please find attached to this letter one (1) hard copy of the Draft Scoping Report, and one (1) CD which contain electronic copies of the reports.

Please provide us with your comment on the 30th May 2012 at the latest, as per the 40 days comment period stipulated in the EIA regulations, 2010.

If there is any further information that you require, please do not hesitate to contact me.

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DWA

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Department of Water Affairs (DWA)

Director: Water Sector Regulation and Use
Northern Cape Department of Water Affairs
Private Bag X6101
Kimberley
8300

Tel: (053) 830 8802
Fax: (053) 831 4534
Cell: 082 883 6741

20 APRIL 2012

ATTENTION: MR. A ABRAHAMS

RE: Submission of Draft Scoping Report for Your Review and Comment - Proposed Photo-voltaic Solar Power Generation Plant on the Farm Konkoonsies close to Pofadder in the Northern Cape (NEAS REF: DEA/ EIA/ 0000529/ 2011 & DEA REF: 12/ 12/ 20/ 2443)

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Namakwa District Municipality

Private Bag X20
Springbok
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Tel: (027) 712 8000
Fax: (027) 712 8040

20 APRIL 2012

ATTENTION: MR. A RICHARDS

RE: Submission of Draft Scoping Report for Your Review and Comment - Proposed Photo-voltaic Solar Power Generation Plant on the Farm Konkoonsies close to Pofadder in the Northern Cape (NEAS REF: DEA/ EIA/ 0000529/ 2011 & DEA REF: 12/ 12/ 20/ 2443 & Your REF: 16.2.1.3)

Dear Mr. A Richards

Please find attached to this letter one (1) hard copy of the Draft Scoping Report, and one (1) CD which contain electronic copies of the reports.

Please provide us with your comment on the 30thMay 2012 at the latest, as per the 40 days comment period stipulated in the EIA regulations, 2010.

If there is any further information that you require, please do not hesitate to contact me.

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WEBSITE
www.escience.co.za

EMAIL
roelof@escience.co.za

Khai Ma Local Municipality

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Actis
Mar 21, 2019 11:02

Khai Ma Local Municipality

New Street
Pofadder
8890

Tel: (054) 933 1000
Fax: (054) 933 0252

20 APRIL 2012

ATTENTION: MR. W. ANDRE

RE: Submission of Draft Scoping Report for Your Review and Comment - Proposed Photo-voltaic Solar Power Generation Plant on the Farm Konkoonsies close to Pofadder in the Northern Cape (NEAS REF: DEA/ EIA/ 0000529/ 2011 & DEA REF: 12/ 12/ 20/ 2443)

Dear Mr. W. Andre

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Please provide us with your comment on the 30thMay 2012 at the latest, as per the 40 days comment period stipulated in the EIA regulations, 2010.

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Actis
Mar 21, 2019 11:02

COPIES OF LETTERS SEND TO THE RELEVANT PARTIES REGARDING THE FINAL SCOPING REPORT

DENC

Northern Cape Department of Environment and Nature Conservation (DENC)

The Director
Northern Cape Department of Environment and Nature Conservation
90 Long Street
Kimberley
8300

Tel: (053) 807 7464
Fax: (053) 831 3530

14 JUNE 2012

ATTENTION: MR. TSHLO MAKAUNDI

RE: Submission of Final Scoping Report for Your Comment - Proposed Photo-voltaic Solar Power Generation Plant on the Farm Konkoonsies close to Pofadder in the Northern Cape (NEAS REF: DEA/ EIA/ 0000529/ 2011 & DEA REF: 12/ 12/ 20/ 2443).

Dear MR. TSHLO MAKAUNDI

Please find attached to this letter one (1) CD which contain electronic copies of the report and relative shape files. A hardcopy of the report is available for your review at our offices on request.

Please forward your comments directly to Mr Takalani Maswime of the Department of Environmental Affairs (Private Bag X447 Pretoria 0001) as well provide us with your comment before 24thJuly 2012 at the latest, as per the 40 days comment period stipulated in the EIA regulations, 2010.

If there is any further information that you require, please do not hesitate to contact me.

YOURS FAITHFULLY,

ROELOF LETTER
ENVIRONMENTAL ASSESSMENT PRACTITIONER
FOR: ESCIENCE ASSOCIATES (PTY) LTD

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DAFF

Department Agriculture, Forestry and Fisheries (DAFF)

Chief Forester
Louise Vale Weg
Upington
880

Tel: 054 338 5839
Fax: 054 334 0030

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ENVIRONMENTAL ASSESSMENT PRACTITIONER
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DWA

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confidential
Kilpatrick Archer
Actis
Mar 21, 2019 11:02

Department of Water Affairs (DWA)

Director: Water Sector Regulation and Use
Northern Cape Department of Water Affairs
Private Bag X6101
Kimberley
8300

Tel: (053) 830 8802
Fax: (053) 831 4534
Cell: 082 883 6741

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Namakwa District Municipality

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Kilpatrick Archer
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Namakwa District Municipality

Private Bag X20
Springbok
8240

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Fax: (027) 712 8040

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Khai Ma Local Municipality

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Pofadder
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Tel: (054) 933 1000
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14 JUNE 2012

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ENVIRONMENTAL ASSESSMENT PRACTITIONER
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Oaklands
2192

TELEPHONE
+27 11 7186380

FACSIMILE
+27 865 994 687

WEBSITE
www.escience.co.za

EMAIL
roelof@escience.co.za

confidential
Kilpatrick Archer
Actis
Mar 21, 2019 11:02

COPIES OF LETTERS SEND TO THE RELEVANT PARTIES REGARDING THE DRAFT AMENDED SCOPING REPORT

DENC

Northern Cape Department of Environment and Nature Conservation (DENC)

The Director
Northern Cape Department of Environment and Nature Conservation
90 Long Street
Kimberley
8300

Tel: (053) 807 7464
Fax: (053) 831 3530

4 SEPTEMBER 2012

ATTENTION: MR. TSHLO MAKAUNDI

RE: Submission of Amended Scoping Report for Your Review and Comment - Proposed Photo-voltaic Solar Power Generation Plant on the Farm Konkoonsies close to Pofadder in the Northern Cape (NEAS REF: DEA/ EIA/ 0000529/ 2011 & DEA REF: 12/ 12/ 20/ 2443).

Dear MR. TSHLO MAKAUNDI

Your department has been identified as being a commenting authority for the subject Environmental Impact Assessment (EIA) process. Please find attached to this letter one (1) CD which contain electronic copies of the above mentioned report and relative shape files.

Please provide us with your comment on or before the 6thOctober 2012 at the latest, as per the 30 days comment period stipulated in the EIA regulations, 2010.

If there is any further information that you require, please do not hesitate to contact me.

YOURS FAITHFULLY,

ROELOF LETTER
ENVIRONMENTAL ASSESSMENT PRACTITIONER
FOR: ESCIENCE ASSOCIATES (PTY) LTD

ESCIENCE ASSOCIATES (PTY) LTD

POSTAL ADDRESS
PO Box 2950
Saxonwold
2132

PHYSICAL ADDRESS
9 Victoria Street
Oaklands
2192

TELEPHONE
+27 11 7186380

FACSIMILE
+27 865 994 687

WEBSITE
www.escience.co.za

EMAIL
roelof@escience.co.za

DAFF

Department Agriculture, Forestry and Fisheries (DAFF)

Chief Forester
Louise Vale Weg
Upington
880

Tel: 054 338 5839
Fax: 054 334 0030

4 SEPTEMBER 2012

ATTENTION: Mrs. Jacoline Mans

RE: Submission of Amended Scoping Report for Your Review and Comment - Proposed Photo-voltaic Solar Power Generation Plant on the Farm Konkoonsies close to Pofadder in the Northern Cape (NEAS REF: DEA/ EIA/ 0000529/ 2011 & DEA REF: 12/ 12/ 20/ 2443).

Dear Mrs. Jacoline Mans

Your department has been identified as being a commenting authority for the subject Environmental Impact Assessment (EIA) process. Please find attached to this letter one (1) CD which contain electronic copies of the above mentioned report and relative shape files.

Please provide us with your comment on or before the 6thOctober 2012 at the latest, as per the 30 days comment period stipulated in the EIA regulations, 2010.

If there is any further information that you require, please do not hesitate to contact me.

YOURS FAITHFULLY,

ROELOF LETTER
ENVIRONMENTAL ASSESSMENT PRACTITIONER
FOR: ESCIENCE ASSOCIATES (PTY) LTD

ESCIENCE ASSOCIATES (PTY) LTD

POSTAL ADDRESS
PO Box 2950
Saxonwold
2132

PHYSICAL ADDRESS
9 Victoria Street
Oaklands
2192

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+27 865 994 687

WEBSITE
www.escience.co.za

EMAIL
roelof@escience.co.za

DWA

confidential
Kilpatrick Archer
Actis
Mar 21, 2019 11:02

Department of Water Affairs (DWA)

Director: Water Sector Regulation and Use
Northern Cape Department of Water Affairs
Private Bag X6101
Kimberley
8300

Tel: (053) 830 8802
Fax: (053) 831 4534
Cell: 082 883 6741

04 SEPTEMBER 2012

ATTENTION: MR. A ABRAHAMS/ S.C. CLOETE

RE: Submission of Amended Scoping Report for Your Review and Comment - Proposed Photo-voltaic Solar Power Generation Plant on the Farm Konkoonsies close to Pofadder in the Northern Cape (NEAS REF: DEA/ EIA/ 0000529/ 2011 & DEA REF: 12/ 12/ 20/ 2443)

Dear Mr. Abrahams/ S.C.Cloete

Your department has been identified as being a commenting authority for the subject Environmental Impact Assessment (EIA) process. Please find attached to this letter one (1) CD which contain electronic copies of the above mentioned report and relative shape files.

Please provide us with your comment on or before the 6thOctober 2012 at the latest, as per the 30 days comment period stipulated in the EIA regulations, 2010.

If there is any further information that you require, please do not hesitate to contact me.

YOURS FAITHFULLY,

ROELOF LETTER
ENVIRONMENTAL ASSESSMENT PRACTITIONER
FOR: ESCIENCE ASSOCIATES (PTY) LTD

ESCIENCE ASSOCIATES (PTY) LTD

POSTAL ADDRESS
PO Box 2950
Saxonwold
2132

PHYSICAL ADDRESS
9 Victoria Street
Oaklands
2192

TELEPHONE
+27 11 7186380

FACSIMILE
+27 865 994 687

WEBSITE
www.escience.co.za

EMAIL
roelof@escience.co.za

Namakwa District Municipality

confidential
Kilpatrick Archer
Actis
Mar 21, 2019 11:02

Namakwa District Municipality

Van Riebeeck Straat
Springbok
8240

Tel: (027) 712 8000
Fax: (027) 712 8040

4 SEPTEMBER 2012

ATTENTION: MR. IMMANUEL SMITH

RE: Submission of Amended Scoping Report for Your Comment - Proposed Photo-voltaic Solar Power Generation Plant on the Farm Konkoonsies close to Pofadder in the Northern Cape (NEAS REF: DEA/ EIA/ 0000529/ 2011 & DEA REF: 12/ 12/ 20/ 2443 & Your REF: 16.2.1.3)

Dear Immanuel

Your department has been identified as being a commenting authority for the subject Environmental Impact Assessment (EIA) process. Please find attached to this letter one (1) hardcopy and CD which contain electronic copies of the above mentioned report and relative shape files.

Please provide us with your comment on or before the 6thOctober 2012 at the latest, as per the 30 days comment period stipulated in the EIA regulations, 2010.

If there is any further information that you require, please do not hesitate to contact me.

YOURS FAITHFULLY,

ROELOF LETTER
ENVIRONMENTAL ASSESSMENT PRACTITIONER
FOR: ESCIENCE ASSOCIATES (PTY) LTD

ESCIENCE ASSOCIATES (PTY) LTD

POSTAL ADDRESS
PO Box 2950
Saxonwold
2132

PHYSICAL ADDRESS
9 Victoria Street
Oaklands
2192

TELEPHONE
+27 11 7186380

FACSIMILE
+27 865 994 687

WEBSITE
www.escience.co.za

EMAIL
roelof@escience.co.za

Khai Ma Local Municipality

confidential
Kilpatrick Archer
Actis
Mar 21, 2019 11:02

Khai Ma Local Municipality

New Street
Pofadder
8890

Tel: (054) 933 1000
Fax: (054) 933 0252

4 SEPTEMBER 2012

ATTENTION: MR THABO MOLETE

RE: Submission of Amended Scoping Report for Your Review and Comment - Proposed Photo-voltaic Solar Power Generation Plant on the Farm Konkoonsies close to Pofadder in the Northern Cape (NEAS REF: DEA/ EIA/ 0000529/ 2011 & DEA REF: 12/ 12/ 20/ 2443)

Dear Thabo

Your department has been identified as being a commenting authority for the subject Environmental Impact Assessment (EIA) process. Please find attached to this letter one (1) hardcopy and CD which contain electronic copies of the above mentioned report and relative shape files.

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If there is any further information that you require, please do not hesitate to contact me.

YOURS FAITHFULLY,

ROELOF LETTER
ENVIRONMENTAL ASSESSMENT PRACTITIONER
FOR: ESCIENCE ASSOCIATES (PTY) LTD

ESCIENCE ASSOCIATES (PTY) LTD

POSTAL ADDRESS
PO Box 2950
Saxonwold
2132

PHYSICAL ADDRESS
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Oaklands
2192

TELEPHONE
+27 11 7186380

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Proof of sending and proof of delivery of hardcopy of the draft scoping report to relevant government departments

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POST A COMMENT SO WE CAN BETTER SERVICE YOU.
Click Here >

SMS SERVICE

SMS 35277 TO TRACK YOUR PARCEL
Click Here >

TRACK PARCEL CONSIGNMENT TRACK BY REFERENCE

Please enter a Parcel below

TA738705159ZA Submit

Parcel Tracking Results

Parcel Number: TA738705159ZA
Consignment No: 8240 - Springbok

TRACKING LINE	TYPE	DRIVER / LOCATION	ROUTE / REGISTRATION	DATE	TIME	BRANCH	COMMENTS
	POD	SPRINGBOK	8008225191084	2012/04/24	16:43	SPRINGBOK POSTOFFICE	J MAARMAN
	DELIVERY	SPRINGBOK		2012/04/24	14:42	SPRINGBOK POSTOFFICE	1ST NOTIFICATION
	COLL DOC	Springbok	BTA.171	2012/04/21	00:41	JHB NETWORKS BRANCH	C405571006
	COLL IN	IMA.200	SS45.OPS	2012/04/20	20:48	JOHANNESBURG BRANCH	***
	COLL DOC	INSCAN	JOE.171	2012/04/20	19:20	JHB NETWORKS BRANCH	C404541462
	COLL DOC	171 OUTSCAN	ASA.200	2012/04/20	17:52	JOHANNESBURG BRANCH	C361941591

SUBBD13339203

POD COPY

Sender's Details

POSTNET NORWOOD
71 GRANT AVENUE

NORWOOD

JOHANNESBURG

JHB

011 728 6404

SPECIAL INSTRUCTIONS

IF THIS SHIPMENT CONTAINS ANY DANGEROUS GOODS ALL REGULATIONS MUST BE COMPLIED WITH. THIS IS YOUR RESPONSIBILITY AS SHIPPER. (SEE CLAUSE 6 OVERLEAF). GOODS ARE SHIPPED AT OWNER'S RISK, SUBJECT TO CONTRACT FOR CARRIAGE OVERLEAF. UTi SUN COURIERS LIMITS ITS LIABILITY TO R 250.00 PER SHIPMENT. (SEE CLAUSE 8.2 OVERLEAF). IF YOU WISH UTi SUN COURIERS TO ACCEPT A HIGHER LIABILITY, THE VALUE OF THIS SHIPMENT MUST BE DECLARED IN THE SPACE PROVIDED. (SEE CLAUSES 8.2, 8.3 AND 8.4 OVERLEAF).

SENDER'S AUTHORISED SIGNATURE

DATE

Total Parcels

NO. OF PARCELS PER DIMENSIONS

Goods received in full without damage

Name Of Receiver (PLEASE PRINT CLEARLY)

CARRIAGE / DISPATCH NOTE

UTi South Africa (Pty) Ltd
t/a UTi Sun Couriers
PO Box 63, The Reeds 0061
Tel (012) 673-2000
Reg. No. 2004/015747/07
VAT Reg. No. 4260213873

SUBBD13339182

Sender's Details	Consignee's Details. Full Street Address Please
POSTNET NORWOOD GRANT AVENUE	Company Name: CHIEF FORESTER
	Street Address: LOUISE VALE WEG
NNESBURG	Suburb: UPINGTON
JNB WBLL Postal Code: 2192	City / Town: UPINGTON Postal Code: 8800
	Contact: MRS FACOLINE MAAS
728 6494	Phone: 054 238 5839

ry	South Africa	Botswana	Lesotho	Namibia	Swaziland	Other (Please Specify)
	X					

Analysis Code:

CTIONS o/h

005196

Bill To Sender: X Consignee: Other (Name Please):

If Consignee Or Other (Third Party) Is Billed, Sender Remains Liable For Unpaid Charges.

CONTAINS ANY DANGEROUS GOODS ALL REGULATIONS MUST
H. THIS IS YOUR RESPONSIBILITY AS SHIPPER. (SEE CLAUSE
OODS ARE SHIPPED AT OWNER'S RISK, SUBJECT TO CONTRACT
VERLEAF.UTi SUN COURIERS LIMITS ITS LIABILITY TO R 250.00
SEE CLAUSE 8.2 OVERLEAF). IF YOU WISH UTi SUN COURIERS
IGHER LIABILITY, THE VALUE OF THIS SHIPMENT MUST BE
E SPACE PROVIDED. (SEE CLAUSES 8.2, 8.3 AND 8.4 OVERLEAF).

SENDER'S AUTHORISED SIGNATURE DATE: 20/04/2012

f of Delivery e-mail Address / Fax Number

ES	NO. OF PARCELS PER DIMENSIONS	LENGTH (CM)	WIDTH (CM)	HEIGHT(CM)	Total Mass (Kg)
	1	40	30	2	

ived in full without damage (unless endorsed)

iver (PLEASE PRINT CLEARLY)

C HEFFELS

Time Received: 1321

412

Received By UTi

Name Of Courier (PLEASE PRINT CLEARLY)

Date Received: 20/04/12

Signature:

Tracking history for Parcel SUBBD13339182

Summary

Shipment No:	SUBBD13339182
Dispatch time:	20 Apr 2012 00:00
Shipper:	SUBB
Mass (kg):	1.00
Dimensions (cm):	30x20x1
First Tracked:	SUN (Johannesburg) on 20 Apr 2012 15:58
Last Tracked:	SUN (Johannesburg) on 20 Apr 2012 19:51
Total tracks:	4
Imaged Time:	24 Apr 2012 15:21

Confirmation of Delivery

Date and Time:	23 Apr 2012 13:21
Delivered by:	SUN (Upington)
Delivered in:	UPINGTON
Receiver:	P SCHEFFERS

Full history

Timestamp	Tracked at	Description
20 Apr 2012 19:51	SUN (Johannesburg)	Forwarded by Road to Branch
20 Apr 2012 18:21	SUN (Johannesburg)	WeighStation Small
20 Apr 2012 17:22	SUN (Johannesburg)	Received at Branch
20 Apr 2012 15:54	SUN (Johannesburg)	Collected

Back to Top

Tracking history for Parcel SUBBD13339202

Summary

Shipment No:	SUBBD13339202
Dispatch time:	20 Apr 2012 00:00
Shipper:	SUBB
Mass (kg):	1.00
Dimensions (cm):	30x20x1
First Tracked:	SUN (Johannesburg) on 20 Apr 2012 15:58
Last Tracked:	SUN (Johannesburg) on 20 Apr 2012 19:50
Total tracks:	4
Imaged Time:	25 Apr 2012 15:01

Confirmation of Delivery

Date and Time:	24 Apr 2012 12:15
Delivered by:	SUN (Upington)
Delivered in:	UPINGTON
Receiver:	R V/DER HEEVER

Full history

Timestamp	Tracked at	Description
20 Apr 2012 19:50	SUN (Johannesburg)	Forwarded by Road to Branch
20 Apr 2012 18:20	SUN (Johannesburg)	WeighStation Small
20 Apr 2012 17:22	SUN (Johannesburg)	Received at Branch
20 Apr 2012 15:54	SUN (Johannesburg)	Collected

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POST A COMMENT

POST A COMMENT SO WE CAN BETTER SERVICE YOU.
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SMS SERVICE

SMS 35277 TO TRACK YOUR PARCEL
Click Here >

TRACK PARCEL CONSIGNMENT TRACK BY REFERENCE

Please enter a Parcel below

TA738705159ZA Submit

Parcel Tracking Results

Parcel Number: TA738705159ZA
Consignment No: 8240 - Springbok

TRACKING LINE	TYPE	DRIVER / LOCATION	ROUTE / REGISTRATION	DATE	TIME	BRANCH	COMMENTS
	POD	SPRINGBOK	8008225191084	2012/04/24	16:43	SPRINGBOK POSTOFFICE	J MAARMAN
	DELIVERY	SPRINGBOK		2012/04/24	14:42	SPRINGBOK POSTOFFICE	1ST NOTIFICATION
	COLL DOC	Springbok	BTA.171	2012/04/21	00:41	JHB NETWORKS BRANCH	C405571006
	COLL IN	IMA.200	SS45.OPS	2012/04/20	20:48	JOHANNESBURG BRANCH	***
	COLL DOC	INSCAN	JOE.171	2012/04/20	19:20	JHB NETWORKS BRANCH	C404541462
	COLL DOC	171 OUTSCAN	ASA.200	2012/04/20	17:52	JOHANNESBURG BRANCH	C361941591

CARRIAGE / DISPATCH NOTE

UTi South Africa (Pty) Ltd
t/a UTi Sun Couriers
PO Box 63, The Reeds 0061
Tel (012) 673-2000
Reg. No. 2004/015747/07
VAT Reg. No. 4260213873

SUBBD13339202

Sender's Details	Consignee's Details. Full Street Address Please
POSTNET NORWOOD GRANT AVENUE	Company Name KHAI MA LOCAL MUNICIPALITY
	Street Address NEW STREET
NNESBURG	Suburb POFADDER
JNB WELL — Postal Code 2192	City / Town POFADDER — Postal Code 8890
	Contact MR W ANDRE
728 6494	Phone 054 933 1000

ry	South Africa	Botswana	Lesotho	Namibia	Swaziland	Other (Please Specify)
	X					

Analysis Code

CTIONS 0/F 1 EG

005196

Bill To Sender [X] Consignee [ ] Other (Name Please) [ ]

If Consignee Or Other (Third Party) Is Billed, Sender Remains Liable For Unpaid Charges.

CONTAINS ANY DANGEROUS GOODS ALL REGULATIONS MUST
H. THIS IS YOUR RESPONSIBILITY AS SHIPPER. (SEE CLAUSE
ODS ARE SHIPPED AT OWNER'S RISK, SUBJECT TO CONTRACT
VERLEAF.UTi SUN COURIERS LIMITS ITS LIABILITY TO R 250.00
SEE CLAUSE 8.2 OVERLEAF). IF YOU WISH UTi SUN COURIERS
GHER LIABILITY, THE VALUE OF THIS SHIPMENT MUST BE
SPACE PROVIDED. (SEE CLAUSES 8.2, 8.3 AND 8.4 OVERLEAF).

SENDER'S AUTHORISED SIGNATURE — DATE 20/04/2012

of Delivery [ ] e-mail Address / Fax Number

S	NO. OF PARCELS PER DIMENSIONS	LENGTH (CM)	WIDTH (CM)	HEIGHT(CM)	Total Mass (Kg)
	1	40	30	1	

ved in full without damage (unless endorsed)
er (PLEASE PRINT CLEARLY)

HEEVER

Time Received: 1218

0412

Received By UTi
Name Of Courier (PLEASE PRINT CLEARLY)

Date Received: 20/04/12

Signature:

CARRIAGE / DISPATCH NOTE

UTi South Africa (Pty) Ltd
t/a UTi Sun Couriers
PO Box 63, The Reeds 0061
Tel (012) 673-2000
Reg. No. 2004/015747/07
VAT Reg. No. 4260213873

SUBBD13339202

Sender's Details	Consignee's Details. Full Street Address Please
POSTNET NORWOOD GRANT AVENUE	Company Name KHAI MA LOCAL MUNICIPALITY
	Street Address NEW STREET
NNESBURG	Suburb POFADDER
JNB WELL — Postal Code 2192	City / Town POFADDER — Postal Code 8890
	Contact MR W ANDRE
728 6494	Phone 054 933 1000

ry	South Africa	Botswana	Lesotho	Namibia	Swaziland	Other (Please Specify)
	X					

Analysis Code

CTIONS 0/F 1 EG

005196

Bill To Sender [X] Consignee [ ] Other (Name Please) [ ]

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GHER LIABILITY, THE VALUE OF THIS SHIPMENT MUST BE
SPACE PROVIDED. (SEE CLAUSES 8.2, 8.3 AND 8.4 OVERLEAF).

SENDER'S AUTHORISED SIGNATURE — DATE 20/04/2012

of Delivery [ ] e-mail Address / Fax Number

S	NO. OF PARCELS PER DIMENSIONS	LENGTH (CM)	WIDTH (CM)	HEIGHT(CM)	Total Mass (Kg)
	1	40	30	1	

ved in full without damage (unless endorsed)
er (PLEASE PRINT CLEARLY)

HEEVER

Time Received: 1218

0412

Received By UTi
Name Of Courier (PLEASE PRINT CLEARLY)

Date Received: 20/04/12

Signature:

Tracking history for Parcel SUBBD13339202

Summary

Shipment No:	SUBBD13339202
Dispatch time:	20 Apr 2012 00:00
Shipper:	SUBB
Mass (kg):	1.00
Dimensions (cm):	30x20x1
First Tracked:	SUN (Johannesburg) on 20 Apr 2012 15:58
Last Tracked:	SUN (Johannesburg) on 20 Apr 2012 19:50
Total tracks:	4
Imaged Time:	25 Apr 2012 15:01

Confirmation of Delivery

Date and Time:	24 Apr 2012 12:15
Delivered by:	SUN (Upington)
Delivered in:	UPINGTON
Receiver:	R V/DER HEEVER

Full history

Timestamp	Tracked at	Description
20 Apr 2012 19:50	SUN (Johannesburg)	Forwarded by Road to Branch
20 Apr 2012 18:20	SUN (Johannesburg)	WeighStation Small
20 Apr 2012 17:22	SUN (Johannesburg)	Received at Branch
20 Apr 2012 15:54	SUN (Johannesburg)	Collected

Back to Top

Tracking history for Parcel SUBBD13339182

Summary

Shipment No:	SUBBD13339182
Dispatch time:	20 Apr 2012 00:00
Shipper:	SUBB
Mass (kg):	1.00
Dimensions (cm):	30x20x1
First Tracked:	SUN (Johannesburg) on 20 Apr 2012 15:58
Last Tracked:	SUN (Johannesburg) on 20 Apr 2012 19:51
Total tracks:	4
Imaged Time:	24 Apr 2012 15:21

Confirmation of Delivery

Date and Time:	23 Apr 2012 13:21
Delivered by:	SUN (Upington)
Delivered in:	UPINGTON
Receiver:	P SCHEFFERS

Full history

Timestamp	Tracked at	Description
20 Apr 2012 19:51	SUN (Johannesburg)	Forwarded by Road to Branch
20 Apr 2012 18:21	SUN (Johannesburg)	WeighStation Small
20 Apr 2012 17:22	SUN (Johannesburg)	Received at Branch
20 Apr 2012 15:54	SUN (Johannesburg)	Collected

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SUBBD13339203

POD COPY

Sender's Details

POSTNET NORWOOD
71 GRANT AVENUE

NORWOOD

JOHANNESBURG

JHB

011 728 6404

SPECIAL INSTRUCTIONS

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SENDER'S AUTHORISED SIGNATURE

DATE

Total Parcels

NO. OF PARCELS PER DIMENSIONS

Goods received in full without damage

Name Of Receiver (PLEASE PRINT CLEARLY)

CARRIAGE / DISPATCH NOTE

UTi South Africa (Pty) Ltd
t/a UTi Sun Couriers
PO Box 63, The Reeds 0061
Tel (012) 673-2000
Reg. No. 2004/015747/07
VAT Reg. No. 4260213873

SUBBD13339182

Sender's Details	Consignee's Details. Full Street Address Please
POSTNET NORWOOD GRANT AVENUE	Company Name: CHIEF FORESTER
	Street Address: LOUISE VALE WEG
NNESBURG	Suburb: UPINGTON
JNB WBLL Postal Code: 2192	City / Town: UPINGTON Postal Code: 8800
	Contact: MRS FACOLINE MAAS
728 6494	Phone: 054 238 5839

ry	South Africa	Botswana	Lesotho	Namibia	Swaziland	Other (Please Specify)
	X					

Analysis Code:

CTIONS o/h

005196

Bill To Sender: X Consignee: Other (Name Please):

If Consignee Or Other (Third Party) Is Billed, Sender Remains Liable For Unpaid Charges.

CONTAINS ANY DANGEROUS GOODS ALL REGULATIONS MUST
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E SPACE PROVIDED. (SEE CLAUSES 8.2, 8.3 AND 8.4 OVERLEAF).

SENDER'S AUTHORISED SIGNATURE DATE: 20/04/2012

f of Delivery e-mail Address / Fax Number

ES	NO. OF PARCELS PER DIMENSIONS	LENGTH (CM)	WIDTH (CM)	HEIGHT(CM)	Total Mass (Kg)
	1	40	30	2	

ived in full without damage (unless endorsed)

iver (PLEASE PRINT CLEARLY)

C HEFFELS

Time Received: 1321

412

Received By UTi

Name Of Courier (PLEASE PRINT CLEARLY)

Date Received: 20/04/12

Signature:

Proof of sending and delivery of hardcopies of the final Scoping report to relevant governmental departments.

Tracking history for Parcel **SUBBD14815381**

Summary

Shipment No:	SUBBD14815381
Dispatch time:	14 Jun 2012 00:00
Shipper:	SUBB
Mass (kg):	1.00
Dimensions (cm):	30x20x1
First Tracked:	SUN (Johannesburg) on 14 Jun 2012 16:04
Last Tracked:	SUN (Kimberley) on 15 Jun 2012 16:15
Total tracks:	7
Imaged Time:	15 Jun 2012 22:24

Confirmation of Delivery

Date and Time:	15 Jun 2012 16:15
Delivered by:	SUN (Kimberley)
Receiver:	puseletso

Full history

Timestamp	Tracked at	Description
15 Jun 2012 16:15	SUN (Kimberley)	Delivered
15 Jun 2012 08:26	SUN (Kimberley)	On Delivery
15 Jun 2012 06:26	SUN (Kimberley)	Received at Branch
14 Jun 2012 20:46	SUN (Johannesburg)	Forwarded by Road to Branch
14 Jun 2012 17:42	SUN (Johannesburg)	WeighStation Small
14 Jun 2012 17:09	SUN (Johannesburg)	Received at Branch
14 Jun 2012 15:48	SUN (Johannesburg)	Collected

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confidential
Kilpatrick Archer
Actis
Mar 21, 2019 11:02

Tracking history for Parcel **SUBBD13339203**

Summary

Shipment No:	SUBBD13339203
Dispatch time:	20 Apr 2012 00:00
Shipper:	SUBB
Mass (kg):	1.00
Dimensions (cm):	30x20x1
First Tracked:	SUN (Johannesburg) on 20 Apr 2012 15:58
Last Tracked:	SUN (Kimberley) on 23 Apr 2012 16:19
Total tracks:	7
Imaged Time:	23 Apr 2012 23:29

Confirmation of Delivery

Date and Time:	23 Apr 2012 16:19
Delivered by:	SUN (Kimberley)
Receiver:	leona

Full history

Timestamp	Tracked at	Description
23 Apr 2012 16:19	SUN (Kimberley)	Delivered
23 Apr 2012 07:10	SUN (Kimberley)	On Delivery
21 Apr 2012 06:37	SUN (Kimberley)	Received at Branch
20 Apr 2012 20:17	SUN (Johannesburg)	Forwarded by Road to Branch
20 Apr 2012 18:17	SUN (Johannesburg)	WeighStation Small
20 Apr 2012 17:22	SUN (Johannesburg)	Received at Branch
20 Apr 2012 15:54	SUN (Johannesburg)	Collected

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Parcel Number: TA738705162ZA
Consignment No: 8300 - Kimberley

TRACKING LINE	TYPE	DRIVER / LOCATION	ROUTE / REGISTRATION	DATE	TIME	BRANCH	COMMENTS
	POD	KIMBERLEY	8409085084080	2012/04/23	14:42	KIMBERLEY POSTOFFICE	M POEMEDIE
	DELIVERY	KIMBERLEY		2012/04/21	11:42	KIMBERLEY POSTOFFICE	1ST NOTIFICATION
	COLL DOC	PLASTIC BAGS	JPL.905	2012/04/21	08:29	KIMBERLEY BRANCH	C382480068
	COLL DOC	Kimberley	BTA.171	2012/04/20	22:36	JHB NETWORKS BRANCH	C405571575
	COLL IN	IMA.200	SS45.OPS	2012/04/20	20:46	JOHANNESBURG BRANCH	***
	COLL DOC	INSCAN	JOE.171	2012/04/20	19:20	JHB NETWORKS BRANCH	C404541462
	COLL DOC	200.INSCAN	MNE.200	2012/04/20	17:52	JOHANNESBURG BRANCH	C361941564

APPENDIX 4.6 - ADDITIONAL PUBLIC PARTICIPATION REQUIREMENTS FROM THE DEA:

The following stakeholders have been included in the process, they will be provided a 30 day comment period on the draft amended scoping report from the 5 September 2012 to 6 October 2012. The final amended report will also be made available to these I&Ap. These stakeholders will be informed on all aspect regarding the proposed development:

Table 2-1: Additional Key commenting stakeholders included in the EIA process.		
Eskom (Grid connectivity)	Kevin Leask	Kevin.leask@eskom.co.za
Eskom (Grid connectivity)	Ronald Marais	ronald.marais@eskom.co.za
Eskom (Grid connectivity)	Koos van der Merwe	VDMerwJK@eskom.co.za
Eskom (Snr Env Advisor)	John Geeringh	GeerinJH@eskom.co.za
SANPARKS – Environmental Manager	Sarel Yssel	sarel.yssel@sanparks.org
SANPARKS – Arid region Environmental Manger	Dries Englebrecht	dries.engelbrecht@sanparks.org
SKA office	Dr Adrian Tiplady	atiplady@ska.ac.za

THE AMENDED SCOPING REPORT WAS SEND TO ALL IDENTIFIED I&AP FOR COMMENT. A COMMENTING PERIOD WAS GIVEN FROM 5 SEPTEMBER 2012 TO THE 6 OCTOBER 2012.

Roelof Letter

From:	Roelof Letter
Sent:	05 September 2012 12:20 PM
To:	Roelof Letter
Cc:	'info@namakwa-dm.gov.za'; 'willema@namakwa-dm.gov.za'; 'davyj@kheis.co.za'; 'lesley@khaima.gov.za'; 'enquiries@agrinc.gov.za'; 'jandup1@telkomsa.net'; 'oberholster@webmail.co.za'; 'se@museumsnc.co.za'; 'spothil@gmail.com'; 'sahranc@iafrica.com'; 'conradb@dwaf.gov.za'; 'snydersl@dwaf.gov.za'; 'northerncapetourism@telkomsa.net'; 'kheismun@lantic.net'; 'straussf@kaigarib.co.za'; 'north.western@eskom.co.za'; 'pngidi@environment.gov.za'; 'tgnvisser@telkomsa.net'; 'latrivier@lantic.net'; 'sonderhuis@gmail.com'; 'pienaar.magda@gmail.com'; 'gabriel_viljoen@yahoo.com'; 'mazwir@dwa.gov.za'; 'AbrahamsA@dwa.gov.za'; 'conradb@dwaf.gov.za'; 'snydersl@dwaf.gov.za'; 'AnnelizaC@nda.agric.za'; 'tmakaudi@half.ncape.gov.za'; 'north.western@eskom.co.za'; 'se@museumsnc.co.za'; 'spothil@gmail.com'; 'sahranc@iafrica.com'; 'jsinthumulel@ncpg.gov.za'; 'dBruinER@eskom.co.za'; 'cebekhulum@dwa.gov.za'; 'ismith@namakwa-dm.gov.za'; 'admin@kaigarib.co.za'; 'tourism@northerncape.org.za'; 'envhelp@eskom.co.za'; 'clarkem@kaigarib.co.za'; 'solar@eskom.co.za'; Hanre Crous; lpoll-jonker@environment.gov.za; Tonderai Munthumbira
Subject:	RE: BIOS - Final Scoping Report Comment - proposed Photo-Voltaic Solar Power Generation Plant on the Farm KONKOONSIES close to Pofadder in the Northern Cape
Attachments:	BIOS Amended Scoping Report Konkoonsies low res....pdf
Importance:	High

Dear Stakeholders

Notice is hereby given that the **amended Scoping Report (SR)** for the proposed **Photo-Voltaic Solar Power Generation Plant on the Farm Konkoonsies close to Pofadder in the Northern Cape** is **available for public comment from Thursday the 6th of September 2012**. Please follow the link to our website where you can download electronic copies of the report http://www.esclence.co.za/Pro_Environmental%20Impact%20Assessments.php (Please note the project is listed under Ref: BIOS on the website no. 26). Note that a 30-day comment period is available from Thursday **6th of September 2012 until Saturday 6 October 2012**. A copy of the report can also be requested from the Environmental Assessment Practitioner's office at 9 Victoria Street, Oaklands, Johannesburg.

Please feel free to forward this information to any other persons / organisations who may be interested. Any comments on the report, or further queries regarding this matter, can be directed to me at the contact details below. ESA would like to thank you for your participation in the EIA process to date and look forward to receipt of your comments on the draft Scoping Report.

If you require any additional information please don't hesitate to contact me in this regard.

Kind Regards

Roelof Letter
Environmental Manager

Esclence Associates (Pty) Ltd

2

E-mail: roelof@esclence.co.za
Web: www.esclence.co.za
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9 Victoria Street, Oaklands, Johannesburg, 2192
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Cell: 0835626455
Fax: 0865 994 687
VAT No: 473 025 4416
Reg No: 2009/014472/07

THE AMENDED SCOPING REPORT WAS SENT TO ALL IDENTIFIED COMMENTING AUTHORITIES AS PER DETAILS ABOVE. A COMMENTING PERIOD WAS GIVEN FROM 5 SEPTEMBER 2012 TO THE 6 OCTOBER 2012.

SAHRA

Roelof Letter

From:	Roelof Letter
Sent:	05 September 2012 05:20 PM
To:	KATHRYN SMUTS (KSMUTS@sahra.org.za)
Cc:	lpoll-jonker@environment.gov.za; Hanre Crous
Subject:	BOIS - Submission of Amended Scoping Report for Proposed PV Solar Facility on the farm Konkoonsies in the NC for SAHRA review and Comment
Attachments:	BIOS Amended Scoping Report Konkoonsies low res....pdf
Importance:	High

Tracking:

Recipient	Delivery
KATHRYN SMUTS (KSMUTS@sahra.org.za)	
lpoll-jonker@environment.gov.za	
Hanre Crous	Delivered: 2012/09/05 05:20 PM

Dear Kathryn

You have been identified as either a Key Commenting authority of the EIA process for proposed Photo-voltaic Solar Power Generation Plant on the **Farm Konkoonsies close to Pofadder in the Northern Cape (DEA Ref: 12/12/20/2443)**.. EScience Associates (ESA) act as the independent environmental assessment practitioner (EAP) undertaking the required EIA process (in terms of a basic assessment process) for the aforementioned project proposal, on behalf of Biotherm Energy (Pty) ltd.

A CD copy of this report has been sent to your offices by mail for comment. Also a low resolution copy of the Amended Scoping Report is attached hereto for now. Due to the size of the file, the appendices to the report have been omitted. Please forward your comments to us on/before 6 October 2012 at the latest, as per the 30 days comment period. If we do not receive any comment from you by this date it will be regarded as if your department had no comments on the amended report. A hardcopy of the report is also available for review at our offices on request.

Please feel free to forward this information to any other persons / organisations who may be interested. Any comments on the report, or further queries regarding this matter, can be directed to me at the contact details below. ESA would like to thank you for your participation in the EIA process to date and look forward to receipt of your comments on the Amended Scoping Report.

Kind Regards

Roelof Letter
Environmental Manager

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E-mail: roelof@escience.co.za
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Cell: 0835626455
Fax: 0865 994 687
VAT No: 473 025 4416
Reg No: 2009/014472/07

DENC

Roelof Letter

From: Roelof Letter
Sent: 05 September 2012 02:18 PM
To: 'tmakaudi@ncpg.gov.za'
Subject: BOIS - Submission of Amended Scoping Report for Proposed PV Solar Facility on the farm Konkoonsies in the NC for NDENC review and Comment
Attachments: BIOS Amended Scoping Report Konkoonsies low res...pdf

Importance: High

Mr. Tshlo Makaundi

You have been identified as either a Key Commenting authority of the EIA process for proposed Photo-voltaic Solar Power Generation Plant on the **Farm Konkoonsies close to Pofadder in the Northern Cape (DEA Ref: 12/12/20/2443)**.. EScience Associates (ESA) act as the independent environmental assessment practitioner (EAP) undertaking the required EIA process (in terms of a basic assessment process) for the aforementioned project proposal, on behalf of Biotherm Energy (Pty) ltd.

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Kind Regards

Roelof Letter
Environmental Manager

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Fax: 0865 994 687
VAT No: 473 025 4416
Reg No: 2009/014472/07

ESKOM

Roelof Letter

From: Roelof Letter
Sent: 05 September 2012 12:16 PM
To: Kevin.leask@eskom.co.za; ronald.marais@eskom.co.za
Cc: Hanre Crous; Tonderai Munthumbira; lpoll-jonker@environment.gov.za
Subject: BOIS - Submission of Amended Scoping Report for Proposed PV Solar Facility on the farm Konkoonsies in the NC for ESKOM review and Comment
Attachments: BIOS Amended Scoping Report Konkoonsies low res....pdf

Importance: High

Tracking:

Recipient	Delivery
Kevin.leask@eskom.co.za	
ronald.marais@eskom.co.za	
Hanre Crous	Delivered: 2012/09/05 12:16 PM
Tonderai Munthumbira	
lpoll-jonker@environment.gov.za	

Dear Mr Kevin Leask & Ronald Marais

You have been identified as either a Key Commenting authority of the EIA process for proposed Photo-voltaic Solar Power Generation Plant on the **Farm Konkoonsies close to Pofadder in the Northern Cape (DEA Ref: 12/12/20/2443)**.. EScience Associates (ESA) act as the independent environmental assessment practitioner (EAP) undertaking the required EIA process (in terms of a basic assessment process) for the aforementioned project proposal, on behalf of Biotherm Energy (Pty) ltd.

A low resolution copy of the Amended Scoping Report is attached hereto for now. Due to the size of the file, the appendices to the report have been omitted. Please forward your comments to us on/before 6 October 2012 at the latest, as per the 30 days comment period. If we do not receive any comment from you by this date it will be regarded as if your department had no comments on the amended report. . A hardcopy of the report is also available on request at our offices.

Please feel free to forward this information to any other persons / organisations who may be interested. Any comments on the report, or further queries regarding this matter, can be directed to me at the contact details below. ESA would like to thank you for your participation in the EIA process to date and look forward to receipt of your comments on the Amended Scoping Report.

Kind Regards

Roelof Letter
Environmental Manager

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Cell: 0835626455
Fax: 0865 994 687
VAT No: 473 025 4416
Reg No: 2009/014472/07

SANPARKS

Roelof Letter

From:	Roelof Letter
Sent:	05 September 2012 12:16 PM
To:	sarel.yssel@sanparks.org; dries.engelbrecht@sanparks.org
Cc:	Hanre Crous; Tonderai Munthumbira; lpoll-jonker@environment.gov.za
Subject:	BOIS - Submission of Amended Scoping Report for Proposed PV Solar Facility on the farm Konkoonsies in the NC for SANPARKS review and Comment
Attachments:	BIOS Amended Scoping Report Konkoonsies low res....pdf
Importance:	High

Tracking:

Recipient	Delivery
sarel.yssel@sanparks.org	
dries.engelbrecht@sanparks.org	
Hanre Crous	Delivered: 2012/09/05 12:16 PM
Tonderai Munthumbira	
lpoll-jonker@environment.gov.za	

Dear Mr. Sarel Yssel & Dries Englebrecht

You have been identified as either a Key Commenting authority of the EIA process for proposed Photo-voltaic Solar Power Generation Plant on the **Farm Konkoonsies close to Pofadder in the Northern Cape (DEA Ref: 12/12/20/2443)**.. EScience Associates (ESA) act as the independent environmental assessment practitioner (EAP) undertaking the required EIA process (in terms of a basic assessment process) for the aforementioned project proposal, on behalf of Biotherm Energy (Pty) ltd.

A low resolution copy of the Amended Scoping Report is attached hereto for now. Due to the size of the file, the appendices to the report have been omitted. Please forward your comments to us on/before 6 October 2012 at the latest, as per the 30 days comment period. If we do not receive any comment from you by this date it will be regarded as if your department had no comments on the amended report. . A hardcopy of the report is also available on request at our offices.

Please feel free to forward this information to any other persons / organisations who may be interested. Any comments on the report, or further queries regarding this matter, can be directed to me at the contact details below. ESA would like to thank you for your participation in the EIA process to date and look forward to receipt of your comments on the Amended Scoping Report.

Kind Regards

Roelof Letter
Environmental Manager

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E-mail: roelof@escience.co.za
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Fax: 0865 994 687
VAT No: 473 025 4416
Reg No: 2009/014472/07

SKA

Roelof Letter

From: Roelof Letter
Sent: 05 September 2012 12:15 PM
To: atiplady@ska.ac.za
Cc: Hanre Crous; Tonderai Munthumbira; lpoll-jonker@environment.gov.za
Subject: BOIS - Submission of Amended Scoping Report for Proposed PV Solar Facility on the farm Konkoonsies in the NC for SKA review and Comment
Attachments: BIOS Amended Scoping Report Konkoonsies low res....pdf

Importance: High

Tracking:

Recipient	Delivery
atiplady@ska.ac.za	
Hanre Crous	Delivered: 2012/09/05 12:16 PM
Tonderai Munthumbira	
lpoll-jonker@environment.gov.za	

Dr Adrian Tiplady

You have been identified as either a Key Commenting authority of the EIA process for proposed Photo-voltaic Solar Power Generation Plant on the **Farm Konkoonsies close to Pofadder in the Northern Cape (DEA Ref: 12/12/20/2443)**.. EScience Associates (ESA) act as the independent environmental assessment practitioner (EAP) undertaking the required EIA process (in terms of a basic assessment process) for the aforementioned project proposal, on behalf of Biotherm Energy (Pty) ltd.

A low resolution copy of the Amended Scoping Report is attached hereto. Due to the size of the file, the appendices to the report have been omitted. Please forward your comments to us on/before 6 October 2012 at the latest, as per the 30 days comment period. If we do not receive any comment from you by this date it will be regarded as if your department had no comments on the amended report. A hardcopy of the report is also available on request at our offices,

Please feel free to forward this information to any other persons / organisations who may be interested. Any comments on the report, or further queries regarding this matter, can be directed to me at the contact details below. ESA would like to thank you for your participation in the EIA process to date and look forward to receipt of your comments on the Amended Scoping Report.

Kind Regards

Roelof Letter
Environmental Manager

Escience Associates (Pty) Ltd
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VAT No: 473 025 4416
Reg No: 2009/014472/07

From: Roelof Letter
Sent: 23 August 2012 12:21 PM
To: atiplady@ska.ac.za
Cc: Hanre Crous
Subject: BIOS - Final Scoping Report - proposed Photo-Voltaic Power Generation Plant on the Farm Konkoonsies

close to Pafadder in the Northern Cape for SKA comment
Importance: High

Dear Dr Adrian Tiplady

As part of the Environmental Impact assessment process for the above project it was requested by the Department of Environmental Affairs (DEA), to approach the SKA for comments regarding potential clashing of SKA sites with renewable energy projects. Please can you provide us with formal communication that the prosed site does or doesn't fall within such specified areas.

I have attached a locality map as well as a low resolution copy of the final report submitted to the DEA for approval **(DEA Ref No:12/12/20/2443)**

GPS co-ordinates of center of the site	
28°53'17.95"S	19°33'36.97"E

Kind Regards

Roelof Letter

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E-mail: roelof@escience.co.za
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Cell: 0835626455
Fax: 0865 994 687
VAT No: 473 025 4416
Reg No: 2009/014472/07

Namakwa District Municipality

Roelof Letter

From:	Roelof Letter
Sent:	05 September 2012 12:15 PM
To:	'ismith@namakwa-dm.gov.za'
Cc:	Hanre Crous; Tonderai Munthumbira; lpoll-jonker@environment.gov.za
Subject:	BOIS - Submission of Amended Scoping Report for Proposed PV Solar Facility on the farm Konkoonsies in the NC for Namakwa DM review and Comment
Attachments:	BIOS Amended Scoping Report Konkoonsies low res....pdf
Importance:	High

Tracking:

Recipient	Delivery
'ismith@namakwa-dm.gov.za'	
Hanre Crous	Delivered: 2012/09/05 12:15 PM
Tonderai Munthumbira	
lpoll-jonker@environment.gov.za	

Mr. Immanuel Smith

You have been identified as either a Key Commenting authority of the EIA process for proposed Photo-voltaic Solar Power Generation Plant on the **Farm Konkoonsies close to Pofadder in the Northern Cape (DEA Ref: 12/12/20/2443)**.. EScience Associates (ESA) act as the independent environmental assessment practitioner (EAP) undertaking the required EIA process (in terms of a basic assessment process) for the aforementioned project proposal, on behalf of Biotherm Energy (Pty) ltd.

A hardcopy as well CD copy of this report has been sent to your offices by mail for comment. Also a low resolution copy of the Amended Scoping Report is attached hereto for now. Due to the size of the file, the appendices to the report have been omitted. Please forward your comments to us on/before 6 October 2012 at the latest, as per the 30 days comment period. If we do not receive any comment from you by this date it will be regarded as if your department had no comments on the amended report. A hardcopy of the report is also available for review at our offices on request.

Please feel free to forward this information to any other persons / organisations who may be interested. Any comments on the report, or further queries regarding this matter, can be directed to me at the contact details below. ESA would like to thank you for your participation in the EIA process to date and look forward to receipt of your comments on the Amended Scoping Report.

Kind Regards

Roelof Letter
Environmental Manager

Escience Associates (Pty) Ltd
E-mail: roelof@escience.co.za
Web: www.escience.co.za
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9 Victoria Street, Oaklands, Johannesburg, 2192
Tel: +27 (0)11 718 6380
Cell: 0835626455
Fax: 0865 994 687
VAT No: 473 025 4416
Reg No: 2009/014472/07

Khai Ma Local Municipality

Roelof Letter

From:	Roelof Letter
Sent:	05 September 2012 12:15 PM
To:	'munman@khaima.gov.za'
Cc:	Hanre Crous; Tonderai Munthumbira; lpoll-jonker@environment.gov.za
Subject:	BOIS - Submission of Amended Scoping Report for Proposed PV Solar Facility on the farm Konkoonsies in the NC for Khai Ma LM review and Comment
Attachments:	BIOS Amended Scoping Report Konkoonsies low res....pdf
Importance:	High

Tracking:

Recipient	Delivery
'munman@khaima.gov.za'	
Hanre Crous	Delivered: 2012/09/05 12:15 PM
Tonderai Munthumbira	
lpoll-jonker@environment.gov.za	

Mr Thabo Molete

You have been identified as either a Key Commenting authority of the EIA process for proposed Photo-voltaic Solar Power Generation Plant on the **Farm Konkoonsies close to Pofadder in the Northern Cape (DEA Ref: 12/12/20/2443)**. EScience Associates (ESA) act as the independent environmental assessment practitioner (EAP) undertaking the required EIA process (in terms of a basic assessment process) for the aforementioned project proposal, on behalf of Biotherm Energy (Pty) ltd.

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Kind Regards

Roelof Letter
Environmental Manager

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Cell: 0835626455
Fax: 0865 994 687
VAT No: 473 025 4416
Reg No: 2009/014472/07

DWA

Roelof Letter

From:	Roelof Letter
Sent:	05 September 2012 12:15 PM
To:	'AbrahamsA@dwa.gov.za'; 'cloetes@dwa.gov.za'
Cc:	Hanre Crous; Tonderai Munthumbira; lpoll-jonker@environment.gov.za
Subject:	BOIS - Submission of Amended Scoping Report for Proposed PV Solar Facility on the farm Konkoonsies in the NC for DWA review and Comment
Attachments:	BIOS Amended Scoping Report Konkoonsies low res....pdf
Importance:	High

Tracking:

Recipient	Delivery
'AbrahamsA@dwa.gov.za'	
'cloetes@dwa.gov.za'	
Hanre Crous	Delivered: 2012/09/05 12:15 PM
Tonderai Munthumbira	
lpoll-jonker@environment.gov.za	

Mr. A Abrahams/ S.C. Cloete

You have been identified as either a Key Commenting authority of the EIA process for proposed Photo-voltaic Solar Power Generation Plant on the **Farm Konkoonsies close to Pofadder in the Northern Cape (DEA Ref: 12/12/20/2443)**. EScience Associates (ESA) act as the independent environmental assessment practitioner (EAP) undertaking the required EIA process (in terms of a basic assessment process) for the aforementioned project proposal, on behalf of Biotherm Energy (Pty) ltd.

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Kind Regards

Roelof Letter
Environmental Manager

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Cell: 0835626455
Fax: 0865 994 687
VAT No: 473 025 4416
Reg No: 2009/014472/07

DAFF

Roelof Letter

From:	Roelof Letter
Sent:	05 September 2012 12:14 PM
To:	JacolineMa (JacolineMa@nda.agric.za); MashuduMa@daff.gov.za; ThokoB@daff.gov.za; 'AnnelizaC@nda.agric.za'
Cc:	Hanre Crous; Tonderai Munthumbira; lpoll-jonker@environment.gov.za
Subject:	BOIS - Submission of Amended Scoping Report for Proposed PV Solar Facility on the farm Konkoonsies in the NC for DAFF review and Comment
Attachments:	BIOS Amended Scoping Report Konkoonsies low res...pdf
Importance:	High

Tracking:

Recipient	Delivery
JacolineMa (JacolineMa@nda.agric.za)	
MashuduMa@daff.gov.za	
ThokoB@daff.gov.za	
'AnnelizaC@nda.agric.za'	
Hanre Crous	Delivered: 2012/09/05 12:15 PM
Tonderai Munthumbira	
lpoll-jonker@environment.gov.za	

Dear Mrs. Jacoline Mans (Provincial DAFF), Ms Mashudu Marubini (National DAFF) and Ms Thoko Buthelezi (National DAFF)

You have been identified as either a Key Commenting authority of the EIA process for proposed Photo-voltaic Solar Power Generation Plant on the **Farm Konkoonsies close to Pofadder in the Northern Cape (DEA Ref: 12/12/20/2443)**.. EScience Associates (ESA) act as the independent environmental assessment practitioner (EAP) undertaking the required EIA process (in terms of a basic assessment process) for the aforementioned project proposal, on behalf of Biotherm Energy (Pty) ltd.

A CD copy of this report has been sent to your offices by mail for comment. Also a low resolution copy of the Amended Scoping Report is attached hereto for now. Due to the size of the file, the appendices to the report have been omitted. Please forward your comments to us on/before 6 October 2012 at the latest, as per the 30 days comment period. If we do not receive any comment from you by this date it will be regarded as if your department had no comments on the amended report. A hardcopy of the report is also available for review at our offices on request.

Please feel free to forward this information to any other persons / organisations who may be interested. Any comments on the report, or further queries regarding this matter, can be directed to me at the contact details below. ESA would like to thank you for your participation in the EIA process to date and look forward to receipt of your comments on the Amended Scoping Report.

Kind Regards

Roelof Letter
Environmental Manager

Escience Associates (Pty) Ltd
E-mail: roelof@escience.co.za
Web: www.escience.co.za
PO Box 2950, Saxonwold, 2132
9 Victoria Street, Oaklands, Johannesburg, 2192
Tel: +27 (0)11 718 6380
Cell: 0835626455
Fax: 0865 994 687
VAT No: 473 025 4416
Reg No: 2009/014472/07

PROOF OF SENDING AND DELIVERY OF CD ELECTRONIC COPIES OF THE AMENDED SCOPING REPORT TO RELEVANT GOVERNMENTAL DEPARTMENTS FOR COMMENT.

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t/a UTi Sun Couriers
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Tel (012) 673-2000
Reg. No. 2004/015747/07
VAT Reg. No. 4260213873

SUBBD14500733

POD COPY

Sender's Details	Consignee's Details. Full Street Address Please	Mark Service Required
Company Name: POSTNET NORWOOD 71 GRANT AVENUE	Company Name: DEPT AGRICULTURE, FORESTRY AND FISHERIES (DAFF)	Same Day
Street Address:	Street Address: Louise Vale Weg	Next Business Day
NORWOOD		Before 09h00
Suburb: JOHANNESBURG	Suburb:	Before 10h00
City / Town: JNB Postal Code: 2192	City / Town: Upington Postal Code: 8800	Before 12h00
Contact:	Contact: (054) 3385839.	Economy
Phone: 011 728 6494	Phone: CHIEF FORESTER	After Hours
		BLNS Customs Tariff
		Depot Hand In

Destination Country	South Africa	Botswana	Lesotho	Namibia	Swaziland	Other (Please Specify)
	X					

Sender's Reference: | Analysis Code:

SPECIAL INSTRUCTIONS

Bill Charges To Account No.: 005196 | Bill To Sender: X | Consignee: | Other (Name Please):

If Consignee Or Other (Third Party) is Billed, Sender Remains Liable For Unpaid Charges.

IF THIS SHIPMENT CONTAINS ANY DANGEROUS GOODS ALL REGULATIONS MUST BE COMPLIED WITH. THIS IS YOUR RESPONSIBILITY AS SHIPPER. (SEE CLAUSE 6 OVERLEAF).GOODS ARE SHIPPED AT OWNER'S RISK, SUBJECT TO CONTRACT FOR CARRIAGE OVERLEAF.UTi SUN COURIERS LIMITS ITS LIABILITY TO R 250.00 PER SHIPMENT. (SEE CLAUSE 8.2 OVERLEAF). IF YOU WISH UTi SUN COURIERS TO ACCEPT A HIGHER LIABILITY, THE VALUE OF THIS SHIPMENT MUST BE DECLARED IN THE SPACE PROVIDED. (SEE CLAUSES 8.2, 8.3 AND 8.4 OVERLEAF).

SENDER'S AUTHORISED SIGNATURE: [signature] DATE: 19/8/2012

Original POD Required P.O. Box

e-mail / Fax / Proof of Delivery: | e-mail Address / Fax Number

Total Parcels	NO. OF PARCELS PER DIMENSIONS	LENGTH (CM)	WIDTH (CM)	HEIGHT(CM)	Total Mass (Kg)
1	DOX	40	30	1	7

Goods received in full without damage (unless endorsed)

Name Of Receiver (PLEASE PRINT CLEARLY): PSCHEFFERS

Date Received: 060912 Time Received: 1300

Signature:

Received By UTi

Name Of Courier (PLEASE PRINT CLEARLY): [illegible]

Date Received: 080912 Time Received: 1505

Signature:

Version Control (06/2010)

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UTi™
Sun Couriers

UTi South Africa (Pty) Ltd
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PO Box 63, The Reeds 0061
Tel (012) 673-2000
Reg. No. 2004/015747/07
VAT Reg. No. 4260213873

SUBBD14500732

ACCOUNTS COPY

Sender's Details

Company Name: POSTNET NORWOOD 71 GRANT AVENUE
Street Address:
NORWOOD
Suburb: JOHANNESBURG
City / Town: JNB Postal Code: 2192
Contact:
Phone: 011 728 6494

Consignee's Details. Full Street Address Please

Company Name: NAMAKWA DISTRICT
Street Address: MUNICIPALITY
VAN RIEBEECK STR.
Suburb: SPRINGBOK
City / Town: SPRINGBOK Postal Code: 8240
Contact: IMMANUEL SMITH.
Phone: (027) 712 8000

Mark Service Required

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- ~~Express~~
- With Sunrise Option
- With Saturday Service
- Public Holiday Service
- Economy
- After Hours
- BLNS Customs Tariff
- Depot Hand In
- Insure: Value For Loss or Damage R 0
- Insure: Costs Incidental To Loss, Damage Or Delay) R 0

Destination Country	South Africa	Botswana	Lesotho	Namibia	Swaziland	Other (Please Specify)
	X					

Sender's Reference:
Analysis Code:

SPECIAL INSTRUCTIONS

Bill Charges To Account No. 005196
Bill To Sender X Consignee Other (Name Please)
If Consignee Or Other (Third Party) Is Billed, Sender Remains Liable For Unpaid Charges.

IF THIS SHIPMENT CONTAINS ANY DANGEROUS GOODS ALL REGULATIONS MUST BE COMPLIED WITH. THIS IS YOUR RESPONSIBILITY AS SHIPPER. (SEE CLAUSE 6 OVERLEAF).GOODS ARE SHIPPED AT OWNER'S RISK, SUBJECT TO CONTRACT FOR CARRIAGE OVERLEAF.UTi SUN COURIERS LIMITS ITS LIABILITY TO R 250.00 PER SHIPMENT. (SEE CLAUSE 8.2 OVERLEAF). IF YOU WISH UTi SUN COURIERS TO ACCEPT A HIGHER LIABILITY, THE VALUE OF THIS SHIPMENT MUST BE DECLARED IN THE SPACE PROVIDED. (SEE CLAUSES 8.2, 8.3 AND 8.4 OVERLEAF).

6/9/2012
SENDER'S AUTHORISED SIGNATURE DATE

e-mail / Fax / Proof of Delivery ☐ e-mail Address / Fax Number

Original POD Required P.O. Box

Total Parcels

1

NO. OF PARCELS PER DIMENSIONS	LENGTH (CM)	WIDTH (CM)	HEIGHT(CM)	Total Mass (Kg)
DOX	40	30	1	

Goods received in full without damage (unless endorsed)

Name Of Receiver (PLEASE PRINT CLEARLY):
Date Received: D D M M Y Y
Time Received: H H M M
Signature:

Received By UTi

Name Of Courier (PLEASE PRINT CLEARLY): Emmanuel
Date Received: 0 5 0 6 M M Y Y
Time Received: 1 5 0 5 M M
Signature:

Version Control (08/2010)

B10S

PostNet Name: PostNet Norwood

Tel. No: 011 728 6494 CIT Acc No: Acc# 11865

From: (Sender)
(Company Name) ROELOF
Street Address ESCIENCE SCIENCE
Suburb
City/Town Code
Contact Tel
E-mail

POD

PN5543877

To: (Receiver)
(Company Name) DEPT OF ENVIROMENTAL AFFAIRS
Street Address FEDSURE FORUM BUILDING
Suburb SOUTH TOWER, 4TH FLOOR
City/Town 315 PRETORIUS STREET Code
Contact C/O VANDERWALT STR
E-mail PRETORIA LINDA JONKER

TO: DIRECTOR ENVIROMENTAL IMPACT MANAGEMENT

Insurance Yes No If yes, state value

Domestic
- X OVERNIGHT COURIER 11H00
- NEXT DAY (24 - 48 HRS)
- ECONOMY (48 HRS-72HRS)
- SAMEDAY COURIER
- DAWN COURIER 09H00
- OTHER SPECIFY
- SATURDAY
- PUBLIC HOLIDAY/ AFTER HOURS

International
- DOCUMENTS
- NON-DOCUMENTS

No. of Parcels	Description	Length in cm	Breadth in cm	Height in cm	Mass in kg
1	DOX	40	30	1	2

Total No. of Parcels Total Vol Total Mass

WE HAVE SEEN AND AGREE TO THE STANDARD CONDITIONS OF CARRIAGE (OVERLEAF) WHICH SHALL APPLY TO THIS CONSIGNMENT AND ALL FUTURE CONSIGNMENTS ACCEPTED BY POSTNET. WE FURTHER DECLARE THAT THIS CONSIGNMENT DOES NOT CONTAIN DANGEROUS GOODS

EXPRESS PACK SECURITY NUMBER ON LIP OF FLYER POS 326863

SENDER

Name: Date:

Signature: Time:

PROOF OF DELIVERY

Name: Vuyiswa Date: 06/09/12

Signature: Time: 09:00

ID No.:

POSTNET Courier

ACCEPTED BY POSTNET

Name

Signature

5/9/2012

Date Time

www.postnet.co.za

To track your shipment go to: www.postnet.co.za

PostNet Norwood

PostNet Name:

Tel. No.: 011 728 6494 CIT Acc. No.: Acc# 11865

POD

PN5543858

From: (Sender)
(Company Name) E. Sclenle
Street Address
Suburb
City/Town Code
Contact Raaf Tel
E-mail

To: (Receiver)
(Company Name) N. CAPE Dpt Ment of Environment &
Street Address Nature Conservation Obo
Suburb 90-Long Street
City/Town Kimberley Code 8300
Contact The Director Tel 053.807 7462
E-mail Mr. Tshilo Makaundi

Insurance Yes No If yes, state value

SPECIAL INSTRUCTIONS

Domestic
- [x] OVERNIGHT COURIER 11H00
- [ ] ECONOMY (48 HRS-72HRS)
- [ ] DAWN COURIER 09H00
- [ ] SATURDAY
- [ ] NEXT DAY (24 - 48 HRS)
- [ ] SAMEDAY COURIER
- [ ] OTHER SPECIFY
- [ ] PUBLIC HOLIDAY/ AFTER HOURS

International
- [ ] DOCUMENTS
- [ ] NON-DOCUMENTS

No. of Parcels	Description	Length in cm	Breadth in cm	Height in cm	Mass in kg
1	Doc	40	30	1	1kg
Total No. of Parcels	Total Vol			Total Mass	

WE HAVE SEEN AND AGREE TO THE STANDARD CONDITIONS OF CARRIAGE (OVERLEAF) WHICH SHALL APPLY TO THIS CONSIGNMENT AND ALL FUTURE CONSIGNMENTS ACCEPTED BY POSTNET. WE FURTHER DECLARE THAT THIS CONSIGNMENT DOES NOT CONTAIN DANGEROUS GOODS

EXPRESS PACK SECURITY NUMBER ON LIP OF FLYER 326862

SENDER

Name: Date:

Signature: Time:

PROOF OF DELIVERY

Name: T. Raad Date: 06/09/2012

Signature: Raad. Time: 14:07.

ID No.:

POSTNET Courier

ACCEPTED BY POSTNET

Name

Signature

5/9/12
Date Time

www.postnet.co.za To track your shipment go to: www.postnet.co.za

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Proof of Delivery Click Here >>>

Post a Comment Click Here >>>

CUSTOMER HELPLINE : 0860 023 133

QUICKLINKS

- PRODUCTS AND SERVICES »
- TRACK AND TRACE »
- FIND A POSTAL CODE »
- PROOF OF DELIVERY »
- PARCEL INSURANCE »
- POST A COMMENT »

POST A COMMENT

POST A COMMENT SO WE CAN BETTER SERVICE YOU.
Click Here >

SMS SERVICE

SMS 35277 TO TRACK YOUR PARCEL
Click Here >

TRACK PARCEL CONSIGNMENT TRACK BY REFERENCE

Please enter a Parcel below

TA738705905ZA Submit

Parcel Tracking Results

Parcel Number: TA738705905ZA
Consignment No: 8300 - Kimberley

TRACKING LINE	TYPE	DRIVER / LOCATION	ROUTE / REGISTRATION	DATE	TIME	BRANCH	COMMENTS
	POD	KIMBERLEY	0000000000000	2012/06/18	14:41	KIMBERLEY POSTOFFICE	. MICHAEL
	DELIVERY	KIMBERLEY		2012/06/15	11:43	KIMBERLEY POSTOFFICE	1ST NOTIFICATION
	COLL DOC	PLASTICS TO COUNTER	JPL.905	2012/06/15	08:22	KIMBERLEY BRANCH	C397691989
	COLL IN	IMA.200	SS45.OPS	2012/06/14	22:52	JOHANNESBURG BRANCH	***
	COLL DOC	Kimberley	BTA.171	2012/06/14	19:20	JHB NETWORKS BRANCH	C392005785
	COLL DOC	171.OUTSCAN	MNE.200	2012/06/14	18:13	JOHANNESBURG BRANCH	C392124459

THE FINAL AMENDED SCOPING REPORT WAS SEND TO ALL IDENTIFIED I&AP FOR COMMENT. A COMMENTING PERIOD WAS GIVEN FROM 19 OCTOBER 2012 TO THE 9 NOVEMBER 2012.

DENC

Northern Cape Department of Environment and Nature Conservation (DENC)

The Director
Northern Cape Department of Environment and Nature Conservation
90 Long Street
Kimberley
8300

Tel: (053) 807 7464
Fax: (053) 831 3530

19 OCTOBER 2012

ATTENTION: MR. TSHLO MAKAUNDI

RE: Submission of Final Amended Scoping Report for Your Review and Comment - Proposed Photo-voltaic Solar Power Generation Plant on the Farm Konkoonsies close to Pofadder in the Northern Cape (NEAS REF: DEA/ EIA/ 0000529/ 2011 & DEA REF: 12/ 12/ 20/ 2443).

Dear Tshlo

Please find attached to this letter one (1) CD which contain electronic copies of the above mentioned report and relative shape files. Amendments to the report were made as per the DEA requirement and have been grey scaled for easy reference.

Please forward your comments directly to us as well to Linda Jonker of the Department of Environmental Affairs (DEA) at:

- Department of Environmental Affairs
  4th Floor, South Tower, Fedsure Forum Building
  315 Pretorius Street,
  C/o Pretorius and van der Walt Streets
  Pretoria, 0001

Please also provide us as well the DEA with your comment before 9thNovember 2012.

If there is any further information that you require, please do not hesitate to contact me.

YOURS FAITHFULLY,

ROELOF LETTER

ASSOCIATES (PTY) LTD

POSTAL ADDRESS
PO Box 2950
Saxonwold
2132

PHYSICAL ADDRESS
9 Victoria Street
Oaklands
2192

TELEPHONE
+27 11 7186380

FACSIMILE
+27 865 994 687

WEBSITE
www.escience.co.za

EMAIL
roelof@escience.co.za

ESKOM, SANPARKS, SKA, SAHRA

Roelof Letter

From: Roelof Letter
Sent: 23 October 2012 08:26 AM
To: JacolineMa (JacolineMa@nda.agric.za); MashuduMa@daff.gov.za; ThokoB@daff.gov.za; 'AnnelizaC@nda.agric.za'; KATHRYN SMUTS (KSMUTS@sahra.org.za); 'AbrahamsA@dwa.gov.za'; 'cloetes@dwa.gov.za'; 'munman@khaima.gov.za'; 'tmakaudi@ncpg.gov.za'; info@namakwa-dm.gov.za; willema@namakwa-dm.gov.za; davyj@kheis.co.za; lesley@khaima.gov.za; enquiries@agrinc.gov.za; jandup1@telkomsa.net; oberholster@webmail.co.za; se@museumsnc.co.za; spothil@gmail.com; sahranc@iafrica.com; conradb@dwaf.gov.za; snydersl@dwaf.gov.za; northerncapetourism@telkomsa.net; kheismun@lantic.net; straussf@kaigarib.co.za; north.western@eskom.co.za; pngidi@environment.gov.za; tgnvisser@telkomsa.net; latrivier@lantic.net; sonderhuis@gmail.com; pienaar.magda@gmail.com; gabriel_viljoen@yahoo.com; mazwir@dwa.gov.za; AbrahamsA@dwa.gov.za; conradb@dwaf.gov.za; snydersl@dwaf.gov.za; AnnelizaC@nda.agric.za; tmakaudi@half.ncape.gov.za; north.western@eskom.co.za; se@museumsnc.co.za; spothil@gmail.com; sahranc@iafrica.com; jsinthumulel@ncpg.gov.za; dBruinER@eskom.co.za; cebekhulum@dwa.gov.za; ismith@namakwa-dm.gov.za; admin@kaigarib.co.za; tourism@northerncape.org.za; envhelp@eskom.co.za; clarkem@kaigarib.co.za; solar@eskom.co.za; Kevin.leask@eskom.co.za; ronald.marais@eskom.co.za; John Geeringh (GeeringJH@eskom.co.za); sarel.yssel@sanparks.org; dries.engelbrecht@sanparks.org; atiplady@ska.ac.za; 'ismith@namakwa-dm.gov.za'
Cc: lpoll-jonker@environment.gov.za
Subject: RE: BOIS - Submission of Amended Scoping Report for Proposed PV Solar Facility on the farm Konkoonsies 91 in the NC for Comment (DEA Ref: 12/12/20/2443)
Attachments: Konkoonsies II Solar FINAL Amended Scoping Report low re excl app.pdf
Importance: High

Dear Stakeholder

Notice is hereby given that the **final Amended Scoping Report (SR)** for the proposed **Photo-Voltaic Solar Power Generation Plant on the Farm Konkoonsies 91 close to Pofadder in the Northern Cape** has been submitted to the Department of Environmental Affairs (DEA) for review. A commenting period of 21 days is provided up until **Tuesday the 13th November 2012**.

A low resolution copy of the **Final Amended Scoping Report** is attached hereto for your reference. Due to the size of the file, the appendices to the report have been omitted, if you require these appendices please send such a request and we will be happy to supply to you this. Please forward your comments directly to us as well to Linda Poll-Jonker of the Department of Environmental Affairs (Fedsure Building, 315 Pretorius Street, Pretoria).

Please feel free to forward this information to any other persons / organisations who may be interested. Any comments on the report, or further queries regarding this matter, can be directed to me at the contact details below. ESA would like to thank you for your participation in the EIA process to date and look forward to receipt of your comments on the Final Report.

If you require any additional information please don't hesitate to contact me in this regard.

Kind Regards

Roelof Letter
Environmental Manager

Esclence Associates (Pty) Ltd
E-mail: roelof@esclence.co.za
Web: www.esclence.co.za

confidential
Kilpatrick Archer
Actis
Mar 21, 2019 11:02

Namakwa District Municipality

Van Riebeeck Straat
Springbok
8240

Tel: (027) 712 8000
Fax: (027) 712 8040

19 OCTOBER 2012

ATTENTION: MR. IMMANUEL SMITH

RE: Submission of Final Amended Scoping Report for Your Comment - Proposed Photo-voltaic Solar Power Generation Plant on the Farm Konkoonsies close to Pofadder in the Northern Cape (NEAS REF: DEA/ EIA/ 0000529/ 2011 & DEA REF: 12/ 12/ 20/ 2443 & Your REF: 16.2.1.3)

Dear Immanuel

Please find attached to this letter one (1) CD which contain electronic copies of the above mentioned report and relative shape files. Amendments to the report were made as per the DEA requirement and have been grey scaled for easy reference.

Please forward your comments directly to us as well to Linda Jonker of the Department of Environmental Affairs (DEA) at:

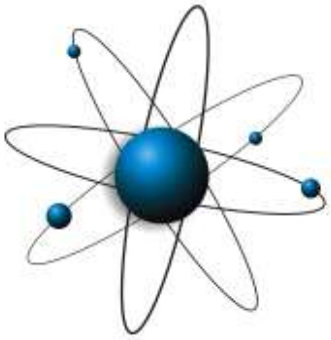
- Department of Environmental Affairs
  4th Floor, South Tower, Fedsure Forum Building
  315 Pretorius Street,
  C/o Pretorius and van der Walt Streets
  Pretoria, 0001

Please also provide us as well the DEA with your comment before 9thNovember 2012.

If there is any further information that you require, please do not hesitate to contact me.

YOURS FAITHFULLY,

ROELOF LETTER
ENVIRONMENTAL ASSESSMENT PRACTITIONER
FOR: ESCIENCE ASSOCIATES (PTY) LTD



ESCIENCE ASSOCIATES (PTY) LTD

POSTAL ADDRESS
PO Box 2950
Saxonwold
2132

PHYSICAL ADDRESS
9 Victoria Street
Oaklands
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TELEPHONE
+27 11 7186380

FACSIMILE
+27 865 994 687

WEBSITE
www.escience.co.za

EMAIL
roelof@escience.co.za

Khai Ma Local Municipality

New Street
Pofadder
8890

Tel: (054) 933 1000
Fax: (054) 933 0252

19 OCTOBER 2012

ATTENTION: MR THABO MOLETE

RE: Submission of Final Amended Scoping Report for Your Review and Comment - Proposed Photo-voltaic Solar Power Generation Plant on the Farm Konkoonsies close to Pofadder in the Northern Cape (NEAS REF: DEA/ EIA/ 0000529/ 2011 & DEA REF: 12/ 12/ 20/ 2443)

Dear Thabo

Please find attached to this letter one (1) CD which contain electronic copies of the above mentioned report and relative shape files. Amendments to the report were made as per the DEA requirement and have been grey scaled for easy reference.

Please forward your comments directly to us as well to Linda Jonker of the Department of Environmental Affairs (DEA) at:

- Department of Environmental Affairs
  4th Floor, South Tower, Fedsure Forum Building
  315 Pretorius Street,
  C/o Pretorius and van der Walt Streets
  Pretoria, 0001

Please also provide us as well the DEA with your comment before 9thNovember 2012.

If there is any further information that you require, please do not hesitate to contact me.

YOURS FAITHFULLY,

ROELOF LETTER
ENVIRONMENTAL ASSESSMENT PRACTITIONER
FOR: ESCIENCE ASSOCIATES (PTY) LTD

ESCIENCE ASSOCIATES (PTY) LTD

POSTAL ADDRESS
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WEBSITE
www.escience.co.za

EMAIL
roelof@escience.co.za

DWA

Department of Water Affairs (DWA)

Director: Water Sector Regulation and Use
Northern Cape Department of Water Affairs
Private Bag X6101
Kimberley
8300

Tel: (053) 830 8802
Fax: (053) 831 4534
Cell: 082 883 6741

19 OCTOBER 2012

ATTENTION: MR. A ABRAHAMS/ S.C. CLOETE

RE: Submission of Final Amended Scoping Report for Your Review and Comment - Proposed Photo-voltaic Solar Power Generation Plant on the Farm Konkoonsies close to Pofadder in the Northern Cape (NEAS REF: DEA/ EIA/ 0000529/ 2011 & DEA REF: 12/ 12/ 20/ 2443)

Dear Mr. Abrahams/ S.C.Cloete

Please find attached to this letter one (1) CD which contain electronic copies of the above mentioned report and relative shape files. Amendments to the report were made as per the DEA requirement and have been grey scaled for easy reference.

Please forward your comments directly to us as well to Linda Jonker of the Department of Environmental Affairs (DEA) at:

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  4th Floor, South Tower, Fedsure Forum Building
  315 Pretorius Street,
  C/o Pretorius and van der Walt Streets
  Pretoria, 0001

Please also provide us as well the DEA with your comment before 9thNovember 2012.

If there is any further information that you require, please do not hesitate to contact me.

YOURS FAITHFULLY,

ROELOF LETTER
FOR: ESCIENCE ASSOCIATES (PTY) LTD

ESCIENCE ASSOCIATES (PTY) LTD

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PHYSICAL ADDRESS
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Oaklands
2192

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WEBSITE
www.escience.co.za

EMAIL
roelof@escience.co.za

DAFF

Department Agriculture, Forestry and Fisheries (DAFF)

Chief Forester
Louise Vale Weg
Upington
880

Tel: 054 338 5909
Fax: 054 334 0030

19 OCTOBER 2012

ATTENTION: Mrs. Jacoline Mans

RE: Submission of Final Amended Scoping Report for Your Review and Comment - Proposed Photo-voltaic Solar Power Generation Plant on the Farm Konkoonsies close to Pofadder in the Northern Cape (NEAS REF: DEA/ EIA/ 0000529/ 2011 & DEA REF: 12/ 12/ 20/ 2443).

Dear Mrs. Jacoline Mans

Please find attached to this letter one (1) CD which contain electronic copies of the above mentioned report and relative shape files. Amendments to the report were made as per the DEA requirement and have been grey scaled for easy reference.

Please forward your comments directly to us as well to Linda Jonker of the Department of Environmental Affairs (DEA) at:

- Department of Environmental Affairs
  4th Floor, South Tower, Fedsure Forum Building
  315 Pretorius Street,
  C/o Pretorius and van der Walt Streets
  Pretoria, 0001

Please also provide us as well the DEA with your comment before 9thNovember 2012.

If there is any further information that you require, please do not hesitate to contact me.

YOURS FAITHFULLY,

ROELOF LETTER

ASSOCIATES (PTY) LTD

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PO Box 2950
Saxonwold
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FACSIMILE
+27 865 994 687

WEBSITE
www.escience.co.za

EMAIL
roelof@escience.co.za

confidential
Kilpatrick Archer
Actis
Mar 21, 2019 11:02

PROOF OF SENDING AND DELIVERY OF CD ELECTRONIC COPIES OF THE FINAL AMENDED SCOPING REPORT TO RELEVANT GOVERNMENTAL DEPARTMENTS FOR COMMENT.

REF BIDS

PostNet Norwood

PostNet Name:

011 728 6494 Acc#11865

Tel. No.: CIT Acc. No.:

PN6120011

CONSIGNEE COPY

(DEA)

From: (Sender) (Company Name) ESCIENCE

Street Address

Suburb

City/Town Code

Contact Tel

E-mail

To: (Receiver) (Company Name) DEPT OF ENVIROMENTAL AFFAIRS

Street Address 4TH FLOOR, SOUTH TOWER,

Suburb FEDSURE BUILDING 315 PRETORIUS

City/Town STREET C/O PRETORIUS & VAN DER- Code

Contact WALT STREET Tel PRETORIA 0001

E-mail LINDA JONKER

012 310 3328/3805

Insurance Yes No If yes, state value

Domestic

- [X] OVERNIGHT COURIER 11H00
- [ ] ECONOMY (48 HRS-72HRS)
- [ ] DAWN COURIER 09H00
- [ ] SATURDAY
- [ ] NEXT DAY (24 - 48 HRS)
- [ ] SAMEDAY COURIER
- [ ] OTHER SPECIFY
- [ ] PUBLIC HOLIDAY/ AFTER HOURS

SPECIAL INSTRUCTIONS

International [ ] DOCUMENTS [ ] NON-DOCUMENTS

No. of Parcels	Description	Length in cm	Breadth in cm	Height in cm	Mass in kg
	BOX				
1		31	22	12	

Total No. of Parcels Total Vol Total Mass 5 kg

WE HAVE SEEN AND AGREE TO THE STANDARD CONDITIONS OF CARRIAGE (OVERLEAF) WHICH SHALL APPLY TO THIS CONSIGNMENT AND ALL FUTURE CONSIGNMENTS ACCEPTED BY POSTNET. WE FURTHER DECLARE THAT THIS CONSIGNMENT DOES NOT CONTAIN DANGEROUS GOODS

EXPRESS PACK SECURITY NUMBER ON LIP OF FLYER

SENDER

Name: Date:

Signature: Time:

PROOF OF DELIVERY

Name: Date:

Signature: Time:

ID No.:

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PostNet Name:

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Tel. No.: CIT Acc. No.:

PN6120013

CONSIGNEE COPY

From: (Sender) (Company Name)

Street Address ESCIENCE

Suburb

City/Town Code

Contact Tel

E-mail

To: (Receiver) (Company Name) KHAI MA LOCAL MUNICIPALITY

Street Address NEW STREET

Suburb

City/Town POFADDER Code

Contact MR THABO MOLETE Tel

E-mail 054 933 1000

Insurance Yes No If yes, state value

Domestic

- [ ] OVERNIGHT COURIER 11H00
- [ ] ECONOMY (48 HRS-72HRS)
- [ ] DAWN COURIER 09H00
- [ ] SATURDAY
- [ ] NEXT DAY (24 - 48 HRS)
- [ ] SAMEDAY COURIER
- [ ] OTHER SPECIFY
- [ ] PUBLIC HOLIDAY/ AFTER HOURS

SPECIAL INSTRUCTIONS

International [ ] DOCUMENTS [ ] NON-DOCUMENTS

No. of Parcels	Description	Length in cm	Breadth in cm	Height in cm	Mass in kg
	DOX	40	30	1	800g

Total No. of Parcels Total Vol Total Mass

WE HAVE SEEN AND AGREE TO THE STANDARD CONDITIONS OF CARRIAGE (OVERLEAF) WHICH SHALL APPLY TO THIS CONSIGNMENT AND ALL FUTURE CONSIGNMENTS ACCEPTED BY POSTNET. WE FURTHER DECLARE THAT THIS CONSIGNMENT DOES NOT CONTAIN DANGEROUS GOODS

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SENDER

Name: Date:

Signature: Time:

PROOF OF DELIVERY

Name: Date:

Signature: Time:

ID No.:

POSTNET Courier

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Maxwell
Name

Signature

19/10/2012
Date Time

PostNet Name: PostNet Norwood

Tel. No.: 011 728 6494 CIT Acc. No.: Acc#11865

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PN6120015

From: (Sender) (Company Name)

Street Address ESCIENCE

Suburb

City/Town Code

Contact Tel

E-mail

To: (Receiver) (Company Name) DEPT AGRICULTURE, FORESTRY AND

Street Address FISHERIES (DAFF)

Suburb LOUISE VALE WEG

City/Town UPINGTON Code 8800

Contact MRS JACOLINE MANS Tel

E-mail 054 338 5909

Insurance Yes No If yes, state value

Domestic
- [X] OVERNIGHT COURIER 11H00
- [ ] ECONOMY (48 HRS-72HRS)
- [ ] DAWN COURIER 09H00
- [ ] SATURDAY
- [ ] NEXT DAY (24 - 48 HRS)
- [ ] SAMEDAY COURIER
- [ ] OTHER SPECIFY
- [ ] PUBLIC HOLIDAY/ AFTER HOURS

SPECIAL INSTRUCTIONS

International [ ] DOCUMENTS [ ] NON-DOCUMENTS

No. of Parcels	Description	Length in cm	Breadth in cm	Height in cm	Mass in kg
1	DOX				
		40	30	1	8kg

Total No. of Parcels | Total Vol | Total Mass

WE HAVE SEEN AND AGREE TO THE STANDARD CONDITIONS OF CARRIAGE (OVERLEAF) WHICH SHALL APPLY TO THIS CONSIGNMENT AND ALL FUTURE CONSIGNMENTS ACCEPTED BY POSTNET. WE FURTHER DECLARE THAT THIS CONSIGNMENT DOES NOT CONTAIN DANGEROUS GOODS

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SENDER

Name: Date:

Signature: Time:

PROOF OF DELIVERY

Name: Date:

Signature: Time:

ID No.:

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19/10/2012 Date Time

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Tel. No.: 011 728 6494 CIT Acc. No.: Acc#11865

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From: (Sender) (Company Name)

Street Address ESCIENCE

Suburb

City/Town Code

Contact Tel

E-mail

To: (Receiver) (Company Name) DEPT OF ENVIRONMENT AND

Street Address NATURE CONSERVATION

Suburb 90 LONG STREET

City/Town KIMBERLEY Code

Contact MR TSHLO MAKHUNDI Tel

E-mail 053 807 7462

Insurance Yes No If yes, state value

Domestic
- [X] OVERNIGHT COURIER 11H00
- [ ] ECONOMY (48 HRS-72HRS)
- [ ] DAWN COURIER 09H00
- [ ] SATURDAY
- [ ] NEXT DAY (24 - 48 HRS)
- [ ] SAMEDAY COURIER
- [ ] OTHER SPECIFY
- [ ] PUBLIC HOLIDAY/ AFTER HOURS

SPECIAL INSTRUCTIONS

International [X] DOCUMENTS [ ] NON-DOCUMENTS

No. of Parcels	Description	Length in cm	Breadth in cm	Height in cm	Mass in kg
1	DOX				
		40	30	10	
					300g

Total No. of Parcels | Total Vol | Total Mass

WE HAVE SEEN AND AGREE TO THE STANDARD CONDITIONS OF CARRIAGE (OVERLEAF) WHICH SHALL APPLY TO THIS CONSIGNMENT AND ALL FUTURE CONSIGNMENTS ACCEPTED BY POSTNET. WE FURTHER DECLARE THAT THIS CONSIGNMENT DOES NOT CONTAIN DANGEROUS GOODS

EXPRESS PACK SECURITY NUMBER ON LIP OF FLYER

SENDER

Name: Date:

Signature: Time:

PROOF OF DELIVERY

Name: Date:

Signature: Time:

ID No.:

POSTNET Courier

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Maxwell Name

Signature

19/10/2012 Date Time

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PostNet Name: PostNet Norwood

Tel. No.: 011 728 6494 CIT Acc. No.: Acc#11865

PN6120016

From: (Sender) (Company Name)	To: (Receiver) (Company Name) NAMAKWA DISTRICT MUNICIPALITY
Street Address ESCIENCE	Street Address VAN RIEBEECK STRAAT
Suburb	Suburb
City/Town Code	City/Town SPRINGBOK Code 8240
Contact Tel	Contact MR IMMANUEL SMITH Tel 027 712 8000
E-mail	E-mail

Insurance Yes / No — If yes, state value

Domestic: ☐ OVERNIGHT COURIER 11H00 ☐ ECONOMY (48 HRS-72HRS) ☐ DAWN COURIER 09H00 ☐ SATURDAY ☐ NEXT DAY (24 - 48 HRS) ☐ SAMEDAY COURIER ☐ OTHER SPECIFY ☐ PUBLIC HOLIDAY/ AFTER HOURS

International: ☐ DOCUMENTS ☐ NON-DOCUMENTS

SPECIAL INSTRUCTIONS

No. of Parcels	Description	Length in cm	Breadth in cm	Height in cm	Mass in kg
1	DOX	60	30	1	8kg

Total No. of Parcels | Total Vol | Total Mass

WE HAVE SEEN AND AGREE TO THE STANDARD CONDITIONS OF CARRIAGE (OVERLEAF) WHICH SHALL APPLY TO THIS CONSIGNMENT AND ALL FUTURE CONSIGNMENTS ACCEPTED BY POSTNET. WE FURTHER DECLARE THAT THIS CONSIGNMENT DOES NOT CONTAIN DANGEROUS GOODS

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Signature: Time:

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Signature: Time:

ID No.:

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Name

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Senders Name / Ref No.	Receivers Name MR A ABRAHAMS / S.C. CLOETE
E-mail Address ESCIENCE / Tel No.	Company Name NAMAQUA DEPT OF WATER AFFAIRS
Company Name	Address PRIVATE BAG X6101
Address	
Town Code	Town KIMBERLEY Tel No. 053 830 8802
	Country Code 8300

Special Instr

Remind receiver to co llect to COUNTER or BOX/BAG
TA 747 034 227 ZA
CUSTOMER COPY 702568

Domestic: ☐ Express (11h00) ☐ Budget/Next Day (Close of Business) ☐ Road (48-72hours) — To ☐ Door ☐ Counter Other

International: ☐ Documents ☐ Non-documents

Insurance — If yes, state value

No. of Parcels	Description	Length in cm	Breadth in cm	Height in cm	Mass in kg
1	DOX	60	30	1	8kg

Total No. of Parcels | Total Vol | Total Mass

Charges	Rands	Cents
Basic Tariff		
Surcharge		
Insurance		
Packaging Sundries		
VAT Amount		
Total Incl. VAT		

SENDERS SIGNATURE	ACCEPTED BY POSTNET	RECEIVED BY
Name: (PLEASE PRINT)	Name: (PLEASE PRINT)	Name: (PLEASE PRINT)
Date: Time:	Date: Time:	Date: Time:
Sign:	Sign:	Sign:

WE HAVE SEEN AND AGREE TO THE STANDARD CONDITIONS OF CARRIAGE (OVERLEAF) WHICH SHALL APPLY TO THIS CONSIGNMENT AND ALL FUTURE CONSIGNMENTS ACCEPTED BY POSTNET. WE FURTHER DECLARE THAT THIS CONSIGNMENT DOES NOT CONTAIN DANGEROUS GOODS

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(011) 864-0067 Ref: 43527/bss

APPENDIX 5.7 - COMMENTS AND RESPONSES REPORT

Comments from IAPs to date	
Comment	Response
Jacoline Mans (NC DAFF): 1. DAFF is mainly concerned about the potential impact on protected tress species. See the National forest Act, Act 84 of 1998 (NFA) as amended section 12(1)(d) read with s15(1) and s62(2). The list of protected tree species was published in GN 734 of 16 September 2011. Please ensure that the anticipated impact (if any) on protected trees are properly assessed during the EIA phase. 2. The final scoping report pointed out that a biodiversity assessment will be conducted during the EIA phase. Please send a copy of this report to the DAFF as soon as it becomes available for comment. .	Noted. The necessary assessment has been conducted and the Biodiversity Assessment provided to DAFF. The only protected tree species observed within or in close proximity to the site was *Aloe dichotoma,* a number of individuals of which were observed at the site, largely within the rocky areas. A removal/translocation permit for affected individuals will be made to the DAFF before construction commences.
Comments received on amended scoping report	
Jacoline Mans (NC DAFF): 1. The DAFF is mainly concerned about the potential impact on protected tree species. See the National Forests Act, Act 84 of 1998 (NFA) as amended. Section 12(1)(d) read with s15(1) and s62(2)(c). The list of protected tree species was published in GN 734 of 16 September 2011. Page 51 of the amended Scoping Report confirmed the presence of Boscia albitrunca within the study area, yet no indication was given of how many protected Trees will be affected. Therefore is it not clear from the report what will be the extent of the impact on protected trees.2 2. Page 28 of the amended Scoping Report (SR) refers to the Northern Cape Nature Conservation Act as Act No. 1374 of 2009. Please note it should read Act No.9 of 2009. 3. Page 28 stated that in terms of the Northern Cape Nature Conservation Act (NCNA), a permit is required from the Department of Agriculture. Forestry and Fisheries (DAFF). Please note that the DAFF has no mandate in terms of the NCNA. Permits issued in terms of the NCNA must be obtained from the provincial Department of Environment and Nature Conservation (DENC). The DAFF issue licenses for the removal or disturbance of protected trees in terms of the National Forests Act, Act 84 of 1998 only. 4. Page 34 point 5.9.1 refers to the National Veld and Forest Fires Act. Act 101 of 1998 (NVFFA). It stated that a company must burn firebreaks in terms of section 21 of the NVFFA. Please note that s21 of the NVFFA	1. Amended in the Scoping report 2. Amended in the Scoping report 3. Amended in the Scoping report 4. Amended in the Scoping report 5. Noted 6. Amended in the Scoping report 7. The screening assessment was done to identify if there was a need for a detailed assessment. Through this process followed the need for a detailed biodiversity assessment was identified and was conducted as part of this EIA phase (See Appendix 7.1). (Pease note this was undertaken by a different consultant that who undertook the desktop screening assessment). 8. The draft Environmental impact report (EIR), detailed faunal and flora specialist report as well associated draft Environmental management program report (EMPr) will be distributed to DAFF for comment and review. 9. As per previous responses, the screening desktop assessment attached to the report was undertaken to inform the scoping process and a detailed biodiversity report was compiled (See Appendix 7.1) during the EIA phase of the project. 10. The detailed assessment was conducted within the optimal period as indicated between August and November. 11. Amended in the Scoping report

refers to the procedure for making Regulations and has nothing to do with firebreaks. The relevant section is section 12.

5. Page 39 refers to the key commenting authorities. Please take note of the new telephone number at the Forestry Office in Upington: (054) 338 5909.

6. Page 42 refers to earlier comments made by the DAFF. Please check the spelling errors and the error with the date on which the protected tree list was published. It was published in 2011.

7. Page 50 refers to vegetation in the study area and stated that "a detailed species account within the study area was not assessed, however this will be made obligatory to the proponent before construction commences following approval of regional DAFF". The Department of Forestry is concerned about this statement. What if numerous plant species of special concern are present on site? The Environmental Impact Assessment (EIA) must assess the potential impact on the environment before a project is authorized and if there are sensitive features it should be mapped and avoided as far as possible. This includes the potential impact on plants of special concern. To say that a detailed plant species account will be assessed before construction commences but after authorization was obtained is not acceptable, unless if it is merely for the purpose of obtaining a permit or license for the destruction of protected plant species. The applicant cannot be exempted from doing a vegetation survey during the EIA phase. It is necessary to assess the potential impact on the vegetation. According to the amended Scoping Report, endangered and protected plant species could occur in the study site.

8. Page 67 stated that a biodiversity study will be conducted during the EIA phase. Kindly provide this office with the biodiversity assessment and the draft Environmental Management Plan (EMP) as soon as it is available.

Vegetation Assessment

9. Page 25 of the vegetation assessment dated July 2012 summarized results and stated that a detailed assessment of local vegetation communities was beyond the scope of the report and that satellite imagery was used to highlight ecosystem diversity in the area. As pointed out above, the DAFF is concerned about this.

10. Page 34 stated that is highly likely that threatened flora could occur within the study site and that the optimal period to survey for these species appears to be August to December. Since we are now in this optimal period for such a survey, the DAFF suggests that the survey be conducted as soon as possible.

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Kilpatrick Archer
Actis
Mar 21, 2019 11:02

11. Page 49 stated that protected trees (National Forests Act, Act 84 of 1998) were observed in the study site and that a "permit would have to be obtained from the Department of Water Affairs .. ." Please note that Forest Act Licenses are obtainable from the Department of Agriculture, Forestry and Fisheries.	
Comments were received from SAHRA on the 03 September 2012 please refer to the public participation report Appendix 5	
Comments received from John Geering (Snr Env Advisor) from Eskom on the 5 September 2012: The proposed development is in close proximity to the existing Eskom Transmission 275kV power line connecting Paulputs substation to the National Grid. Eskom is planning to construct a new high voltage power line from Aggeneys substation to Paulputs substation. It is my understanding that there is an existing environmental authorisation for the power line that was granted by DEA. Please contact Mr Kentridge Makhanya, whom I have copied in this mail, with regards to the proposed Aggeneys-Paulputs HV power line. Please also find attached general requirements for works at or near Eskom assets (Please refer to Appendix 5 for these requirements).	Mr Kentridge Makhanya have been contacted regarding the proposed Aggeneys-Paulputs HV power line and it was determined that the proposed development would not conflict with this infrastructure.

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Kilpatrick Archer
Actis
Mar 21, 2019 11:02

1.1.1 COMMENTS FROM SAHRA

Enquiries: Kathryn Smuts
Tel: 021 462 4502
Email: ksmuts@sahra.org.za
CaseID: 292

Final Comment

In terms of section 38(8) of the National Heritage Resources Act (Act 25 of 1999)

Attention: Mr Roelof Letter
EScience Associates (Pty) Ltd
PO Box 2950
Saxonwold
2132

Proposed Development of a Photo-voltaic Solar Power Generation Plant on the Farm Konkoonsies near Pofadder in the Northern Cape

Rubidge, B. April 2011. *KONKOONSIES 91, POFADDER - PALAEONTOLOGICAL IMPACT ASSESSMENT*
Pelser, A. April 2012. *A REPORT ON A HERITAGE IMPACT ASSESSMENT (HIA) FOR THE PROPOSED PHOTO-VOLTAIC SOLAR POWER GENERATION PLANT ON KONKOONSIES 91, POFADDER DISTRICT, NORTHERN CAPE*

Aurora Power Solutions and Bio Therm Energy are proposing the establishment of a further solar energy plant on Farm Konkoonsies 91. An earlier development on this site was addressed in an AIA (Mr Pelser 2011) and a heritage report (Mr de Jongh 2011). That AIA identified many archaeological sites near the hills and outcrops, which led to the development footprint being moved to safeguard them. SAHRA provided a review comment on these reports on 23 March 2011. Subsequent to that, SAHRA received a Palaeontological report (Prof. Rubidge 2011) and provided a letter of exemption (15.05.2012) from further palaeontological studies.

The archaeologist surveyed the newly proposed development area on foot and identified five sites. The surface visibility was indicated as good due to the flat, sandy terrain with only patches of grass and shrubs. Site 1 consisted of a scatter of ostrich eggshell consistent with the remains of a water flask. Site 2 consisted of a scatter of quartz, some flaked and one point. Similar scatters occurred throughout the area. Site 3 contained further scattered ostrich eggshell fragments, possibly indicating another broken water carrier. Site 4 was an ephemeral, low, packed stone wall that was possibly a windbreak; no stone tools were found in association with the feature. Site 5 consisted of a third discrete scatter of ostrich eggshell. Site 4 and 5 are unlikely to be impacted by construction as they are located on ridges which will not be developed.

As indicated in the Letter of Exemption (15 May 2012), the proposed development area is underlain by granite and gneiss, which are unfossiliferous.

Decision:

SAHRA supports the recommendations of the authors and requests that:

- The areas identified around hills and outcrops where stone tool scatters occur should be preserved. For this reason a buffer zone of 30m is required around outcrops and identified archaeological sites. If this is not deemed possible, a Phase 2 mitigation might be required: SAHRA will require that, in terms

Enquiries: Kathryn Smuts
Tel: 021 462 4502
Email: ksmuts@sahra.org.za
CaseID: 292

of s.38(4)(b&c) of the National Heritage Resources Act, the provisions of s 35 apply as appropriate. The specialist will require a mitigation permit from the relevant Heritage Resources Authority. On receipt of a satisfactory mitigation (Phase 2) permit report from the archaeologist, the heritage authority will make further recommendations in terms of the site. Very often permission is given for the destruction of the remainder of the archaeological or palaeontological sites. Very rarely, if a site has high heritage significance the authority may request that it be conserved, that mini-site management plans, interpretive material and possibly protective infrastructure be established

- This mitigation, if it is required, should include collection of the ostrich eggshell scatters in order that potential rim-sherds can be identified and refitting can be attempted.

If the recommendations made in the specialist report and in this comment are adhered to, the SAHRA Archaeology, Palaeontology and Meteorites Unit has no objection to the development (in terms of the archaeological and palaeontological components of the heritage resources).

If any new evidence of archaeological sites or artefacts, graves or other heritage resources are found during development, construction or mining, SAHRA (Katie Smuts/Colette Scheermeyer, Tel: 021 462 4502) and a professional archaeologist must be alerted immediately.

Decisions on Built Environment (e.g. structures over 60 years) and Cultural Landscapes and associated Living Heritage (e.g. sacred sites) must be made by the Provincial Heritage Resources Authority of the Northern Cape (Mr. Andrew Timothy, email: ratha.timothy@gmail.com) to whom this Archaeological Review Comment will be copied.

Should you have any further queries, please contact the designated official using the case number quoted above in the case header.

Yours faithfully

_____

Kathryn Smuts
Heritage Officer: Archaeology
South African Heritage Resources Agency

confidential
Kilpatrick Archer
Actis
Mar 21, 2019 11:02

Enquiries: Kathryn Smuts
Tel: 021 462 4502
Email: ksmuts@sahra.org.za
CaseID: 292

Date: Monday September 03, 2012

_____

Colette Scheermeyer
SAHRA Head Archaeologist
South African Heritage Resources Agency

ADMIN:
(DEA, Ref: 12/12/20/2443)

Terms & Conditions:

1. This approval does not exonerate the applicant from obtaining local authority approval or any other necessary approval for proposed work.
2. If any heritage resources, including graves or human remains, are encountered they must be reported to SAHRA immediately.
3. SAHRA reserves the right to request additional information as required.

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Kilpatrick Archer
Actis
Mar 21, 2019 11:02

1.1.3 COMMENTS FROM DAFF

agriculture,
forestry & fisheries

Department:
Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA

Directorate: Forestry Management (Other Regions)
P.O. Box 2782, Upington, 8800, Tel 054 338 5909, Fax 054 334 0030

Enquiries: J Mans
E-mail: **JacolineMa@daff.gov.za**
Date: 10 September 2012
Ref: **F13/11/2/156/1**

Mr. Roelof Letter
EScience Associates (Pty) Ltd
P.O. Box 2950
SAXONWOLD
2132

ATTENTION: Mr. Roelof Letter (roelof@escience.co.za)

RE: COMMENTS ON AMENDED SCOPING REPORT FOR THE PROPOSED PHOTOVOLTAIC SOLAR POWER PLANT ON THE FARM 'KONKOONSIES', POFADDER, NORTHERN CAPE PROVINCE (DEA REF: 12/12/20/2443)

The Directorate: Forestry Management (Other Regions) in the National Department of Agriculture, **Forestry** and Fisheries (DAFF) would hereby like to make the following comments on the above-mentioned proposed development:

1. The DAFF is mainly concerned about the potential impact on protected tree species. See the National Forests Act, Act 84 of 1998 (NFA) as amended, section 12(1)(d) read with s15(1) and s62(2)(c). The list of protected tree species was published in GN 734 of 16 September 2011. Page 51 of the amended Scoping Report confirmed the presence of *Boscia albitrunca* within the study area, yet no indication was given of how many protected trees will be affected. Therefore is it not clear from the report what will be the extent of the impact on protected trees.

Amended Scoping Report:

2. Page 28 of the amended Scoping Report (SR) refers to the Northern Cape Nature Conservation Act as Act No. 1374 of 2009. Please note it should read Act No. 9 of 2009.

3. Page 28 stated that in terms of the Northern Cape Nature Conservation Act (NCNA), a permit is required from the Department of Agriculture, Forestry and Fisheries (DAFF). Please note that the DAFF has no mandate in terms of the NCNA. Permits issued in terms of the NCNA must be obtained from the provincial Department of Environment and Nature Conservation (DENC). The DAFF issue licenses for the removal or disturbance of protected trees in terms of the National Forests Act, Act 84 of 1998 only.

4. Page 34 point 5.9.1 refers to the National Veld and Forest Fires Act, Act 101 of 1998 (NVFFA). It stated that a company must burn firebreaks in terms of section 21 of the NVFFA. Please note that s21 of the NVFFA refers to the procedure for making Regulations and has nothing to do with firebreaks. The relevant section is section 12.

5. Page 39 refers to the key commenting authorities. Please take note of the new telephone number at the Forestry Office in Upington: (054) 338 5909.

6. Page 42 refers to earlier comments made by the DAFF. Please check the spelling errors and the error with the date on which the protected tree list was published. It was published in 2011.

7. Page 50 refers to vegetation in the study area and stated that "a detailed species account within the study area was not assessed, however this will be made obligatory to the proponent before construction commences following approval of regional DAFF". The Department of Forestry is concerned about this statement. What if numerous plant species of special concern are present on site? The Environmental Impact Assessment (EIA) must assess the potential impact on the environment before a project is authorized and if there are sensitive features it should be mapped and avoided as far as possible. This includes the potential impact on plants of special concern. To say that a detailed plant species account will be assessed before construction commences but after authorization was obtained is not acceptable, unless if it is merely for the purpose of obtaining a permit or license for the destruction of protected plant species. The applicant cannot be exempted from doing a vegetation survey during the EIA phase. It is necessary to assess the potential impact on the vegetation. According to the amended Scoping Report, endangered and protected plant species **could** occur in the study site.

8. Page 67 stated that a biodiversity study will be conducted during the EIA phase. Kindly provide this office with the biodiversity assessment and the draft Environmental Management Plan (EMP) as soon as it is available.

Vegetation assessment

9. Page 25 of the vegetation assessment dated July 2012 summarized results and stated that a detailed assessment of local vegetation communities was beyond the scope of the report and that satellite imagery was used to highlight ecosystem diversity in the area. As pointed out above, the DAFF is concerned about this.

10. Page 34 stated that is highly likely that threatened flora could occur within the study site and that the optimal period to survey for these species appears to be August to December. Since we are now in this optimal period for such a survey, the DAFF suggests that the survey be conducted as soon as possible.

11. Page 49 stated that protected trees (National Forests Act, Act 84 of 1998) were observed in the study site and that a "permit would have to be obtained from the Department of Water Affairs..." Please note that Forest Act Licenses are obtainable from the Department of Agriculture, Forestry and Fisheries.

Yours truly,

J.Mans

Jacoline Mans
Chief Forester: NFA Regulation

DEPT. VAN LANDBOU, BOSBOU & VISSERYE
NORTHERN CAPE REGION
2012 -09- 10
PO BOX 2782, UPINGTON, 8800
TEL: 054 338 5860, FAX: 054 334 0030
DEPT. OF AGRICULTURE, FORESTRY & FISHERIES

agriculture,
forestry & fisheries

Department:
Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA

Directorate: Forestry Management (Other Regions)
P.O. Box 2782, Upington, 8800, Tel 054 338 5839, Fax 054 334 0030

Enquiries: J Mans
E-mail: **JacolineMa@daff.gov.za**
Date: 11 July 2012
Ref: **F13/11/2/156**

Mr. Nylko Nkosi
Department of Environmental Affairs
Private Bag X447
PRETORIA
0001

cc EScience Associates (Pty) Ltd
P.O. Box 2950
SAXONWOLD
2132

ATTENTION: Mr. N. Nkosi (nnkosi@environment.gov.za)
Roelof Letter (roelof@escience.co.za)

RE: COMMENTS ON FINAL SCOPING REPORT FOR THE PROPOSED PHOTOVOLTAIC SOLAR POWER PLANT ON THE FARM 'KONKOONSIES', POFADDER, NORTHERN CAPE PROVINCE (DEA REF: 12/12/20/2443)

The Directorate: Forestry Management (Other Regions) in the National Department of Agriculture, **Forestry** and Fisheries (DAFF) would hereby like to make the following comments on the above-mentioned proposed development:

1. The DAFF is mainly concerned about the potential impact on protected tree species. See the National Forests Act, Act 84 of 1998 (NFA) as amended, section 12(1)(d) read with s15(1) and s62(2)(c). The list of protected tree species was published in GN 734 of 16 September 2011. Please ensure that the anticipated impact (if any) on protected trees are properly assessed during the EIA phase.

2. The final scoping report pointed out that a biodiversity assessment will be conducted during the EIA phase. Please send a copy of this report to the DAFF as soon as it becomes available for comments.

Yours truly,

J Mans

Jacoline Mans
Chief Forester: NFA Regulation

DEPT. VAN LANDBOU, BOSBOU & VISSERYE
NORTHERN CAPE REGION
2012 -07- 11
PO BOX 2782, UPINGTON, 8800
TEL: 054 338 5860, FAX: 054 334 0030
DEPT. OF AGRICULTURE, FORESTRY & FISHERIES

1.1.5 COMMENTS FROM ESKOM

Eskom requirements for work in or near Eskom servitudes.

1. Eskom's rights and services must be acknowledged and respected at all times.

2. Eskom shall at all times retain unobstructed access to and egress from its servitudes.

3. Eskom's consent does not relieve the developer from obtaining the necessary statutory, land owner or municipal approvals.

4. Any cost incurred by Eskom as a result of non-compliance to any relevant environmental legislation will be charged to the developer.

5. If Eskom has to incur any expenditure in order to comply with statutory clearances or other regulations as a result of the developer's activities or because of the presence of his equipment or installation within the servitude restriction area, the developer shall pay such costs to Eskom on demand.

6. The use of explosives of any type within 500 metres of Eskom's services shall only occur with Eskom's previous written permission. If such permission is granted the developer must give at least fourteen working days prior notice of the commencement of blasting. This allows time for arrangements to be made for supervision and/or precautionary instructions to be issued in terms of the blasting process. It is advisable to make application separately in this regard.

7. Changes in ground level may not infringe statutory ground to conductor clearances or statutory visibility clearances. After any changes in ground level, the surface shall be rehabilitated and stabilised so as to prevent erosion. The measures taken shall be to Eskom's satisfaction.

8. Eskom shall not be liable for the death of or injury to any person or for the loss of or damage to any property whether as a result of the encroachment or of the use of the servitude area by the developer, his/her agent, contractors, employees, successors in title, and assignees. The developer indemnifies Eskom against loss, claims or damages including claims pertaining to consequential damages by third parties and whether as a result of damage to or interruption of or interference with Eskom's services or apparatus or otherwise. Eskom will not be held responsible for damage to the developer's equipment.

9. No mechanical equipment, including mechanical excavators or high lifting machinery, shall be used in the vicinity of Eskom's apparatus and/or services, without prior written permission having been granted by Eskom. If such permission is granted the developer must give at least seven working days' notice prior to the commencement of work. This allows time for arrangements to be made for supervision and/or precautionary instructions to be issued by the relevant Eskom Manager

   Note: Where and electrical outage is required, at least fourteen work days are required to arrange it.

10. Eskom's rights and duties in the servitude shall be accepted as having prior right at all times and shall not be obstructed or interfered with.

11. Under no circumstances shall rubble, earth or other material be dumped within the servitude restriction area. The developer shall maintain the area concerned to Eskom's satisfaction. The developer shall be liable to Eskom for the cost of any remedial action which has to be carried out by Eskom.

12. The clearances between Eskom's live electrical equipment and the proposed construction work shall be observed as stipulated by *Regulation 15* of the *Electrical Machinery Regulations of the Occupational Health and Safety Act, 1993 (Act 85 of 1993).*

13. Equipment shall be regarded electrically live and therefore dangerous at all times.

14. In spite of the restrictions stipulated by Regulation 15 of the Electrical Machinery Regulations of the Occupational Health and Safety Act, 1993 (Act 85 of 1993), as an additional safety precaution, Eskom will not approve the erection of houses, or structures occupied or frequented by human beings, under the power lines or within the servitude restriction area.

15. Eskom may stipulate any additional requirements to highlight any possible exposure to Customers or Public to coming into contact or be exposed to any dangers of Eskom plant.

16. It is required of the developer to familiarise himself with all safety hazards related to Electrical plant.

17. Any third party servitudes encroaching on Eskom servitudes shall be registered against Eskom's title deed at the developer's own cost. If such a servitude is brought into being, its existence should be endorsed on the Eskom servitude deed concerned, while the third party's servitude deed must also include the rights of the affected Eskom servitude.

John Geeringh (Pr Sci Nat)

Senior Environmental Advisor
Eskom GC: Land Development

confidential
Kilpatrick Archer
Actis
Mar 21, 2019 11:02

Roelof Letter

From: John Geeringh <GeerinJH@eskom.co.za>
Sent: 23 October 2012 11:45 AM
To: Roelof Letter
Subject: RE: Proposed Solar PV facility: Konkoonsies

You are correct, work required at the substation will only require an internal EMP from Eskom. No listed activities will be triggered for the substation works. The substation is currently a 220kV substation and will stay that way for the foreseeable future.

John

From: Roelof Letter [mailto:Roelof@escience.co.za]
Sent: 12 October 2012 01:25 PM
To: John Geeringh
Cc: Marc Wright; Tonderai Munthumbira; tkoom@biothermenergy.com
Subject: RE: Proposed Solar PV facility: Konkoonsies

Hi John

As per our discussion earlier, please would you confirm that the expansion required to the Paulputs substation; as to accommodate the proposed PV Solar facility would not likely trigger any listed activity in terms of GNR. 544, 545 or 546? As discussed we have made provision in the EIA in terms of the transmission line infrastructure required for the facility to the substation.

Kind Regards

Roelof Letter
Environmental Manager

Escience Associates (Pty) Ltd
E-mail: roelof@escience.co.za
Web: www.escience.co.za
PO Box 2950, Saxonwold, 2132
9 Victoria Street, Oaklands, Johannesburg, 2192
Tel: +27 (0)11 718 6380
Cell: 0835626455
Fax: 0865 994 687
VAT No: 473 025 4416
Reg No: 2009/014472/07

From: John Geeringh [mailto:GeerinJH@eskom.co.za]
Sent: 05 September 2012 01:38 PM
To: Roelof Letter
Cc: Kentridge Makhanya
Subject: Proposed Solar PV facility: Konkoonsies

The proposed development is in close proximity to the existing Eskom Transmission 275kV power line connecting Paulputs substation to the National Grid. Eskom is planning to construct a new high voltage power line from Aggeneys substation to Paulputs substation. It is my understanding that there is an existing environmental authorisation for the power line that was granted by DEA. Please contact Mr Kentridge Makhanya, whom I have copied in this mail, with regards to the proposed Aggeneys-Paulputs HV power line. Please also find attached general requirements for works at or near Eskom assets.

Regards

John Geeringh (Pr Sci Nat)
Snr Env Advisor
GC Land Development
Megawatt Park D1 Y38
P O Box 1091
Johannesburg
2000

Tel: 011 516 7233
Fax: 086 661 4064
Cell: 083 632 7663

I'm part of the 49Million initiative.

http://www.49Million.co.za

I'm part of the 49Million initiative.
http://www.49Million.co.za

NB: This Email and its contents are subject to the Eskom Holdings Limited EMAIL LEGAL NOTICE which can be viewed at http://www.eskom.co.za/e-mail_legalnotice

confidential
Kilpatrick Archer
Actis
Mar 21, 2019 11:02

Roelof Letter

From: John Geeringh <GeerinJH@eskom.co.za>
Sent: 05 September 2012 01:38 PM
To: Roelof Letter
Cc: Kentridge Makhanya
Subject: Proposed Solar PV facility: Konkoonsies
Attachments: Eskom requirements for work in or near Eskom servitudes SOLAR.doc

Follow Up Flag: Follow up
Flag Status: Completed

The proposed development is in close proximity to the existing Eskom Transmission 275kV power line connecting Paulputs substation to the National Grid. Eskom is planning to construct a new high voltage power line from Aggeneys substation to Paulputs substation. It is my understanding that there is an existing environmental authorisation for the power line that was granted by DEA. Please contact Mr Kentridge Makhanya, whom I have copied in this mail, with regards to the proposed Aggeneys-Paulputs HV power line. Please also find attached general requirements for works at or near Eskom assets.

Regards

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1.2 APPENDIX 4.8 – MINUTES OF ANY PUBLIC AND/OR STAKEHOLDER MEETINGS

N/A – No Meeting was held to date, as the interest from I&APs was low.

1.3 APPENDIX 4.9 – OTHER

The following Background Information Document sent to I&AP's with regards to the development.

SCOPING AND ENVIRONMENTAL IMPACT ASSESSMENT (EIA) PROCESSES

PROPOSED DEVELOPMENT OF PHOTO-VOLTAIC SOLAR POWER PLANTS AT TWO LOCATIONS IN THE NORTHERN CAPE

BACKGROUND INFORMATION DOCUMENT (BID)

March 2012

ESCIENCE ASSOCIATES (PTY) LTD

POSTAL ADDRESS:
PO Box 2950
Saxonwold
2132

PHYSICAL ADDRESS:
9 Victoria Street
Oaklands
Johannesburg
2192

TEL:
+27 (0)11 728 2683

CELL:
+27 (0)82 564 9445

FAX:
086 512 2366

E-MAIL:
info@escience.co.za

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Mar 21, 2019 11:02

PURPOSE OF THIS DOCUMENT

The purpose of this Background Information Document (BID) is to provide introductory information to potentially Interested and Affected Parties (I&APs) on the Environmental Impact Assessment (EIA) process required, in terms of National Environmental Management Act (No 107 of 1998) and the associated EIA regulations of 18 June 2010.

The BID is the first communication regarding the EIA process for the proposed projects, and serves as an invitation to register as an I&AP and participate as a stakeholder throughout the EIA process. This would include the opportunity to attend briefing meetings, review all reports generated, and/or submit comments during the process. The BID presents the first opportunity to provide comment, and your participation will assist in identifying any environmental and socio-economic issues related to the proposed project that should be evaluated in the EIA.

To ensure that you are identified as an I&AP for the proposed EIA process, please submit your name, contact information and interest in the project to the contact person given below on or before Friday 17 April 2012. Should you have any queries with respect to the above processes, please contact the person below:

Mr Roelof Letter at EScience Associates (Pty) Ltd.
Tel: (011) 718 6380 / 083 562 6455
Fax: 086 599 4687
E-mail: **roelof@escience.co.za**
Post: PO Box 2950, Saxonwold, 2132

INTRODUCTION AND PROJECT DESCRIPTION

Biotherm Energy (Pty) Ltd is proposing to develop two photo-voltaic solar power plants of various sizes (greater than 20 hectares and greater than 20 Mega-Watts (MW)) on the farm KleinZwart Bast near Kenhardt and on the Farm Konkoonsies near Pofadder in Northern Cape Province.

Photovoltaic's (PVs) are materials that convert solar radiation directly into electricity. Photo-voltaic solar cells are divided into two distinct groups: Traditional crystalline silicon solar cells and thin film solar cells. The crystalline silicon solar cells are made from monocrystalline silicon or polycrystalline silicon. The thin film technologies comprise of thinner layers of semiconductor material which are produced using a splutter process. Due to the growing demand for renewable energy sources, the manufacture of solar cells and photo-voltaic modules has advanced dramatically in recent years.

Solar Photovoltaic's is growing rapidly, albeit from a small base, to a total global capacity of 67 GW at the end of 2011, representing 0.5% of worldwide electricity demand. More than 100 countries use solar PV. Installations may be ground-mounted (and sometimes integrated with farming and grazing) or built into the roof or walls of a building (building-integrated photovoltaic's) (Wikipedia, 2012). Roughly 90% of this generating capacity consists of grid-tied electrical systems. Such installations may be ground-mounted (and sometimes integrated with

farming and grazing) or built into the roof or walls of a building, known as Building Integrated Photovoltaic's. The proposed solar PV power plants will have varying sizes and capacities.

Photovoltaic solar power plants comprise of solar modules connected together to form solar arrays for the production of electricity. Direct current electricity is produced from the solar array which in turn is connected to inverters for conversion to alternating current. Power from the inverters is then stepped up via transformers to voltages suitable for injection into the national grid for distribution to consumers.

Solar power plants can either have fixed tilt systems or tracking systems as shown in the diagrams below. Modules in a fixed tilt system are mounted at an optimised angle facing the sun. With tracking systems, the surface of the arrays is moved to follow the sun resulting in large radiation gains. Systems can be set to track the sun's daily path and/or its annual path.

Photo below shows a typical example of a fixed tilt PV array. (This is an example only)

Figure 1: Fixed tilt PV array

Photo below shows a typical example of a tracking PV array. (This is an example only)

Figure 2: Tracking PV array

As there are 2 sites that will be investigated, the following environmental processes will be followed for each of the 2 sites:

Site 1: KleinZwart Bast– The site will be subject to a full Scoping and EIA process.

Site 2: Konkoonsies– The site will be subject to a full Scoping and EIA process.

PROJECT REFERENCE NUMBERS FROM NATIONAL DEPARTMENT OF ENVIRONMENTAL AFFAIRS (DEA)

Project site	NEAS reference number	DEA reference number
KleinZwart Bast full Scoping and EIA	DEA/EIA/0000525/2011	12/12/20/2430
Konkoonsies full Scoping and EIA	DEA/EIA/0000529/2011	12/12/20/2443

LOCALITIES OF THE 2 PROPOSED SITES

Site 1: Kleinzwart Bast (S 29˚0.29'40" and E 20˚0.47'20").

The site for the proposed facility lies within the Namakwa District Municipality and the Khai ma Municipality approximately 36Km's South west of Kenhardt in the Northern Cape. The portion of the Farm KleinZwart Bast that is earmarked for the solar development is indicated in figure 3 below.

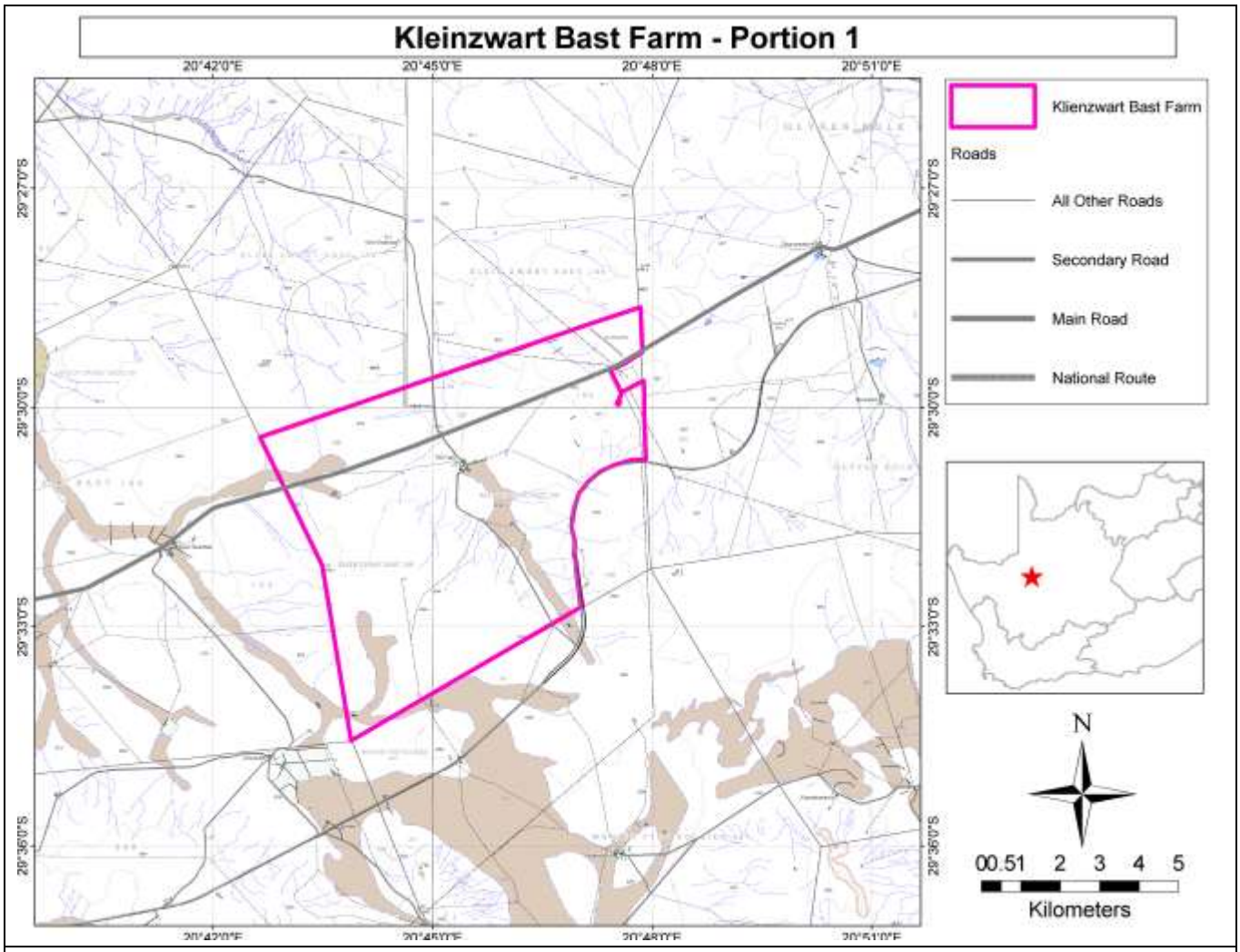

Figure 3: Topographical Locality Map of the study area for the farm KleinZwart Bast

Site 2: Konkoonsies: Approx 32 km's north- east of Pofadder, (S 280 52'55" and E 190 33'53")

The Farm Konkoonsies is located in the Namakwa District Municipality and Khai ma Municipality Local Municipality. It is 32kms north of the town of Pofadder. The portion of the Farm Konkoonsies that is earmarked for the solar development is indicated in figure 4 below.

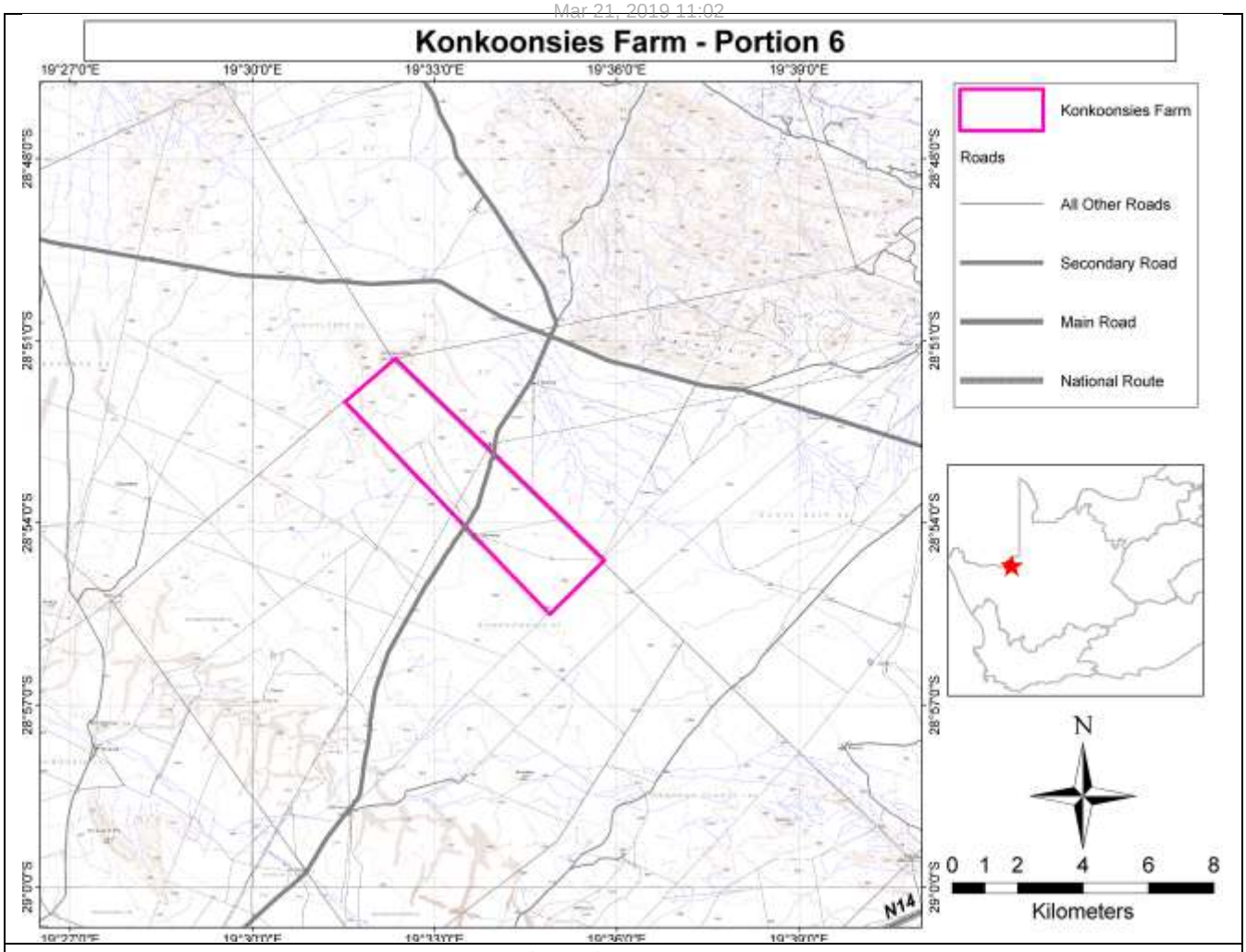

Figure 4: Topographical Locality Map of the farm Konkoonsies

LEGAL & REGULATORY FRAMEWORK

The National Environmental Management Act (NEMA), (Act 108 of 1998), is South Africa's overarching environmental legislation, and contains a comprehensive legal framework to give effect to the environmental rights contained in section 24 of The Constitution. The proposed project would trigger so called "listed activities", which may not commence prior to obtaining an Environmental Authorisation in terms of Section 24 of NEMA, A full inventory of the "listed activities" can be requested from the environmental assessment practitioner (EAP). Due to the nature and/or scale of some of these activities, NEMA require that the potential environmental impacts must be considered, investigated, assessed and reported on to the competent authorities through either a Basic Assessment process or through a detailed Scoping and Environmental Impact Assessment (EIA) process, described in the NEMA 2010 EIA Amendment Regulations (R543) of 18 June 2010.

The establishment of this solar power generation facilities on the two farms will be subjected to a Scoping and EIA processes. There are various activities that will be "triggered" by the proposed development. The activities are listed in terms of Government Notice R545 of 18 June 2010.

These listing are as follows:

For the full scoping and EIA process the following are considered:

Activity 1:
The construction of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more**.**

Activity 8:
The construction of facilities or infrastructure for the transmission and distribution of electricity with a capacity of 275 kilovolts or more, outside an urban area or industrial complex.

Activity 15:
Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more; except where such physical alteration takes place for:

(i) linear development activities; or
(ii) agriculture or afforestation where activity 16 in this Schedule will apply.

WHAT IS AN ENVIRONMENTAL IMPACT ASSESSMENT?

The main aim of an Environmental Impact Assessment (EIA) process is to assess the significance of potential environmental impacts of proposed projects in order to assign appropriate management measures to reduce the significance of those identified impacts, and to provide this information to the relevant Government Authorities who are responsible for making decisions on the environmental approvals that the project would require either before it may commence, or where substantial variations are proposed for already authorised activities.

An EIA is a methodical and systematic process to identify potential positive and negative impacts on the biophysical, socio-economic and cultural environment that may result from a proposed activity. The EIA aims to ensure effective compliance and governance concerning the sustainable use of environmental resources, while simultaneously focusing on key issues such as stakeholder empowerment, and providing access to relevant and concise information to enable informed decision-making. The EIA process is also used to examine alternatives and management measures to minimise negative and optimise positive impacts. The ultimate objectives of the EIA process are to prevent significant detrimental impact on the environment and to ensure sustainable development.

The EIA has to consider the different perspectives and requirements of all role players, who derive different benefits from participating in the EIA process. These can include amongst others Government authorities, developers, land owners and other interested and affected parties.

Biotherm Energy (Pty) Ltd is proposing to investigate the feasibility of establishing two photo-voltaic facilities on farm Konkoonsies and KleinZwart Bast, therefore according to GN R545 (Listing Notice 2); S&EIA process is required for the photo-voltaic solar facilities.

PUBLIC PARTICIPATION PROCESS

The public participation process during any Scoping and EIA process may consist of the following main activities:

NOTIFICATION of I&APs regarding the EIA process, consultation activities and availability of reports and decisions by the authorities, using a variety of mechanisms.

FOCUS GROUP MEETINGS with relevant sectoral groups (groups of role players with similar interest, such as the tourism and agricultural sector, local government, etc.) if required.

PUBLIC MEETINGS that will be advertised. These will provide I&APs with information and opportunities to record concerns, issues and suggestions, as well as to identify other I&APs.

COMMENT PERIODS (14 - 30 calendar days) will be communicated for both the draft Scoping and Environmental Impact assessment Reports, in order to provide registered I&APs with the opportunity to review and comment on the information compiled through the EIA process.

Everyone has the right to be involved in decisions that may affect them. Participation by I&APs is in everyone's best interest because:

It provides opportunities for I&APs and the authorities to obtain clear, accurate and understandable information about the expected environmental and socio-economic impacts of the proposed development.

It provides members of the public with the opportunity to voice their concerns and to raise questions regarding the project.

It provides I&APs with the opportunity to suggest ways for reducing or mitigating any negative impacts of the project, and for enhancing its benefits.

It will enable the project proponent to consider the needs, preferences and values of I&APs in their decisions.

It provides opportunities for the clearing up of misunderstandings about technical issues, resolving disputes and reconciling conflicting interests.

It is vital for ensuring transparency and accountability in decision-making.

It contributes toward maintaining a healthy, vibrant democracy.

You are important to the process and we urge you to participate by registering as an Interested or Affected Party (Registration Form attached). The sharing of information forms the basis of any stakeholder engagement process and offers I&APs the opportunity to become actively involved in the project from the outset. It also plays an important role in the understanding of environmental investigations, as input from I&APs helps to ensure that all potential issues are considered in the EIA.

IAP REGISTRATION FORM (Photo-voltaic solar power plants – Farms Konkoonsies and KleinZwart Bast Northern Cape)

Please complete and return to EScience Associates on or before **Friday 17 April 2012** by means of the following (or alternatively phone Roelof Letter at (011) 718 6380 / 083 562 6455): E-mail: roelof@escience.co.za or Fax: 086 599 4687; Post: PO Box 2950, Saxonwold, 2132

PERSONAL DETAILS:

Title:_____ Initials:_____ Surname:_____

Company / Organisation (if applicable):_____

Position/Nature of involvement (e.g. property owner): _____

Specific project interest (i.e. Konkoonsies, Klein Zwart Bast):_____

Street address:_____

Postal address:_____

Tel (incl. area code):_____ Cell:_____

Fax number:_____ E-mail:_____

I want to receive correspondence/updates regarding the project: *YES / NO*

Preferred method of communication: *Post / Phone / Fax / E-mail*

COMMENTS/QUESTIONS:

1. Do you have any specific interest in the proposed project?

2. What issues, comments and concerns would you like to raise with regard to the proposed EIA and public participation process?

3. What potential impacts do you foresee associated with the proposed project?

4. Are there any other role-players/stakeholders that you feel we should consult with? (Please state name & contact details)?

APPENDIX 6: SITE PHOTO REPORT

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Site photos (clockwise from North)

From Northern central boundary of site looking North West

From Northern central boundary of site looking NWW

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From Northern central boundary of site looking West

From Northern centre boundary of site looking SWW

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From Northern centre boundary of site looking SW

From centre of site looking South

Additional site and surrounds photos

APPENDIX 7: SPECIALIST ASSESSMENTS

APPENDIX 7: SPECIALIST ASSESSMENTS

APPENDIX 7.1: SIMON TODD BIODIVERSITY IMPACT ASSESSMENT REPORT

PROPOSED PHOTOVOLTAIC SOLAR ENERGY FACILITY ON KONKOONSIES, NORTHERN CAPE:

FAUNA & FLORA SPECIALIST REPORT FOR IMPACT ASSESSMENT

PRODUCED FOR ESCIENCE ASSOCIATES

ON BEHALF OF

BIOTHERM ENERGY

BY

SIMON TODD CONSULTING

Simon.Todd@3foxes.co.za

OCTOBER 2012

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Kilpatrick Archer
Actis
Mar 21, 2019 11:02

CONTENTS

DECLARATION OF CONSULTANTS' INDEPENDENCE

The author of this report, Simon Todd, does hereby declare that he is an independent consultant appointed by the Client and has no business, financial, personal or other interest in the activity, application or appeal in respect of which he was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of the specialist performing such work. All opinions expressed in this report are his own.

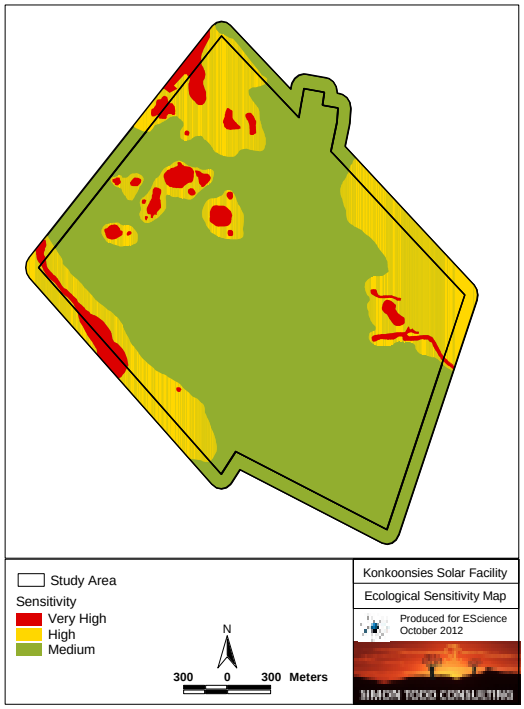
Simon Todd Pr.Sci.Nat 400425/11.

September 2012

EXECUTIVE SUMMARY

This report details the faunal and botanical impacts likely to be associated with the development of the proposed Konkoonsies II PV Facility, approximately 40 km northeast of Pofadder in the Northern Cape.

A site visit and desktop study were conducted to assess the presence and distribution of ecologically sensitive, species and habitats. The results were integrated to produce a sensitivity map for the site which is depicted below. The dominant sensitive feature at the site are a number of rocky outcrops which should be avoided on account of their flora and fauna sensitivity. The sandy plains which characterise the majority of the site are however not considered highly sensitive and would be suitable for the development.



Overall, four major risk factors were identified as being associated with the development and were assessed, as follows:

- Impacts on vegetation and protected plant species
- Increased erosion risk
- Faunal impacts relating to increased levels of noise, pollution, disturbance and human presence at the site.
- Disruption of broad-scale ecological processes

Summary assessment of the pre- and post-mitigation impacts associated with the construction and operation phases of the project

Impact	**Pre Mitigation**	**Post Mitigation**
Impacts on vegetation and protected plant species	Medium (50)	Low (28)
Increased erosion risk	Medium (40)	Low (21)
Faunal impact and disturbance	Medium (48)	Low (24)
Disruption of broad scale processes	Medium (36)	Low (24)

Some loss of vegetation and fauna habitat will occur regardless of where the facility is located or what mitigation measures are implemented. However, the receiving vegetation type is one of the most extensive vegetation types in the country and the extent of habitat loss resulting from the development is not significant when considered in that context or the landscape at the site. The development of the facility will result in the presence of a significant amount of hardened surfaces such as access roads as well as the panels themselves. These are likely to generate significant amounts of runoff during rainfall events, which will pose a significant erosion risk. Disturbance at the site should be minimized and specific measures to combat erosion should form part of the design and construction aspects of the facility.

Overall, there is sufficient moderate sensitivity space at the site that it should not be necessary to impinge on the higher sensitivity rocky outcrops. Provided that these areas are avoided and standard mitigation measures are implemented to reduce the impact on protected plant species and reduce the risk of erosion, then it is not likely that the development of the site would result in significant loss of biodiversity or degradation of the receiving environment.

1 INTRODUCTION

Biotherm Energy (Pty) Ltd proposes to develop a solar energy facility on the farm Konkoonies, adjacent to the ESKOM Paulputs substation, approximately 30 km northeast of Pofadder in the Northern Cape. The facility will be referred to as Konkoonsies II PV Solar Energy Facility and is proposed to be developed in phases starting with an already approved 10 MW facility and increase the capacity (second phase) to develop an additional 267 hectares in spatial extent with a generation capacity of approximetalty 133 MW covering the entire feasible area. This however is based on the IPP allocation and could result in being broken down into a 75 MW facility during phase 2 and the remaining identified feasible area during a future phase 3 expansion. The Paulputs substation will need to be extended to accommodate the new connection bays for the PV facility. In terms of the EIA regulations, an environmental authorization is required before the development can proceed. EScience Associates (Pty) Ltd has been appointed to undertake the EIA process for the above facility and have appointed Simon Todd Consulting to conduct a fauna and flora Impact Assessment Specialist Report for the development.

The detailed terms of reference for the project are detailed below

1.1 SCOPE OF STUDY

The scope of the study includes the following activities

- A description of the environment that may be affected by the activity and the manner in which the environment may be affected by the proposed project
- A description and evaluation of environmental issues and potential impacts (incl. using direct, indirect and cumulative impacts) that have been identified
- A statement regarding the potential significance of the identified issues based on the evaluation of the issues/impacts
- An indication of the methodology used in determining the significance of potential environmental impacts
- An assessment of the significance of direct indirect and cumulative impacts in terms of the following criteria :
    - The nature of the impact, which shall include a description of what causes the effect, what will be affected and how it will be affected
    - The extent of the impact, indicating whether the impact will be local (limited to the immediate area or site of development), regional, national or international
    - The duration of the impact, indicating whether the lifetime of the impact will be of a short-term duration (0-5 years), medium-term (5- 15 years), long-term (> 15 years, where the impact will cease after the operational life of the activity) or permanent
    - The probability of the impact, describing the likelihood of the impact actually occurring, indicated as improbable (low likelihood) probable (distinct possibility), highly probable (most likely), or definite (Impact will occur regardless of any preventable measures)
    - The severity/beneficial scale indicating whether the impact will be very

severe/beneficial (a permanent change which cannot be mitigated/permanent and significant benefit with no real alternative to achieving this benefit) severe/beneficial (long-term impact that could be mitigated/long-term benefit) moderately severe/beneficial (medium- to long-term impact that could be mitigated/ medium- to long-term benefit), slight or have no effect

- The significance which shall be determined through a synthesis of the characteristics described above and can be assessed as low medium or high
- The status which will be described as either positive, negative or neutral
- The degree to which the impact can be reversed
- The degree to which the impact may cause irreplaceable loss of resources
- The degree to which the impact can be mitigated

- A description and comparative assessment of all alternatives
- Recommendations regarding practical mitigation measures for potentially significant impacts, for inclusion in the Environmental Management Programme (EMPr)
- An indication of the extent to which the issue could be addressed by the adoption of mitigation measures
- A description of any assumptions uncertainties and gaps in knowledge
- An environmental impact statement which contains :
  - A summary of the key findings of the environmental impact assessment;
  - An assessment of the positive and negative implications of the proposed activity;
  - A comparative assessment of the positive and negative implications of identified alternatives

General Considerations:

- Disclose any gaps in information or assumptions made.
- Recommendations for mitigatory measures to minimise impacts identified.
- An outline of additional management guidelines.
- Provide monitoring requirements, mitigation measures and recommendations in a table format as input into the Environmental Management Plan (EMP) for faunal related issues.

A description of the potential impacts of the development and recommended mitigation measures are to be provided which will be separated into the following project phases:

- Pre-construction
- Construction
- Operational phase

1.2 DATA SOURCING AND REVIEW

Apart from the data collected on-site, other data sources consulted and used where necessary in the study includes the following:

Vegetation:

- Vegetation types and their conservation status were extracted from the South African National Vegetation Map (Mucina and Rutherford 2006).
- Information on plant and animal species recorded for the Quarter Degree Squares (QDS) 2819 CD, DC and 2919 AB, BA was extracted from the SABIF/SIBIS database hosted by SANBI. This area has however not been well sampled, suggesting the list is not likely to be comprehensive.
- The IUCN conservation status (Table 1) of the species in the list was also extracted from the database and is based on the Threatened Species Programme, Red List of South African Plants (2011).
- Threatened Ecosystem data was extracted from the National List of Threatened Ecosystems 2010.
- Freshwater and wetland information was extracted from the National Freshwater Ecosystem Priority Areas assessment, NFEPA (Nel et al. 2011).
- Important catchments and protected areas expansion areas were extracted from the National Protected Areas Expansion Strategy 2008 (NPAES).

Fauna

- Lists of mammals, reptiles and amphibians which are likely to occur at the site were derived based on distribution records from the literature and various spatial databases (SANBI's SIBIS and BGIS databases).
- Literature consulted includes Branch (1988) and Alexander and Marais (2007) for reptiles, Du Preez and Carruthers (2009) for amphibians, Friedmann and Daly (2004) and Skinner and Chimimba (2005) for mammals.
- Reptiles were extracted from the SARCA web portal, hosted by the ADU, http://vmus.adu.org.za
- The faunal species lists provided are based on species which are known to occur in the broad geographical area, as well as a preliminary assessment of the availability and quality of suitable habitat at the site. For each species, the likelihood that it occurs at the site was rated according to the following scale:
    - **Low:** The available habitat does not appear to be suitable for the species and it is unlikely that the species occurs at the site.
    - **Medium:** The habitat is broadly suitable or marginal and the species may occur at the site.
    - **High:** There is an abundance of suitable habitat at the site and it is highly probable that the species occurs there.
    - **Definite:** Species that were directly or indirectly (scat, characteristic diggings, burrows etc.) observed at the site.

- The conservation status of each species is also listed, based on the IUCN Red List Categories and Criteria version 3.1 (2012) (See Table 1) and where species have not been assessed under these criteria, the CITES status is reported where possible. These lists are adequate for mammals and

amphibians, the majority of which have been assessed, however the majority of reptiles have not been assessed and therefore, it is not adequate to assess the potential impact of the development on reptiles, based on those with a listed conservation status alone. In order to address this shortcoming, the distribution of reptiles was also taken into account such that any narrow endemics or species with highly specialized habitat requirements occurring at the site were noted.

Table 1. The IUCN Red List Categories for fauna and flora. Species which fall within the categories in red and orange below, are of conservation concern.

IUCN Red List Category
Critically Endangered (CR)
Endangered (EN)
Vulnerable (VU)
Near Threatened (NT)
Critically Rare
Rare
Declining
Data Deficient - Insufficient Information (DDD)
Data Deficient - Taxonomically Problematic (DDT)
Least Concern

2 REGULATORY AND LEGISLATIVE OVERVIEW

A summary of the relevant portions of the Acts which govern the activities and potential impacts to the environment associated with the development are listed below. Provided that standard mitigation and impact avoidance measures are implemented, not all the activities listed in the Acts below would actually be triggered.

National Environmental Management Act (NEMA) (Act No 107, 1998):

NEMA requires that measures are taken that "prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development." In addition:

- That the disturbance of ecosystems and loss of biological diversity are avoided, or where they cannot be altogether avoided, are minimised and remedied:
- That a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and
- Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuKonkoonsies, wetlands, and similar systems require specific attention in management and

planning procedures, especially where they are subject to significant human resource usage and development pressure.

Environment Conservation Act (ECA) (No 73 of 1989 Amendment Notice No. R1183 of 1997)

This Act provides for the effective protection and controlled utilisation of the environment. This Act has been largely repealed by NEMA, but certain provisions remain, in particular provisions relating to environmental impact assessments. The ECA requires that developers must undertake Environmental Impact Assessments (EIA) for all projects listed as a Schedule 1 activity in the EIA regulations.

National Environmental Management: Biodiversity Act (NEMBA) (Act 10 of 2004):

The National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA) provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. The Draft National List of Threatened Ecosystems (Notice 1477 of 2009, Government Gazette No 32689, 6 November 2009) has been gazetted for public comment. The list of threatened terrestrial ecosystems supersedes the information regarding terrestrial ecosystem status in the NSBA 2004. In terms of the EIA regulations, a basic assessment report is required for the transformation or removal of indigenous vegetation in a critically endangered or endangered ecosystem regardless of the extent of transformation that will occur. However, all of the vegetation types within and surrounding the study site are classified as Least Threatened.

NEM:BA also deals with endangered, threatened and otherwise controlled species, under the TOPS Regulations (Threatened or Protected Species Regulations). The Act provides for listing of species as threatened or protected, under one of the following categories:

- **Critically Endangered:** any indigenous species facing an extremely high risk of extinction in the wild in the immediate future.
- **Endangered:** any indigenous species facing a high risk of extinction in the wild in the near future, although it is not a critically endangered species.
- **Vulnerable:** any indigenous species facing an extremely high risk of extinction in the wild in the medium-term future; although it is not a critically endangered species or an endangered species.
- **Protected species:** any species which is of such high conservation value or national importance that it requires national protection. Species listed in this category include, among others, species listed in terms of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

A TOPS permit is required for any activities involving any TOPS-listed species.

Certain activities, known as Restricted Activities, are regulated by a set of permit regulations published under the Act. These activities may not proceed without environmental authorization. Those relevant to the current study are listed below.

Under the **Environmental Impact Assessment Regulations Listing Notice 2 of 2010** (No. R.387) the following activities are likely to be triggered:

Activity 1: The construction of facilities or infrastructure, including associated structures or infrastructure, for -

(a) the generation of electricity where –

(i) the electricity output is 20 megawatts or more; or

(ii) the elements of the facility cover a combined area in excess of 1 hectare;

And, under **Environmental Impact Assessment Regulations Listing Notice 3** of 2010 (*R.546):*

Activity 14. The clearing of an area of 5 hectares or more of vegetation where 75% or more of the vegetation cover constitutes indigenous vegetation.

It is important to note that the above thresholds and activities also apply to phased developments "*where any phase of the activity may be below a threshold but where a combination of the phases, including expansions or extensions, will exceed a specified threshold."*

National Forests Act (No. 84 of 1998):

The National Forests Act provides for the protection of forests as well as specific tree species, quoting directly from the Act: "*no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a licence or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated".*

The only protected tree species observed within or in close proximity to the site was *Aloe dichotoma*, a number of individuals of which where observed at the site, largely within the rocky areas.

Conservation of Agricultural Resources Act (Act 43 of 1983):

The Conservation of Agricultural Resources Act provides for the regulation of control over the utilisation of the natural agricultural resources in order to promote the conservation of soil, water and vegetation and provides for combating weeds and invader plant species. The Conservation of Agricultural Resources Act defines different categories of alien plants and those listed under Category 1 are prohibited and must be controlled while those listed under Category 2 must be grown within a demarcated area under permit. Category 3 plants includes ornamental plants that may no longer be planted but existing plants may remain provided that all reasonable steps are taken to prevent the spreading thereof, except within the floodline of water courses and wetlands.

The abundance of alien plant species at the site was very low, which can be ascribed firstly to the aridity of the site as well as the low rainfall in the period preceding the site visit. The only alien specis observed

within the site were *Prosopis glandulosa* and *Salsola kali*, both of which are category 1b invaders and should be cleared from the site,

National Veld and Forest Fire Act (Act No. 101 of 1998)

The purpose of this Act is to prevent and combat veld, forest and mountain fires. The Act provides for a variety of institutions, methods and practices for achieving the purpose such as the formation of fire protection associations. It also places responsibility on landowners to develop and maintain firebreaks as well as be sufficiently prepared to combat veld fires in terms of equipment as well as suitably trained personnel.

The site is however arid and given the sparse vegetation cover, it is highly unlikely that fires are a normal occurrence in the area. Fires at the site are not currently considered to be a significant risk. However, if site is not grazed occasionally, there is a danger that sufficient biomass to carry a fire would build up. Given the risk that this would pose to the development, plant biomass at the site should be managd in a biodiversity-compatible manner such as through the use of livestock grazing.

Northern Cape Nature Conservation Act, No. 9 of 2009:

The Northern Cape Nature Conservation Act provides inter alia for the sustainable utilisation of wild animals, aquatic biota and plants as well as permitting and trade regulations regarding wild fauna and flora within the province. In terms of this act the following section may be relevant with regards to any security fencing the development may require.

Manipulation of boundary fences

19. No Person may –

(a) erect, alter remove or partly remove or cause to be erected, altered removed or partly removed, any fence, whether on a common boundary or on such person's own property, in such a manner that any wild animal which as a result thereof gains access or may gain access to the property or a camp on the property, cannot escape or is likely not to be able to escape therefrom;

The Act also lists protected fauna and flora under 3 schedules ranging from Endangered (Schedule 1), protected (schedule 2) to common (schedule 3). The majority of mammals, reptiles and amphibians are listed under Schedule 2, except for listed species which are under Schedule 1. A permit is required for any activities which involve species listed under schedule 1 or 2. Of relevance for the current development is the fact that several plant families and genera are listed in their entirety as protected, this includes, inter alia *Mesembryanthemaceae*, *Amaryllidaceae*, *Apocyanceae*, *Asphodeliaceae*, *Crassulaceae*, *Iridaceae* and *Euphorbia*. Although there are few species of conservation concern within these families and genera at the site, the species present within the development footprint will need to be listed with the permit application. A permit obtainable from the DENC permit office in Kimberly would be required for the site clearing. A permit would also be required to destroy or translocated any

nationally or provincially listed species from the site. A single permit, which covers all of these permitting requirements as well as meets TOPS regulations, is used.

3 METHODOLOGY

3.1 SITE VISIT

The site visit took place on the 22nd of August 2012. During the site visit, the different biodiversity features, habitat, vegetation and landscape units present at the site were identified and mapped in the field. Walk-through-surveys were conducted across the site and all plant and animal species observed were recorded. Searches for listed and protected plant species at the site were conducted and the location of all listed plant species observed was recorded using a GPS. The site was well covered during the site visit and it is not likely that there any significant features present that were not observed and investigated during the site visit. Active searches for reptiles and amphibians were also conducted within habitats likely to harbor or be important for such species. The presence of sensitive habitats such as wetlands or pans and unique edaphic environments such as rocky outcrops or quartz patches were noted in the field if present and recorded on a GPS and mapped onto satellite imagery of the site.

3.2 SENSITIVITY MAPPING & ASSESSMENT

An ecological sensitivity map of the site was produced by integrating the information collected on-site with the available ecological and biodiversity information available in the literature and various spatial databases. This includes delineating the different vegetation and habitat units identified in the field and assigning sensitivity values to the units based on their ecological properties, conservation value and the potential presence of species of conservation concern. The ecological sensitivity of the different units identified in the mapping procedure was rated according to the following scale:

- **Low** – Units with a low sensitivity where there is likely to be a negligible impact on ecological processes and terrestrial biodiversity. This category is reserved specifically for areas where the natural vegetation has already been transformed, usually for intensive agricultural purposes such as cropping. Most types of development can proceed within these areas with little ecological impact. There were however no Low Sensitivity areas within the study area.
- **Medium**- Areas of natural or previously transformed land where the impacts are likely to be largely local and the risk of secondary impact such as erosion low. Development within these areas can proceed with relatively little ecological impact provided that appropriate mitigation measures are taken.
- **High** – Areas of natural or transformed land where a high impact is anticipated due to the high biodiversity value, sensitivity or important ecological role of the area. Development within these areas is undesirable and should only proceed with caution as it may not be possible to mitigate all impacts appropriately.

- **Very High** – Critical and unique habitats that serve as habitat for rare/endangered species or perform critical ecological roles. These areas are essentially no-go areas from a developmental perspective and should be avoided at all costs.

3.3 SAMPLING LIMITATIONS AND ASSUMPTIONS

The major potential limitation associated with the sampling approach is the narrow temporal window of sampling. Ideally, a site should be visited several times during different seasons to ensure that the full complement of plant and animal species present are captured. The full extent of the current site was observed only during the current site visit. However, part of the central extent of the site was previously investigated in March 2012, when it was relatively wet and many of the annuals and forbs absent during the second site visit were present at the time. The lists of amphibians, reptiles and mammals for the site are based on those observed at the site as well as those likely to occur in the area based on their distribution and habitat preferences. This represents a sufficiently conservative and cautious approach which takes the study limitations into account.

3.4 RELEVANT ASPECTS OF THE DEVELOPMENT

Figure 1. Google satellite view of the proposed Konkoonsies Solar Energy Facility site, illustrating the study areas as well as the ESKOM powerlines which run to and from the Konkoonsies Substation.

A single site is being considered and alternative sites are not being assessed or compared to one another. The current development proposal is approximately 133 MW plant which would occupy approximately 267 ha of the site. The site is approximately 531 ha in extent and occurs on both sides of the gravel access road which runs through the site. The area consists of low hills and plains, with a number of rocky outcrops in the northwest of the site. Although there are no major drainage lines within the site, there are a numbner of smaller washes present. Due to the very arid nature of the area, there is no intensive agriculture present and site consists entirely of natural vegetation used for extensive livestock grazing.

Important aspects of the construction and infrastructure of the development which are potentially relevant to assessing the likely impacts of the activities associated with the development include the following:

- Solar PV Arrays will be installed in rows at the site. They will be mounted on steel structures which will be piled or cemented into the ground depending on soil conditions
- Underground cabling will run the length of the arrays and will link the arrays to inverters.
- A grid connection substation will be constructed which will house the power transformers which will increase the voltage before it connects to the ESKOM grid via an overhead line to the Paulputs substation.
- The Paulputs substation will have to be extended to accommodate bays for the new connection.
- Service roads will run between the rows of arrays and will be used for maintenance activities such as cleaning the arrays.

Additional permanent infrastructure and temporary construction activities which will occur at the site will include:

- Auxiliary electrical equipment
- A small site office and storage facility, including security and ablution facilities
- Temporary construction camp
- A lay-down area for the temporary storage of materials during the construction activities.

4 DESCRIPTION OF THE AFFECTED ENVIRONMENT- BASELINE

4.1 BROAD-SCALE VEGETATION PATTERNS

National Vegetation Types

The site lies entirely within the Bushmanland Arid Grassland vegetation type. This vegetation unit is the second most extensive vegetation type in South Africa and occupies an area of 45478 km^2 and extends from around Aggeneys in the east to Prieska in the west. It is associated largely with red-yellow apedal (without structure), freely drained soils, with a high base status and mostly less than 300mm deep. Due

the arid nature of the unit which receives between 70 and 200 mm annual rainfall, it has not been significantly impacted by intensive agriculture and more than 99% of the original extent of the vegetation type is still intact and its' conservation status is classified as Least Threatened. Mucina & Rutherford (2006) list 6 endemic species for the vegetation type which is relatively few given the extensive nature of the vegetation type. More than 99% of the original extent of the vegetation type is still intact and its' conservation status is classified as Least Threatened. Other vegetation types present in the broad area include Lower Gariep Broken Veld and Bushmanland Sandy Grassland, which are also classified as Least Threatened.

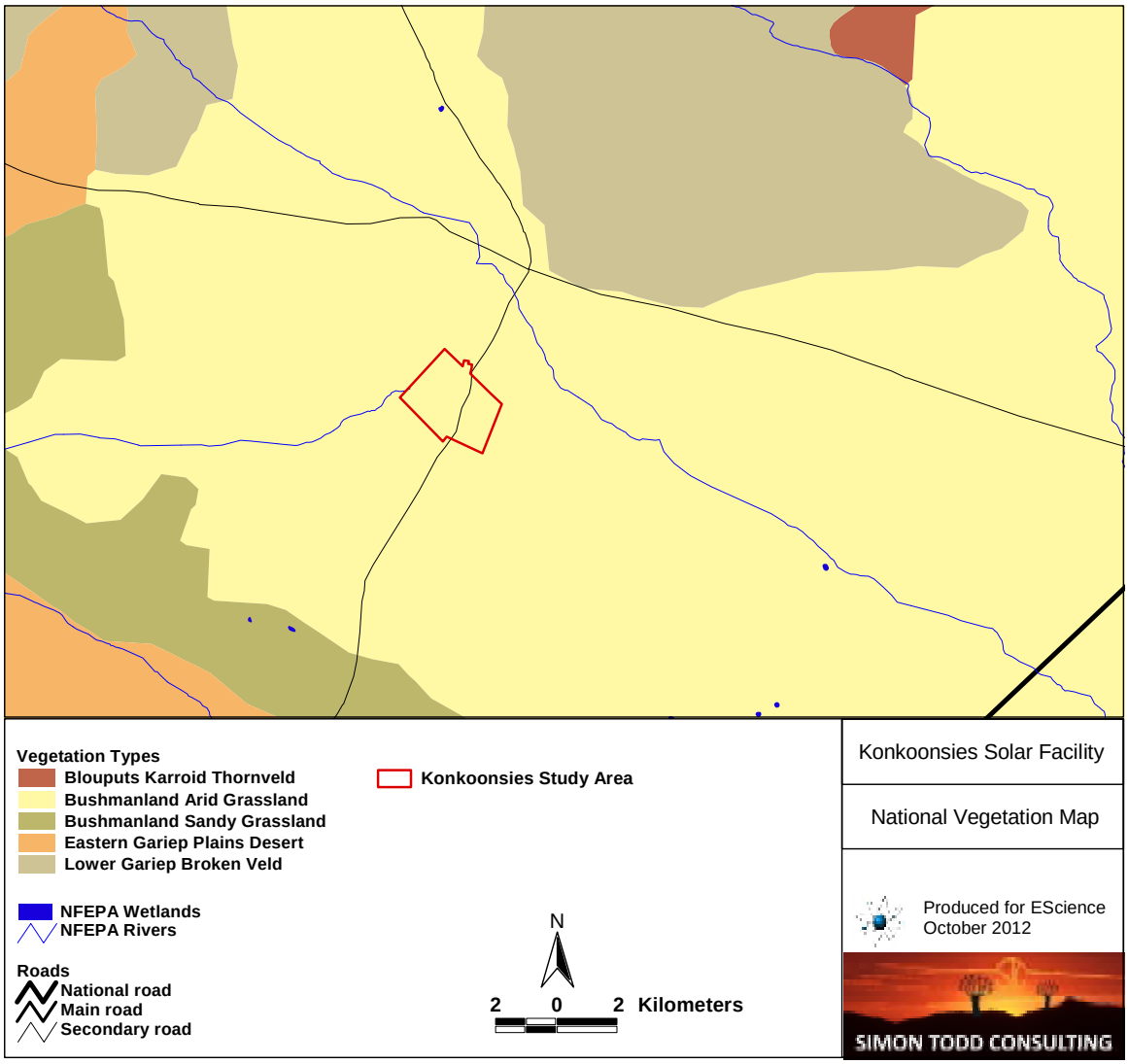


Figure 2. Broad-scale overview of the vegetation in and around the proposed Konkoonsies Solar Energy Facility. The vegetation map is an extract of the national vegetation map as produced by

Mucina & Rutherford (2006), and also includes rivers, pans and wetlands delineated by the National Freshwater Ecosystem Priority Areas assessment (Nel et al. 2011).

4.2 FINE-SCALE VEGETATION PATTERNS

Within the site, at least three different plant communities were apparent, each associated with different habitats at the site. The majority of the site is dominated by open grassland on sandy soils, characteristic of the Bushmanland Arid Grassland vegetation type. Within the site, there are also a number of rocky outcrops present, as well as a stony hill towards the northeast of the site.

Sandy Grassland

The predominant vegetation community at the site is Sandy Grassland. The dominant grass species present were *Stipagrostis anomala*, *Stipagrostis obtusa*, *Stipagrostis ciliata* var. *capensis*, *Stipagrostis uniplumis* var. *neesii* and *Schmidtia kalahariensis* (Figure 3). The abundance of *Schmidtia kalahariensis* was relatively low at the time of the site visit, but this annual grass may increase during exceptionally wet years to become the dominant grass species present. Dominant shrub species within this community include shrubs such as *Rhigozum trichotomum*, *Lycium eenii*, *Hermannia spinosa* and *Eriocephalus microphyllus* var. *pubescens*. There were no large trees present at the site, but two species of low trees, *Boscia foetida* subsp. *foetida* and *Parkinsonia africana* were relatively common. This is not considered to be a sensitive plant community as it is widespread and contains relatively low diversity and abundance of species of conservation concern.

Figure 3. Two examples of the Sandy Grassland community type, illustrating the relatively homogenous nature of the vegetation in the study area.

Rocky Outcrops

The rocky outcrops at the site are highly distinctive from the surrounding plains and contain many species not found elsewhere. The rocky outcrops are also important from a faunal perspective as they

provide habitat for an array of species associated with such rocky ourcrops. Species observed on the rocky outcrops include *Chascanum garipense*, *Tricholaena capensis subsp. capensis*, *Montinia caryophyllacea*, *Cissampelos capensis*, *Hermannia minutiflora*, *Enneapogon scaber*, C*ommiphora gracilifrondosa* and *Aloe dichotoma*. This habitat is considered high sensitivity and should not be impacted by the development.

Figure 4. Example of the rocky outcrops at the site. These areas are important habitats for both fauna and flora and should not be impacted by the development.

Stony Hills

Along the northeastern and southwestern margins of the site, fairly extensive stony hills are present. These areas are fundamentally different from the rocky outcrops in that they are comprised of much smaller rock fragments and the vegetation composition is also distinctive from the rocky outcrops. Plant species characteristic of these areas include *Kissenia capensis*, *Boscia foetida* subsp. *foetida*, *Enneapogon scaber*, *Barleria rigida*, *Monechma spartioides*, *Hermbstaedtia glauca*, *Microloma incanum* and *Aptosimum spinescens*. This plant community is considered moderately sensitive on account of the higher plant and faunal diversity associated with this plant community.

Figure 5. The stony hill which characterises the northeastern margin of the study area.

Listed Plant Species

According to the SANBI SIBIS database, 286 plant species have been recorded from the four quarter degree squares 2819 CD, DC and 2919 AB, BA. This is a considerably larger area than the study area and contains many habitats not present in the study area. As a result, the list will contain a lot more species than would occur within the boundaries of the site. Only three of the species on the list are listed by the South African Red Data Lit of Plants. Caesalpinia bracteata is listed as Vulnerable, while Acacia erioloba is listed as declining and and *Hoodia gordoniiI* which is listed as DDD. Of these species, only *Hoodia gordoniiI* occurs at the site. There are, however, a number of species protected under the Northern Cape Nature Conservation Act at the site, the most common of which was Boscia foetida which occurs widely at the site.

4.3 CRITICAL BIODIVERSITY AREAS & BROAD-SCALE PROCESSES

The site falls within the planning domain of the Namakwa Biodiversity Sector Plan (Desmet & Marsh 2008). This biodiversity assessment identifies Critical Biodiversity Areas (CBAs) which represent biodiversity priority areas which should be maintained in a natural to near natural state. The CBA maps indicate the most efficient selection and classification of land portions requiring safeguarding in order to meet national biodiversity objectives. When incorporated into municipal SDFs and bioregional plans, such fine-scale plans are recognized under NEMA and the various activities listed under the act as

described in Section 2.4 come into effect. The CBA map for the general area surrounding the site is depicted in Figure 6, below. The site falls just to the south of an extensive Ecological Support Area. The development of the site is not likely to impact the CBAs or the ESA in the vicinity. The major ecological feature of the broader landscape is the Orange River Valley to the north of the site, which is captured by the extensive ESA. Movement patterns are likely to be within the ESA corridor itself as well as locally, from the vicinity of the Orange River to the adjacent uplands. As such, the site itself is not likely to represent an important area in terms of upland-lowland gradients or faunal movement or migration corridors. The potential of the development to disrupt such gradients is therefore very low.

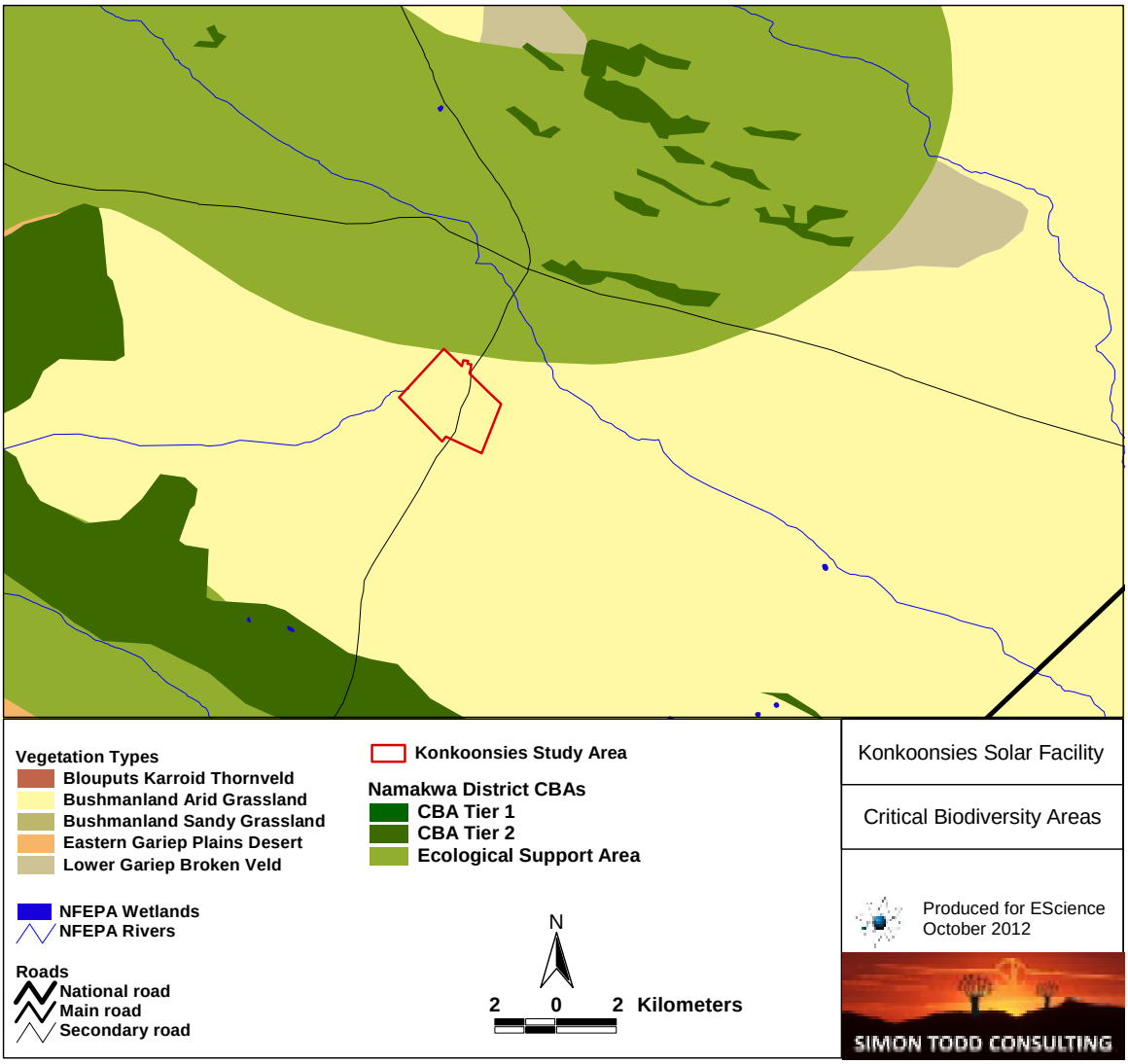


Figure 6. Critical Biodiversity Areas map for the broad area surrounding the proposed Konkoonsies Solar Facility site.

4.4 FAUNAL COMMUNITIES

Mammals

The site falls within the known distribution range of 43 terrestrial mammals. Although this is not a very high total, there is a relatively wide range of habitats available at the site and as a result a large proportion of these species are likely to be present. Species associated with the rocky outcrops include Klipspringer, Rock Hyrax, Dassie Rat, Pygmy Rock Mouse, Western Rock Elephant Shrew and Hewitts' Red Rock Rabbit. Species associated with the sandy plains include the South African Ground Squirrel, Aardvark, various gerbils, Cape and Bat-eared Fox, Steenbok and Meerkat. The only listed mammal which may occur at the site is the Black-footed cat *Felis nigripes*, which is listed as Vulnerable. Although there is a high probability that the black-footed Cat occurs at the site as the habitat is favourable for this species, it is widely distributed across the arid and semi-arid areas of South Africa and the relatively small amount of potential habitat loss resulting from the development would not amount to a significant amount of habitat loss for this species.

Apart from some direct loss of habitat, the development of a PV facility would potentially also disrupt the connectivity of the landscape for mammals as the facility would be likely to be fenced-off, thereby precluding middle and larger sized mammals from traversing the site. However, given the undeveloped and open nature of the area, this effect is not likely to be highly significant as mammals would be able to circle past the facility with relative ease.

Reptiles

The site lies in or near the distribution range of at least 46 reptile species (Appendix 2), indicating that the site has potentially quite high reptile diversity and given the range of habitats available at the site, a large proportion of these are likely to occur at the site. Based on the distribution records and habitat requirements, the composition of the reptile fauna at the site potentially comprises 1 tortoise, 17 snakes, 19 lizards and skinks, 8 geckos and 1 chameleon. Species confirmed at the site include the Namaqua Sand Lizard *Pedioplanis namaquensis*, Ground Agama *Agama aculeata* and Western Rock Skink *Mabuya sulcata*. The only listed species which may occur at the site is the Black Spitting Cobra, *Naja nigricollis woodi*, which is likely to occur in the vicinity of the rocky outcrops as well as other areas with sufficient cover. Although this species is a regional endemic, it is common within its range and the extent of habitat loss resulting from the development would be minimal. The Bushmanland Tent Tortoise is protected under provincial ordinance and is also listed under Appendix II of Cites which regulates trade in these species.

While the development will impact the natural vegetative habitat of the site, the construction of the various infrastructural components such as the PV arrays and buildings will create additional habitat which will attract species which utilize such structures such as tubercled geckos (*Chondrodactylus* spp) and agamas (*Agama* spp). If artificial lighting will be provided at the site at night, this would attract

insects which would in turn attract geckos and other night-feeding insectivores (such as bats and solifugids) to the vicinity of the lights. In order to reduce this potential impact, the use of low-UV emitting lights, such as most LEDs, which attract significantly less insects, should be used.

Amphibians

The site lies within or near the range of six amphibian species, indicating that amphibian diversity at the site is not likely to be very high. In addition, since there is no natural standing water at the site and no significant wetland features, amphibian abundance at the site is likely to be very low and the only species present are likely to be those able to survive independently of water. The development is therefore not likely to result in significant impact on amphibians

4.5 SITE SENSITIVITY ASSESSMENT

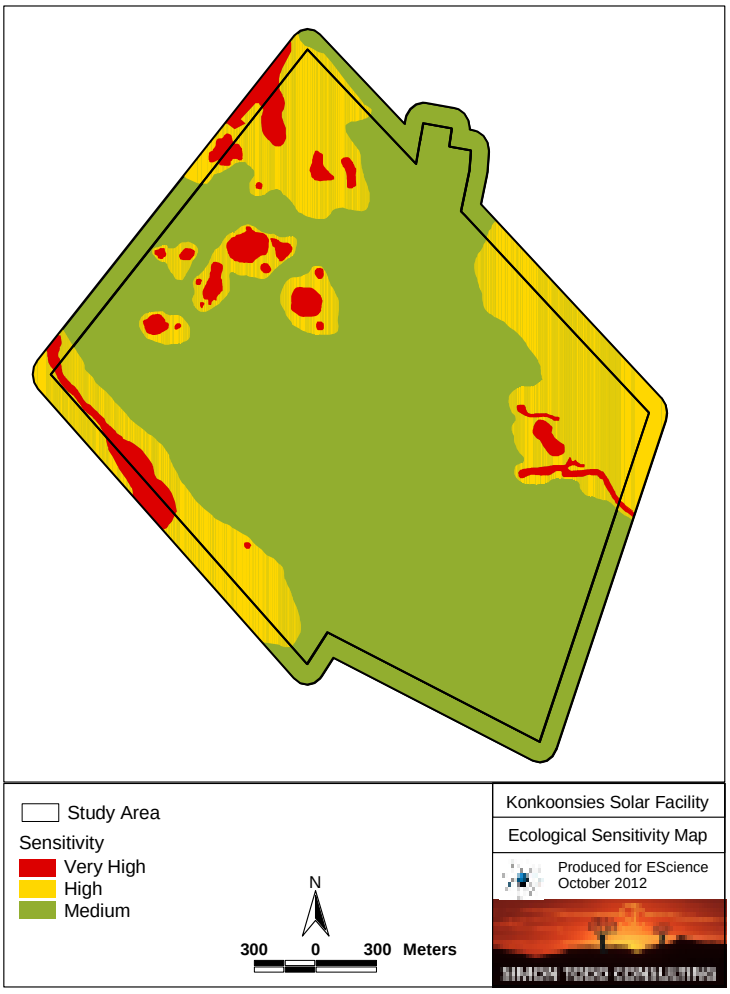


Figure 6. Ecological Sensitivity map of the proposed Konkoonsies Solar Energy Facility site. Those areas classified as Medium Sensitivity are most suitable for the

construction of the facility, while those areas in red should be considered no-go areas from a development perspective.

The ecological sensitivity map for the site is depicted above (Figure 7). The majority of the site is medium sensitivity and suitable for the location of the PV facility. There are, however, a number of rocky outcrops and small drainage features which are sensitive and should be avoided. In addition, where outcrops are close to one another, the areas between the outcrops should also not be developed in order to maintain the connectivity between the outcrops which from an ecological perspective operate like islands within a sea of sand. Within the medium sensitivity areas there is an abundance of *Boscia foetida* which is a provincially protected species as well as a fairly large number of *Hoodia gordonii* plants which are nationally protected. As these species are not rare, their presence does not significantly contribute the sensitivity of this area. Provided that the development can be restricted to the medium sensitivity plains, the impacts of the development would be largely local in nature and not of high significance.

5 IMPACT ASSESSMENT

5.1 ASSESSMENT & SIGNIFICANCE CRITERIA

Direct, indirect and cumulative impacts of the issues identified in this report are assessed in terms of the following criteria:

- The **nature** which includes a description of what causes the effect what will be affected and how it will be affected.

- The **extent** wherein it is indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 is assigned as appropriate (with 1 being low and 5 being high):

- The **duration** wherein it is indicated whether:

    - the lifetime of the impact will be of a very short du ration (0- 1 years) - assigned a score of 1.
    - the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2.
    - medium-term (5-15 years) - assigned a score of 3
    - long term (> 15 years) - assigned a score of 4; or
    - permanent - assigned a score of 5

- The **magnitude** quantified on a scale from 0-10 where 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a

modified way 8 is high (processes are altered to the extent that they temporarily cease) and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.

- The **probability** of occurrence, which shall describe the (likelihood of the impact actually occurring. Probability will be estimated on a scale of 1-5 where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but of low likelihood) , 3 is probable (distinct possibility) , 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).

The **significance** which shall be determined through a syntheses of the characteristics described above and can be assessed as low, medium or high;
and;
the status, which will be described as either positive, negative or neutral.
the degree to which the impact can be reversed.
the degree to which the impact may cause irreplaceable loss of resources.
the degree to which the impact can be mitigated.

The **significance** is calculated by combining the criteria in the following formula:
S = (E + D + M)P
Where

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

The significance weightings for each potential impact are as follows:

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

5.2 IDENTIFICATION & NATURE OF IMPACTS

5.2.1 Impact Risk Factors

Potential ecological impacts resulting from the development would stem from a variety of different activities and risk factors associated with the construction and operational phases of the project including the following:

Construction Phase

- Vegetation clearing for PV panel supports, roads, buildings etc could impact listed plant species as well as high-biodiversity plant communities. Vegetation clearing will also lead to habitat loss for fauna and potentially the loss of sensitive faunal species, habitats and ecosystems.
- Increased erosion risk would be highly likely to result due to the loss of plant cover and soil disturbance created during the construction phase. This may impact downstream riparian and wetland habitats if a lot of silt enters the drainage systems. Although the effects would probably only become apparent during the operational phase, the impact stems from the construction phase and suitable mitigation measures will also need to be applied at this stage.
- Presence and operation of construction machinery on site. This will create a physical impact as well as generate noise, pollution and other forms of disturbance at the site.
- Increased human presence can lead to poaching, illegal plant harvesting and other forms of disturbance such as fire.
- Loss of connectivity & habitat fragmentation may result due to the presence of the generation infrastructure, roads, site fencing and other support infrastructure of the development.

Operational Phase

- During operation the facility itself will operate with little noise and the only staff present during this phase will be security guards. Nevertheless, the presence of the facility and occasional maintenance activities may deter some fauna from the area, amounting to a loss of connectivity & habitat fragmentation.
- Maintenance activities such as vegetation clearing will impact the biodiversity of the site if not conducted in a sensitive manner.

5.2.2 Identified Impacts

The above risk factors are likely to be manifested as the following impacts:

Impacts on vegetation and listed plant species

Some loss of vegetation is an inevitable consequence of the development and this would include the loss of a fairly large number of individuals of protected species.

Increased erosion risk

Increased erosion risk would result from soil disturbance and the loss of plant cover within cleared and disturbed areas. Although parts of the site are quite flat, some parts are moderately steep and there would be some risk of erosion in these areas. The additional runoff generated by the panels and other cleared or hardened areas of the site would also increase the erosion risk. Regular monitoring to ensure that erosion problems are addressed would be required.

Direct Faunal impacts

Increased levels of noise, pollution, disturbance and human presence will be detrimental to fauna. Sensitive and shy fauna would move away from the area during the construction phase as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the construction activities and might be killed. Some mammals and reptiles such as tortoises would be vulnerable to illegal collection or poaching during the construction phase as a result of the large number of construction personnel that are likely to be present.

Loss of landscape connectivity and disruption of broad-scale ecological processes

The presence of the facility could potentially contribute to the disruption of broad-scale ecological processes such as dispersal, migration or the ability of fauna to respond to fluctuations in climate or other conditions. Depending on how the development was fenced off, the fencing would probably also restrict animal movement and disrupt the connectivity of the landscape for fauna which would no longer be able to pass through the area.

5.3 ASSESSMENT OF IMPACTS

The four major impacts identified above are assessed below according to the different criteria as described above.

Impact 1: *Impacts on vegetation and protected plant species*

Impact Nature: Impacts on vegetation and protected plant species would occur due to the construction of the facility.		
	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (3)
Magnitude	Medium (5)	Medium (3)
Probability	Definite (5)	Highly Probable (4)
Significance	Medium (50)	Low (28)
Status	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources	Yes	
Can impacts be mitigated?	To a large extent	
Mitigation	• Vegetation clearing to be kept to a minimum. No unnecessary vegetation to be cleared. • Sensitive areas as demarcated on the sensitivity map should be avoided as far as possible, and where these areas must be traversed by roads of infrastructure, specific precautions should be taken to ensure that impacts are minimized. • The final development area should be surveyed for species suitable for search and rescue, such as *Hoodia gordoni* which should be translocated prior to the commencement of construction.	
Cumulative Impacts	The potential for cumulative impacts is moderate on account of the presence of a CSP development on the neighbouring farm, Scuitklip. The overall untransformed nature of the landscape would however reduce the significance of such cumulative impacts.	
Residual Impacts	Some loss of vegetation is inevitable and cannot be avoided	

Impact 2. *Increased erosion risk*

Impact Nature: Increased erosion risk as a result of soil disturbance and loss of vegetation cover.		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Short-term (2)
Magnitude	Moderate (4)	Low (3)
Probability	Highly Probable (4)	Probable (3)
Significance	Medium (40)	Low (21)
Status	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources	Yes	No
Can impacts be mitigated?	Yes	
Mitigation	• Roads should run along the contour wherever possible and roads that do not should have diversion structures in place at regular intervals to ensure that water flow and movement is regulated in a manner which minimizes erosion risk. • Although there are no major drainage lines within the site, roads which cross minor drainage lines should be constructed in manner which does not encourage erosion of the downstream channel and does not disrupt the natural flow of water down the channel. • Post-construction revegetation of all bare areas with local species. • Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance. • All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques.	
Cumulative Impacts	Higher sediment loads in rivers and streams will affect in-stream vegetation and biota	
Residual Impacts	If erosion at the site is controlled, then there will be no residual impact	

Impact 3. *Direct Faunal Impacts*

Impact Nature: Faunal habitat destruction, alteration and physical disturbance.		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Medium (6)	Medium-Low (3)
Probability	Highly Probable (4)	Probable (3)
Significance	Medium (48)	Low (24)
Status	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	To some extent	
Mitigation	• Any fauna directly threatened by the construction activities should be removed to a safe location by the ECO or other suitably qualified person. • The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the demarcated construction site. This should specifically include the rocky outcrops which should be avoided. • Fires should only be allowed within fire-safe demarcated areas. • No fuelwood collection should be allowed on-site. • No dogs should be allowed on site. • If the site must be lit at night for security purposes, this should be done with low-UV type lights (such as most LEDs), which do not attract insects. • All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill. • No unauthorized persons should be allowed onto the site. • Staff present during the operational phase should receive environmental education so as to ensure that that no hunting, killing or harvesting of plants and animals occurs.	
Cumulative Impacts	The potential for cumulative impacts is relatively low, given the relatively small extent of the site in relation to the scale and nature	

	of the surrounding landscape. The CSP development nearby would contribute to cumulative impact.
Residual Impacts	Residual impacts for fauna would be largely restricted to a small amount of habitat loss.

Impact 4: *Disruption of broad-scale ecological processes*

Impact Nature: Disruption of the broad-scale ecological processes.		
	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Low (3)
Probability	Probable (4)	Probable (3)
Significance	Moderate (36)	Low (24)
Status	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	To some extent, but many fauna are likely to avoid the area regardless of the mitigation measures implemented.	
Mitigation	• Although the facility is likely to be fenced with mesh fencing that is impermeable to most fauna, some animals may occasionally dig their way into the site or enter through gaps or gates. If such animals become trapped in the facility, they should be allowed to exit on their own and should not be unnecessarily persecuted. • Areas of natural vegetation within the site should be managed in a manner which promotes or is at least compatible with the maintenance of biodiversity at the site.	
Cumulative Impacts	The potential for cumulative impacts is low to moderate on account of the open nature of the surrounding landscape and fact that the site is not likely to lie within an area that acts as a corridor for faunal movement or migration.	
Residual Impacts	There will be some residual habitat loss and disruption of the landscape as a result of the development, but the implications for broad-scale processes would be very low.	

Summary Assessment

The majority of the site is not highly sensitive and provided that the sensitive features of the site, particularly the rocky outcrops and their immediate environment can be avoided, then the impacts associated with the development are likely to be low, especially after mitigation. Some loss of vegetation and fauna habitat will occur regardless of where the facility is located or what mitigation measures are implemented. However, the significance of this impact is relatively low on account of the paucity of species of conservation concern in the area. In addition, the site lies within an area that has not be heavily impacted by transformation and the extent of habitat loss resulting from the development is not significant when considered in light of the extensive nature of the receiving vegetation type which is among the most extensive in the country. The disturbance associated with the development will increase erosion risk at the site, however, with the appropriate mitigation, this risk can be effectively reduced.

Table 1. Summary assessment of the pre- and post-mitigation impacts associated with the development of the Konkoonsies Solar Energy Facility.

Impact	Pre Mitigation	Post Mitigation
Impacts on vegetation and protected plant species	Medium (50)	Low (28)
Increased erosion risk	Medium (40)	Low (21)
Faunal impact and disturbance	Medium (48)	Low (24)
Disruption of broad scale processes	Medium (36)	Low (24)

6 CONCLUSION & RECOMMENDATIONS

Although there are some sensitive habitats present within the site, thase are clearly differentiated from the surrounding landscape and can easily be avoided. The impact of the development on *Boscia foetida* and *Hoodia gordoni* would be moderate at a local level but would not be of wider significance. The affected individuals of Hoodia can also be translocated outside of the development footprint to offset the impact on this species to some degree. As the panels and other hardened surfaces of the development are likely to generate significant runoff during larger showers, measures to regulate and control runoff should form an important element of construction-phase mitigation at the site.

7 ACTIVITIES FOR INCLUSION THE DRAFT EMP

Below are the measures that should be implemented as part of the EMP for the development. The measures below do not exactly match with the impacts that have been identified above, as certain mitigation measures, such as limiting the loss of vegetation may be effective at combating several different impacts, such as erosion, faunal impact etc.

Objective: Limit disturbance of vegetation and loss of protected flora during construction			
Project component/s	Arrays, their supports, cabling; access and maintenance roads etc		
Potential Impact	Loss of plant cover leading to erosion as well as loss of faunal habitat and loss of specimens of protected plants.		
Activity/risk source	Construction activities		
Mitigation: Target/Objective	No wholesale clearing of vegetation outside of the development footprint Minimal impact on terrestrial environment. Successful translocation of protected species		
Mitigation: Action/control		Responsibility	Timeframe
(1) Preconstruction surveys for listed flora during the flowering season. (2) Translocate protected species prior to the commencement of construction activities. (3) Erosion control should begin in the construction phase and should be integrated into the design features of the facility. (4) Demarcate areas to be cleared. (5) Revegetation of cleared areas that are no longer used or monitoring to ensure that recovery is taking place (6) Alien plant clearing where necessary.		Management/ECO	Construction
Performance	Ground layer cover has been retained through construction phase and low		

Indicator	numbers of protected species affected.
Monitoring	• Document pre- and post- construction cover of the ground layer. • Monitor alien plant abundance an annual basis. • Document revegetation actions taken and their success • Document erosion problems and the control measures implemented

Objective: Limit terrestrial faunal impacts		
Project component/s	Construction activities and human presence	
Potential Impact	Disturbance of faunal communities due to construction as well as poaching and hunting risk from personnel.	
Activity/risk source	Habitat transformation during construction; site fencing, presence of construction and operation personnel.	
Mitigation: Target/Objective	Low faunal impact, during construction and operation.	
Mitigation: Action/control	Responsibility	Timeframe
(1) Environmental induction for all staff (2) ECO to monitor and enforce ban on hunting, collecting etc of all plants and animals or their products.	Management/ECO	Construction & Operation
Performance Indicator	No mortality of fauna during construction	
Monitoring	• Monitoring for compliance during the construction phase	

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9 ANNEX 1. LIST OF PLANTS

List of plant species which are known to occur in the vicinity of the proposed Konkoonsies Solar Energy site according to the SANBI SIBIS database (Accessed & records downloaded 09 September 2012).

Family	Species	Family	Species
ACANTHACEAE	*Acanthopsis disperma*	ACANTHACEAE	*Acanthopsis hoffmannseggiana*
ACANTHACEAE	*Barleria lancifolia subsp. lancifolia*	ACANTHACEAE	*Barleria lichtensteiniana*
ACANTHACEAE	*Barleria rigida*	ACANTHACEAE	*Blepharis mitrata*
ACANTHACEAE	*Blepharis pruinosa*	ACANTHACEAE	*Monechma divaricatum*
ACANTHACEAE	*Monechma incanum*	ACANTHACEAE	*Monechma spartioides*
ACANTHACEAE	*Petalidium lucens*	AIZOACEAE	*Aizoon canariense*
AIZOACEAE	*Galenia africana*	AIZOACEAE	*Galenia fruticosa*
AIZOACEAE	*Galenia sarcophylla*	AIZOACEAE	*Galenia secunda*
AIZOACEAE	*Tetragonia arbuscula*	AIZOACEAE	*Tetragonia reduplicata*
AIZOACEAE	*Trianthema parvifolia var. parvifolia*	AIZOACEAE	*Trianthema parvifolia var. rubens*
AMARANTHACEAE	*Amaranthus praetermissus*	AMARANTHACEAE	*Sericocoma avolans*
ANACARDIACEAE	*Rhus burchellii*	ANACARDIACEAE	*Searsia burchellii*
ANACARDIACEAE	*Searsia populifolia*	APOCYNACEAE	*Fockea sinuata*
APOCYNACEAE	*Hoodia gordonii*	APOCYNACEAE	*Microloma incanum*
APOCYNACEAE	*Microloma sagittatum*	APOCYNACEAE	*Pergularia daemia var. leiocarpa*
APOCYNACEAE	*Pergularia daemia subsp. garipensis*	ASPARAGACEAE	*Asparagus denudatus*
ASPARAGACEAE	*Asparagus exuvialis forma exuvialis*	ASPARAGACEAE	*Asparagus pearsonii*
ASPHODELACEAE	*Aloe claviflora*	ASPHODELACEAE	*Aloe dichotoma var. dichotoma*
ASTERACEAE	*Amellus tridactylus subsp. arenarius*	ASTERACEAE	*Arctotis leiocarpa*
ASTERACEAE	*Berkheya spinosissima subsp. namaensis var. namaensis*	ASTERACEAE	*Berkheya spinosissima subsp. spinosissima*
ASTERACEAE	*Dicoma capensis*	ASTERACEAE	*Didelta carnosa var. carnosa*
ASTERACEAE	*Dimorphotheca polyptera*	ASTERACEAE	*Dimorphotheca sinuata*
ASTERACEAE	*Eriocephalus ericoides subsp. ericoides*	ASTERACEAE	*Eriocephalus microphyllus var. pubescens*
ASTERACEAE	*Eriocephalus pauperrimus*	ASTERACEAE	*Eriocephalus spinescens*
ASTERACEAE	*Euryops dregeanus*	ASTERACEAE	*Felicia clavipilosa subsp. clavipilosa*
ASTERACEAE	*Foveolina dichotoma*	ASTERACEAE	*Gazania lichtensteinii*
ASTERACEAE	*Geigeria filifolia*	ASTERACEAE	*Geigeria vigintisquamea*
ASTERACEAE	*Gorteria corymbosa*	ASTERACEAE	*Helichrysum argyrosphaerum*
ASTERACEAE	*Helichrysum herniarioides*	ASTERACEAE	*Ifloga molluginoides*
ASTERACEAE	*Kleinia longiflora*	ASTERACEAE	*Myxopappus acutilobus*
ASTERACEAE	*Osteospermum pinnatum var. breve*	ASTERACEAE	*Osteospermum rigidum var. rigidum*
ASTERACEAE	*Pentzia pinnatisecta*	ASTERACEAE	*Pseudognaphalium luteo-album*
ASTERACEAE	*Pteronia leucoclada*	ASTERACEAE	*Pulicaria scabra*
ASTERACEAE	*Senecio niveus*	ASTERACEAE	*Senecio sisymbriifolius*
ASTERACEAE	*Tripteris microcarpa subsp. microcarpa*	ASTERACEAE	*Ursinia nana subsp. nana*
BIGNONIACEAE	*Rhigozum trichotomum*	BORAGINACEAE	*Codon royenii*

BORAGINACEAE	*Ehretia rigida subsp. rigida*
BORAGINACEAE	*Trichodesma africanum*
BRASSICACEAE	*Heliophila deserticola var. deserticola*
BRASSICACEAE	*Heliophila trifurca*
BURSERACEAE	*Commiphora namaensis*
CAPPARACEAE	*Boscia albitrunca*
CAPPARACEAE	*Cadaba aphylla*
CAPPARACEAE	*Cleome foliosa var. lutea*
CAPPARACEAE	*Maerua gilgii*
CHENOPODIACEAE	*Salsola barbata*
CHENOPODIACEAE	*Salsola glabrescens*
CHENOPODIACEAE	*Salsola namibica*
CHENOPODIACEAE	*Salsola zeyheri*
COLCHICACEAE	*Ornithoglossum vulgare*
CUCURBITACEAE	*Coccinia rehmannii*
CUCURBITACEAE	*Cucumis sagittatus*
CYPERACEAE	*Cyperus marginatus*
EUPHORBIACEAE	*Euphorbia gariepina subsp. balsamea*
EUPHORBIACEAE	*Euphorbia glanduligera*
EUPHORBIACEAE	*Euphorbia multiceps*
EUPHORBIACEAE	*Euphorbia spinea*
FABACEAE	*Acacia erioloba*
FABACEAE	*Adenolobus garipensis*
FABACEAE	*Cyamopsis serrata*
FABACEAE	*Indigastrum argyraeum*
FABACEAE	*Indigofera alternans var. alternans*
FABACEAE	*Indigofera hololeuca*
FABACEAE	*Indigofera sessilifolia*
FABACEAE	*Leobordea platycarpa*
FABACEAE	*Lessertia pauciflora var. pauciflora*
FABACEAE	*Melilotus albus*
FABACEAE	*Parkinsonia africana*
FABACEAE	*Prosopis glandulosa var. glandulosa*
FABACEAE	*Ptycholobium biflorum subsp. biflorum*
FABACEAE	*Tephrosia dregeana var. dregeana*
FRANKENIACEAE	*Frankenia pulverulenta*
GERANIACEAE	*Monsonia umbellata*
GISEKIACEAE	*Gisekia pharnacioides var. pharnacioides*
HYACINTHACEAE	*Albuca setosa*
HYACINTHACEAE	*Dipcadi gracillimum*
LAMIACEAE	*Stachys burchelliana*
BORAGINACEAE	*Heliotropium curassavicum*
BRASSICACEAE	*Heliophila deserticola*
BRASSICACEAE	*Heliophila deserticola var. micrantha*
BURSERACEAE	*Commiphora gracilifrondosa*
CAMPANULACEAE	*Wahlenbergia psammophila*
CAPPARACEAE	*Boscia foetida subsp. foetida*
CAPPARACEAE	*Cleome angustifolia subsp. diandra*
CAPPARACEAE	*Cleome oxyphylla var. oxyphylla*
CHENOPODIACEAE	*Salsola armata*
CHENOPODIACEAE	*Salsola columnaris*
CHENOPODIACEAE	*Salsola kali*
CHENOPODIACEAE	*Salsola rabieana*
COLCHICACEAE	*Ornithoglossum viride*
CONVOLVULACEAE	*Ipomoea cairica var. cairica*
CUCURBITACEAE	*Cucumis africanus*
CUCURBITACEAE	*Kedrostis africana*
EBENACEAE	*Diospyros acocksii*
EUPHORBIACEAE	*Euphorbia gariepina subsp. gariepina*
EUPHORBIACEAE	*Euphorbia inaequilatera var. inaequilatera*
EUPHORBIACEAE	*Euphorbia rudis*
EUPHORBIACEAE	*Euphorbia virosa*
FABACEAE	*Acacia mellifera subsp. detinens*
FABACEAE	*Caesalpinia bracteata*
FABACEAE	*Hoffmannseggia lactea*
FABACEAE	*Indigastrum argyroides*
FABACEAE	*Indigofera heterotricha*
FABACEAE	*Indigofera pechuelii*
FABACEAE	*Lebeckia spinescens*
FABACEAE	*Lessertia annularis*
FABACEAE	*Lotononis rabenaviana*
FABACEAE	*Melolobium candicans*
FABACEAE	*Pomaria lactea*
FABACEAE	*Prosopis velutina*
FABACEAE	*Sutherlandia microphylla*
FABACEAE	*Trigonella hamosa*
GERANIACEAE	*Monsonia parvifolia*
GISEKIACEAE	*Gisekia africana var. africana*
HYACINTHACEAE	*Albuca acuminata*
HYACINTHACEAE	*Dipcadi glaucum*
IRIDACEAE	*Moraea venenata*
LOASACEAE	*Kissenia capensis*

LOPHIOCARPACEAE	*Lophiocarpus polystachyus*	LORANTHACEAE	*Tapinanthus oleifolius*
MALVACEAE	*Hermannia gariepina*	MALVACEAE	*Hermannia grandiflora*
MALVACEAE	*Hermannia marginata*	MALVACEAE	*Hermannia minutiflora*
MALVACEAE	*Hermannia modesta*	MALVACEAE	*Hermannia spinosa*
MALVACEAE	*Hermannia stricta*	MALVACEAE	*Hibiscus elliottiae*
MALVACEAE	*Radyera urens*	MELIACEAE	*Nymania capensis*
MENISPERMACEAE	*Cissampelos capensis*	MESEMBRYANTHEMACEAE	*Aridaria noctiflora subsp. straminea*
MESEMBRYANTHEMACEAE	*Mesembryanthemum coriarium*	MESEMBRYANTHEMACEAE	*Mesembryanthemum crystallinum*
MESEMBRYANTHEMACEAE	*Mesembryanthemum inachabense*	MESEMBRYANTHEMACEAE	*Phyllobolus lignescens*
MESEMBRYANTHEMACEAE	*Prenia tetragona*	MESEMBRYANTHEMACEAE	*Psilocaulon articulatum*
MESEMBRYANTHEMACEAE	*Psilocaulon coriarium*	MESEMBRYANTHEMACEAE	*Psilocaulon subnodosum*
MESEMBRYANTHEMACEAE	*Ruschia ferox*	MOLLUGINACEAE	*Hypertelis salsoloides var. salsoloides*
MOLLUGINACEAE	*Limeum aethiopicum var. aethiopicum*	MOLLUGINACEAE	*Limeum aethiopicum var. lanceolatum*
MOLLUGINACEAE	*Limeum aethiopicum subsp. aethiopicum var. aethiopicum*	MOLLUGINACEAE	*Limeum argute-carinatum var. kwebense*
MOLLUGINACEAE	*Limeum myosotis var. confusum*	MOLLUGINACEAE	*Limeum sulcatum var. gracile*
MOLLUGINACEAE	*Limeum sulcatum var. robustum*	MOLLUGINACEAE	*Mollugo cerviana var. cerviana*
MOLLUGINACEAE	*Pharnaceum brevicaule*	MOLLUGINACEAE	*Suessenguthiella scleranthoides*
MONTINIACEAE	*Montinia caryophyllacea*	NEURADACEAE	*Grielum humifusum var. parviflorum*
NEURADACEAE	*Grielum sinuatum*	NYCTAGINACEAE	*Phaeoptilum spinosum*
OXALIDACEAE	*Oxalis beneprotecta*	PASSIFLORACEAE	*Adenia repanda*
PEDALIACEAE	*Rogeria longiflora*	PEDALIACEAE	*Sesamum capense*
PLUMBAGINACEAE	*Dyerophytum africanum*	POACEAE	*Aristida adscensionis*
POACEAE	*Aristida congesta subsp. barbicollis*	POACEAE	*Cenchrus ciliaris*
POACEAE	*Cynodon dactylon*	POACEAE	*Enneapogon cenchroides*
POACEAE	*Enneapogon desvauxii*	POACEAE	*Enneapogon scaber*
POACEAE	*Eragrostis annulata*	POACEAE	*Eragrostis biflora*
POACEAE	*Eragrostis brizantha*	POACEAE	*Eragrostis nindensis*
POACEAE	*Eragrostis porosa*	POACEAE	*Leucophrys mesocoma*
POACEAE	*Odyssea paucinervis*	POACEAE	*Phragmites australis*
POACEAE	*Polypogon monspeliensis*	POACEAE	*Schmidtia kalahariensis*
POACEAE	*Setaria verticillata*	POACEAE	*Sporobolus nervosus*
POACEAE	*Stipagrostis anomala*	POACEAE	*Stipagrostis brevifolia*
POACEAE	*Stipagrostis ciliata var. capensis*	POACEAE	*Stipagrostis hochstetteriana var. hochstetteriana*
POACEAE	*Stipagrostis hochstetteriana var. secalina*	POACEAE	*Stipagrostis namaquensis*
POACEAE	*Stipagrostis obtusa*	POACEAE	*Stipagrostis uniplumis var. neesii*
POACEAE	*Stipagrostis uniplumis var. uniplumis*	POACEAE	*Tragus berteronianus*
POACEAE	*Tragus racemosus*	POACEAE	*Tricholaena capensis subsp. capensis*
POLYGALACEAE	*Polygala leptophylla var. leptophylla*	POLYGALACEAE	*Polygala seminuda*
POLYGONACEAE	*Persicaria decipiens*	PORTULACACEAE	*Anacampseros filamentosa subsp. tomentosa*
PORTULACACEAE	*Avonia albissima*	PORTULACACEAE	*Talinum arnotii*
POTTIACEAE	*Tortula atrovirens*	RHAMNACEAE	*Ziziphus mucronata subsp. mucronata*

RICCIACEAE	*Riccia cavernosa*	RUBIACEAE	*Kohautia caespitosa subsp. brachyloba*
RUBIACEAE	*Kohautia cynanchica*	SANTALACEAE	*Thesium lineatum*
SAPINDACEAE	*Pappea capensis*	SCROPHULARIACEAE	*Aptosimum elongatum*
SCROPHULARIACEAE	*Aptosimum junceum*	SCROPHULARIACEAE	*Aptosimum marlothii*
SCROPHULARIACEAE	*Aptosimum procumbens*	SCROPHULARIACEAE	*Aptosimum spinescens*
SCROPHULARIACEAE	*Diascia engleri*	SCROPHULARIACEAE	*Jamesbrittenia aridicola*
SCROPHULARIACEAE	*Jamesbrittenia ramosissima*	SCROPHULARIACEAE	*Lyperia tristis*
SCROPHULARIACEAE	*Manulea nervosa*	SCROPHULARIACEAE	*Manulea schaeferi*
SCROPHULARIACEAE	*Peliostomum leucorrhizum*	SCROPHULARIACEAE	*Selago albida*
SCROPHULARIACEAE	*Selago articulata*	SCROPHULARIACEAE	*Selago dinteri subsp. pseudodinteri*
SCROPHULARIACEAE	*Selago divaricata*	SCROPHULARIACEAE	*Veronica anagallis-aquatica*
SOLANACEAE	*Datura stramonium*	SOLANACEAE	*Lycium bosciifolium*
SOLANACEAE	*Lycium cinereum*	SOLANACEAE	*Lycium eenii*
SOLANACEAE	*Lycium oxycarpum*	SOLANACEAE	*Lycium pumilum*
SOLANACEAE	*Nicotiana glauca*	SOLANACEAE	*Nicotiana longiflora*
SOLANACEAE	*Solanum capense*	TAMARICACEAE	*Tamarix usneoides*
TECOPHILAEACEAE	*Cyanella lutea*	URTICACEAE	*Forsskaolea candida*
VERBENACEAE	*Chascanum garipense*	VISCACEAE	*Viscum capense*
VISCACEAE	*Viscum rotundifolium*	ZYGOPHYLLACEAE	*Augea capensis*
ZYGOPHYLLACEAE	*Sisyndite spartea*	ZYGOPHYLLACEAE	*Tribulus cristatus*
ZYGOPHYLLACEAE	*Tribulus pterophorus*	ZYGOPHYLLACEAE	*Tribulus terrestris*
ZYGOPHYLLACEAE	*Zygophyllum dregeanum*	ZYGOPHYLLACEAE	*Zygophyllum foetidum*
ZYGOPHYLLACEAE	*Zygophyllum microcarpum*	ZYGOPHYLLACEAE	*Zygophyllum prismatocarpum*
ZYGOPHYLLACEAE	*Zygophyllum retrofractum*	ZYGOPHYLLACEAE	*Zygophyllum rigidum*
ZYGOPHYLLACEAE	*Zygophyllum simplex*	ZYGOPHYLLACEAE	*Zygophyllum suffruticosum*

10 ANNEX 2. LIST OF MAMMALS

List of mammals which are known to occur and are likely to occur in the vicinity of the Konkoonsies Solar Energy Facility. Habitat notes and distribution records are based on Skinner & Chimimba (2005), while conservation status is from the IUCN Red Lists 2012. IUCN-listed species are highlighted.

Scientific Name	Common Name	Status	Habitat	Likelihood
Macroscledidea (Elephant Shrews):				
Macroscelides proboscideus	Round-eared Elephant Shrew	LC	Species of open country, with preference for shrub bush and sparse grass cover, also occur on hard gravel plains with sparse boulders for shelter, and on loose sandy soil provided there is some bush cover	High
Elephantulus rupestris	Western Rock Elephant Shrew	LC	Rocky koppies, rocky outcrops or piles of boulders where these offer sufficient holes and crannies for refuge.	High
Tubulentata:				
Orycteropus afer	Aardvark	LC	Wide habitat tolerance, being found in open woodland, scrub and grassland, especially associated with sandy soil	Definite
Hyracoidea (Hyraxes)				
Procavia capensis	Rock Hyrax	LC	Outcrops of rocks, especially granite formations and dolomite intrusions in the Karoo. Also erosion gullies	Definite
Lagomorpha (Hares and Rabbits):				
Lepus capensis	Cape Hare	LC	Dry, open regions, with palatable bush and grass	High
Lepus saxatilis	Scrub Hare	LC	Common in agriculturally developed areas, especially in crop-growing areas or in fallow lands where there is some bush development.	Low
Pronologus saunsersiae	Hewitt's Red Rock Rabbit	LC	Closely confined to rocky koppies, rocky kloofs and gorges.	Definite
Rodentia (Rodents):				
Hystrix africaeaustralis	Cape Porcupine	LC	Catholic in habitat requirements.	Definite
Petromus typicus	Dassie Rat	LC	Mountainous regions and inselbergs, where they are confined to rocky outcrops and live in crevices or piles of boulders	High
Pedetes capensis	Springhare	LC	Occur widely on open sandy ground or sandy scrub, on overgrazed grassland, on the fringes of vleis and dry river beds.	High
Xerus inauris	South African Ground Squirrel	LC	Open terrain with a sparse bush cover and a hard substrate	Definite
Graphiurus ocularis	Spectacled Dormouse	LC	Associated with sandstones of Cape Fold mountains, which have many vertical and horizontal crevices.	Low
Rhabdomys pumilio	Four-striped Grass Mouse	LC	Essentially a grassland species, occurs in wide variety of habitats where there is good grass cover.	High
Thallomys paedulcus	Acacia Tree Rat	LC	Associated with stands of Acacia woodland	Low

Aethomys namaquensis	Namaqua Rock Mouse	LC	Catholic in their habitat requirements, but where there are rocky koppies, outcrops or boulder-strewn hillsides they use these preferentially	Definite
Parotomys brantsii	Brants' Whistling Rat	LC	Associated with a dry sandy substrate in more arid parts of the Nama-karoo and Succulent Karoo. Species selects areas of low percentage of plant cover and areas with deep sands.	High
Parotomys littledalei	Littledale's Whistling Rat	LC	Riverine associations or associated with Lycium bushes or Psilocaulon absimile	High
Desmodillus auricularis	Cape Short-tailed Gerbil	LC	Tend to occur on hard ground, unlike other gerbil species, with some cover of grass or karroid bush	High
Gerbillurus paeba	Hairy-footed Gerbil	LC	Gerbils associated with Nama and Succulent Karoo preferring sandy soil or sandy alluvium with a grass, scrub or light woodland cover	High
Gerbillurus tytonis	Dune Hairy-footed Gerbil	LC	Hot dry areas on shifting red sand dunes	High
Gerbilliscus leucogaster	Bushveld Gerbil	LC	Predominantly associated with light sandy soils or sandy alluvium	Low
Gerbilliscus brantsii	Higheld Gerbil	LC	Sandy soils or sandy alluvium with some cover of grass, scrub or open woodland	Medium
Saccostomus campestris	Pouched Mouse	LC	Catholic habitat requirements, commoner in areas where there is a sandy substrate.	Medium
Malacothrix typica	Gerbil Mouse	LC	Found predominantly in Nama and Succulent Karoo biomes, in areas with a mean annual rainfall of 150-500 mm.	High
Petromyscus collinus	Pygmy Rock Mouse	LC	Arid areas on rocky outcrops or koppies with a high rock cover	High
Primates:				
Papio ursinus	Chacma Baboon	LC	Can exploit fynbos, montane grasslands, riverine courses in deserts, and simply need water and access to refuges.	High
Eulipotyphla (Shrews):				
Crocidura cyanea	Reddish-Grey Musk Shrew	LC	Occurs in relatively dry terrain, with a mean annual rainfall of less than 500 mm. Occur in karroid scrub and in fynbos often in association with rocks.	Low
Carnivora:				
Proteles cristata	Aardwolf	LC	Common in the 100-600mm rainfall range of country, Nama-Karoo, Succulent Karoo Grassland and Savanna biomes	High
Caracal caracal	Caracal	LC	Caracals tolerate arid regions, occur in semi-desert and karroid conditions	High
Felis silvestris	African Wild Cat	LC	Wide habitat tolerance.	High

Felis nigripes	Black-footed cat	VU	Associated with arid country with MAR 100-500 mm, particularly areas with open habitat that provides some cover in the form of tall stands of grass or scrub.	High
Genetta genetta	Small-spotted genet	LC	Occur in open arid associations	High
Suricata suricatta	Meerkat	LC	Open arid country where substrate is hard and stony. Occur in Nama and Succulent Karoo but also fynbos	Definite
Cynictis penicillata	Yellow Mongoose	LC	Semi-arid country on a sandy substrate	Definite
Vulpes chama	Cape Fox	LC	Associated with open country, open grassland, grassland with scattered thickets and coastal or semi-desert scrub	High
Canis mesomelas	Black-backed Jackal	LC	Wide habitat tolerance, more common in drier areas.	High
Otocyon megalotis	Bat-eared Fox	LC	Open country with mean annual rainfall of 100-600 mm	Definite
Ictonyx striatus	Striped Polecat	LC	Widely distributed throughout the sub-region	High
Rumanantia (Antelope):				
Oryx gazella	Gemsbok	LC	Open arid country	Low
Sylvicapra grimmia	Common Duiker	LC	Presence of bushes is essential	High
Antidorcas marsupialis	Springbok	LC	Arid regions and open grassland.	Low
Raphicerus campestris	Steenbok	LC	Inhabits open country,	Definite
Oreotragus oreotragus	Klipspringer	LC	Closely confined to rocky habitat.	Medium

11 ANNEX 3. LIST OF REPTILES

List of reptiles which are likely to occur at the proposed Konkoonsies Solar Energy Facility. Habitat notes and distribution records are based on Branch (1988) and Alexander and Marais (2007), while conservation status is from the IUCN Red Lists 2012.

Scientific Name	Common Name	Distribution	Status	Habitat	Likelihod
Tortoises and Terrapins:					
Psammobates tentorius verroxii	Bushmanland Tent Tortoise	Endemic	Data Deficient	Varied: usually arid karroid areas or rocky sandveld	High
Snakes:					
Rhinotyphlops schinzi	Schinz's Beaked Blind Snake	Endemic	Data Deficient	Semi-deseet and arid savanna	High
Leptotyphlops occidentalis	Western Thread Snake	Endemic	Data Deficient	Nambib Desert and Karoo scrub	High
Lamprophis capensis	Brown House Snake	Widespread	Data Deficient	Common in highveld grassland & arid karroid regions, but found everywhere & tolerant of urban sprawl	High
Pseudaspis cana	Mole Snake	Widespread	Data Deficient	Sandy scrubland in SW Cape, highveld grassland & mountainous & desert regions	High
Prosymna bivittata	Two-striped Shovel-snout			Acacia sanannah entering sandveld	Low
Dipsina multimaculata	Dwarf Beaked Snake	Endemic	Data Deficient	Rocky, sandy areas. Cape karroid areas.	High
Psammophis notostictus	Karoo Sand or Whip Snake	Widespread	Data Deficient	Arid scrubland & karroid regions	High
Psammophis leightoni	Cape Whip Snake	Endemic	Data Deficient	Coastal fynbos, desert and semi-desert	High
Dasypeltis scabra	Common/Rhombic Egg Eater	Widespread	LC	Absent only from true desert & closed-canopy forest	High
Telescopus beetzii	Namib Tiger Snake	Endemic	Data Deficient	Rocky, arid regions	High
Telescopus semiannulatus	Eastern Tiger Snake	Widespread	Data Deficient	Desert to Karoo, savanna and forest	Low
Aspidelaps lubricus	Coral Shield Cobra	Widespread	Data Deficient	Karroid & sandveld regions, entering dry valley plains in S and E Cape	High
Naja nivea	Cape Cobra	Widespread	Data Deficient	Arid karroid regions, particularly along river courses, entering well drained open areas along the southern coast	High
Naja nigricollis woodi	Black Spitting Cobra	Endemic	SARDB Rare	Namibia to Citrusdal in karroid scrub	High

Bitis arietans	Puff Adder	Widespread	Data Deficient	Absent only from desert & mnt tops	High
Bitis xeropaga	Desert Mountain Adder	Endemic	Data Deficient	Mountain slopes and sparsely vegetated rocky hillsides	Low
Bitis caudalis	Horned Adder	Widespread	Data Deficient	Sandy regions, throughout Karoo	High
Worm Lizards					
Monopeltis infuscata	Dusky Spade-snouted Worm Lizard	Widespread		Dry and moist savannah	Low
Lizard and Skinks:					
Acontias lineatus	Striped Legless Skink	Endemic	Data Deficient	Sandy, arid soils	High
Mabuya capensis	Cape Skink	Widespread	Data Deficient	Very varied: arid karroid veld, moist coastal bush, montane grassland, etc	High
Mabuya occidentalis	Western Three-Striped Skink	Widespread	Data Deficient	Arid Savanna karroid veld and desert	High
Mabuya spilogaster	Kalahari Tree Skink	Widespread		Arid Savannah	High
Mabuya sulcata	Western Rock Skink	Widespread	Data Deficient	Karroid areas	High
Mabuya striata	Striped Skink	Widespread	Data Deficient	Varied, except desert areas, succulent karoo and fynbos	Low
Mabuya variegata	Variegated Skink	Widespread	Data Deficient	Extremely varied; desert, karroid veld, montane grassland, savanna, coastal bush & valley bushveld	High
Meroles suborbitalis	Spotted Desert Lizard	Endemic	Data Deficient	Varied, arid savanna to desert	High
Nucras tessellata tessellata	Striped Sandveld Lizard	Widespread	Data Deficient	Open arid savannah & karroid veld	High
Pedioplanis laticeps	Cape Sand Lizard	Endemic	LC	Coastal dunes and succulent karroid veld	Low
Pedioplanis lineoocellata	Spotted Sand Lizard	Endemic	Data Deficient	Very varied: karroid veld, valley bushveld & arid & mesic savannah	High
Pedioplanis namaquensis	Namaqua Sand Lizard	Widespread	Data Deficient	Karroid veld	High
Pedioplanis undata	Western Sand Lizard	Widespread	Data Deficient	Prefers arid, sparsely vegetated desert	High
Cordylus polyzonus	Karoo Girdled Lizard	Endemic	Data Deficient	Karroid regions, coastal renosterveld and succulent karoo	High
Platysaurus broadleyi	Broadley's Flat Lizard	Narrow Endemic	Data Deficient	Rocky, arid sanannah, between augrabies and Pella	Low
Agama aculeata	Ground Agama	Widespread	Data Deficient	Semi desert and savanna	High

Agama anchietae	Anchieta's Agama	Widespread	Data Deficient	Semi desert and arid savanna	High
Agama atra	Southern Rock Agama	Endemic	Data Deficient	Semi-desert to fynbos, from sea level to mountain tops	Low
Chameleons:			Data Deficient		
Chamaeleo namaquensis	Namaqua Chameleon	Widespread	LC	Sandy regions (incl coastal dunes) with scrub vegetation	High
Geckos:			Data Deficient		
Chondrodactylus angulifer	Giant Ground Gecko	Endemic	LC	Gravel plains, interdune spaces & sandy flats	High
Lygodactylus bradfieldi	Bradfield's Dwarf Gecko	Widespread	Data Deficient	Arid savannah and succulent desert	High
Chondrodactylus bibronii	Bibron's Tubercled Gecko	Endemic	Data Deficient	Rocky outcrops, cliffs and large trees	High
Pachydactylus turneri	Turner's Thick-toed Gecko	Widespread	Data Deficient	Semi-desert and arid savannah	Low
Pachydactyus haackei	Haacke's Thick-toed Gecko	Endemic	Data Deficient	Large rock outcrops	Low
Pachydactylus rugosus	Rough Thick-toed Gecko	Endemic	Data Deficient	Semi-desert and succulent karroid veld	High
Pachydactylus serval	Western Spotted Gecko	Endemic	Data Deficient	Semi desert and succulent karroid veld	High
Ptenopus garrulus	Common Barking Gecko	Endemic	Data Deficient	Desert and semi-desert on various soil types, preferring flat stable sandy soils with sparse vegetation cover	High

12 ANNEX 4. LIST OF AMPHIBIANS

List of amphibians which may occur at the Konkoonsies Solar Energy Facility. Habitat notes and distribution records are based on Du Preez and Carruthers (2009), while conservation status is from the IUCN Red Lists 2012.

Scientific Name	**Common Name**	**Status**	**Habitat**	**Distribution**	Konkoonsies
Vandijkophrynus gariepensis	Karoo Toad	Not Threatened	Karoo Scrub	Widespread	Low
Vandijkophrynus robinsoni	Paradise Toad	Not Threatened	Natural springs and waterholes in the arid areas of the Richtersveld	Endemic	Low
Phrynomantis annectens	Marbled Rubber Frog	Not Threatened	Arid environments, closely associated with inselbergs and rocky areas	Widespread	High
Xenopus laevis	Common Platanna	Not Threatened	Any more or less permanent water	Widespread	Low
Cacosternum boettgeri	Common Caco	Not Threatened	Marshy areas, vleis and shallow pans	Widespread	Low
Tomopterna tandyi	Tandy's Sand Frog	Not Threatened	Nama karoo grassland and savanna	Widespread	Low

SHORT CV OF CONSULTANT:

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SUMMARY OF EXPERTISE:

SIMON TODD

- Profession: Ecological Consultant
- Specialisation: Plant & Animal Ecology
- Years of Experience: 15 Years

Skills & Primary Competencies

- Research & description of ecological patterns & processes in Fynbos, Succulent Karoo, Nama Karoo, Thicket, Arid Grassland and Savannah Ecosystems.
- Ecological Impacts of land use on biodiversity
- Vegetation surveys & degradation assessment & mapping
- Long-term vegetation monitoring
- Faunal surveys & assessment.
- GIS & remote sensing

Tertiary Education:

- 1992-1994 – BSc (Botany & Zoology), University of Cape Town
- 1995 – BSc Hons, Cum Laude (Zoology) University of Natal
- 1996-1997- MSc, Cum Laude (Conservation Biology) University of Cape Town

Employment History

- 1997 – 1999 – Research Scientist (Contract) – South African National Biodiversity Institute
- 2000-2004 – Specialist Scientist (Contract) - South African National Biodiversity Institute
- 2004-2007 – Senior Scientist (Contract) – Plant Conservation Unit, Department of Botany, University of Cape Town
- 2007 Present – Senior Scientist (Associate) – Plant Conservation Unit, Department of Botany, University of Cape Town.

General Experience & Expertise

- Conducted a large number of fauna and flora specialist assessments distributed widely across South Africa. Projects have ranged in extent from <50 ha to more then 50 000 ha.
- Extensive experience in the field and exceptional level of technical expertise, particularly with regards to GIS capabilities which is essential with regards to producing high-quality sensitivity maps for use in the design of final project layouts.
- Strong research background which has proved invaluable when working on several ecologically sensitive and potentially controversial sites containing some of the most threatened fauna in South Africa.
- Published numerous research reports as well as two book chapters and a large number of papers in leading scientific journals dealing primarily with human impacts on the vegetation and ecology of South Africa.
- Maintain several long-term vegetation monitoring projects distributed across Namaqualand and the karoo.
- Guest lecturer at two universities and have also served as an external examiner.
- Reviewed papers for more than 10 international ecological journals.
- Past chairman and current committee member of the Arid Zone Ecological Forum.
- SACNASP registered as a Professional Natural Scientist, (Ecology) No. 400425/11.

A selection of recent work is as follows:

Specialist Assessments:

ESKOM 300MW Kleinsee Wind Energy Facility. Fauna Specialist Report For Impact Assessment. Savannah Environmental. 2012.

Karoshoek Solar Valley Development, Near Upington: Fauna & Flora Specialist Impact Assessment Report. Savannah Environmental. 2012.

Project Blue Wind And Solar Energy Facility, Near Kliensee. Fauna Specialist Report For Impact Assessment. Savannah Environmental. 2012.

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Richtersveld Wind Farm: Ecological and Biodiversity Assessment: Terrestrial Vertebrate Fauna & Botanical Specialist Study. Specialist Report for Environmental Resources Management (ERM). 2011.

Roggeveld Wind Farm: Ecological and Biodiversity Assessment: Terrestrial Vertebrate Fauna & Botanical Specialist Study. Specialist Report for Environmental Resources Management (ERM). 2011.

Witberg Wind Farm: Ecological and Biodiversity Assessment: Terrestrial Vertebrate Fauna & Botanical Specialist Study. Specialist Report for Environmental Resources Management (ERM). 2011.

Skuitdrift Solar Facility. Fauna & Flora Specialist Report for Basic Assessment. Specialist Report for Cape EAPrac. 2012.

Khoi-Sun Solar Facility. Fauna & Flora Specialist Scoping Report. Specialist Report for Cape EAPrac. 2012.

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APPENDIX 7.2: ECOINFO BASELINE BIODIVERSITY ASSESSMENT

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Mar 21, 2019 11:02

Informative Level Specialist Report: Vegetation Report For the Konkoonsies Extended Area Northern Cape

Commissioned by

EScience Associates (Pty) Ltd

Compiled by

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Report Status	**Version**	**File Route**
Final	2	Z:\projekte\Specialist_5solarsites_escience\Reports\tx\Konkoonsies\EkoInfo CC Vegetation Konkoonsies Extented_MS2kv2.doc

1 EXECUTIVE SUMMARY

Escience Associates requested EkoInfo CC to do a small scale/ coarse grain survey of a proposed solar park site, west of Kakamas in the Northern Cape. The main aim of the survey was to identify an area, in which the solar park could be developed which will have the least influence on the environment. The total study area covered 517 ha. The site visit was visited twice, once during January 2011 when the western area was assessed and a second time during March 2012 when the eastern area was assesed. The site is referred to as Konkoonsies.

The emphasis of the study was on literature and desktop review, with dominant plant species, vertebrate species (mammals, birds, herpetofauna) and photos recorded on site. **On a national level the study area is located with the least threatened** Bushmanland Arid Grassland **vegetation unit.** Based on the desktop review using satellite imagery, it was determined that the central section contains those areas which the transformation of the vegetation will have the least influence on a regional and local scale. Available information from national data sources such as South African National Biodiversity Institute and Council of Geoscience, **it was determined that there is a high probability that four vulnerable threatened Red Data plant, sixty plus provincially protected, two nationally protected, seven (7) plants with medicinal properties and three alien invasive species could occur within the study area**. Please note that the presence of the provincially protected species, *Hoodia gordonia* was confirmed during the site visit on a sand covered outcrop along the northern boundary of the eastern area.

With regards to fauna, the presence of jackal and suricates were noted, but no specific species of concern.

In discussions with a conservation official of Northern Cape Province, it was confirmed that a permit will be required for the move or destruction of any provincially protected species. However, the Record of Decision (ROD) needs to be submitted with the permit application as well as the density (number of protected species) to be moved or destroyed. **Therefore the presence/ absence of the potentially present protected species based on the PRECIS data will have to be confirmed and there density determined; and permits obtained PRIOR to the commencement of construction.**

The most optimal period to do these assessments will be during the summer months.

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2 INTRODUCTION

EScience Associates Pty (Ltd) approached EkoInfo CC to assist them with an informative level/ small scale/ coarse grain ecological assessment for the expansion/ extension of a proposed solar park development, near Kakamas in the Northern Cape (Figure 1). The site is referred to as Konkoonsies. EkoInfo CC did an original assessment in January 2011, while an additional survey was done in March 2012.

2.1 Scope of work/ Terms of reference

South Africa's National Environmental Management Act (NEMA No 107 of 1998) and National Environmental Management: Biodiversity Act (NEMBA No 10 of 2004) requires the protection and effective management of the environment with specific emphasis on ecosystem – and species diversity and specific systems such as wetlands.

Therefore the terms of reference relates to these broad objectives in providing:

1. An environmental overview of the areas in which the proposed sites are located
2. The ecosystems associated with these proposed areas
3. Species of concern such as threatened Red Data flora, nationally or provincially protected plants, medicinal plants and alien invasive species, which could occur in these areas.

To achieve these objectives a literature and desktop review was done based on scientific and popular publications, small - and large-scale Geographic Information System (GIS) datasets and a site visit during January 2011 for the western area and during March 2012 for the eastern area.

During the January 2011 site visit, the emphasis was placed on identifying an area of less 20 ha, however during the March 2012, the eastern section was evaluated and the area subsequently assessed as a unit.

2. 1. Limitations

1. The site visit was done over a three-day period during January 2011, the least optimal period to assess the presence of threatened Red Data flora in the area and over a one-day period in March 2012.
2. No plants were sampled during the site visits; only conspicuous vegetation/ habitat variation was noted and documented using digital photographs, video recordings and a relational database (Appendix B). Therefore it was not possible to describe and map the vegetation communities present within the areas using recognised scientific methods such as the Braun-Blanquet approach. Simon Todd Consulting (Appendix D) did a detail assessment with regards to the presence of species of concern (Red Data and protected, both provincial and national) for the western section, however the report does not show the extent and distribution of the local vegetation units or the ecological drivers (geology, topography, soil, slope, aspect, soil conditions) associated with them for the western area.
3. The main sources of information for this report were international, national and regional data sources such as:
    a. International level – Digital Elevation Model (DEM) from ESRI World Dataset CD National level - 1: 250 000 or less scale wetland data from BGIS at SANBI[1]
    b. National level – 1: 250 000 or less scale landform data from BGIS at SANBI
    c. Regional level - 1: 250 000 scale geology data from the Council of Geoscience
    d. Regional level - 1: 250 000 scale land type data from the Institute for Soil, Climate and Water
    e. Regional level - 1: 250 000 scale vegetation data from the VEGMAP publication at SANBI
    f. Local level – 1: 50 000 scale topocadastral maps from the Surveyor – General

[1] South African National Biodiversity Institute

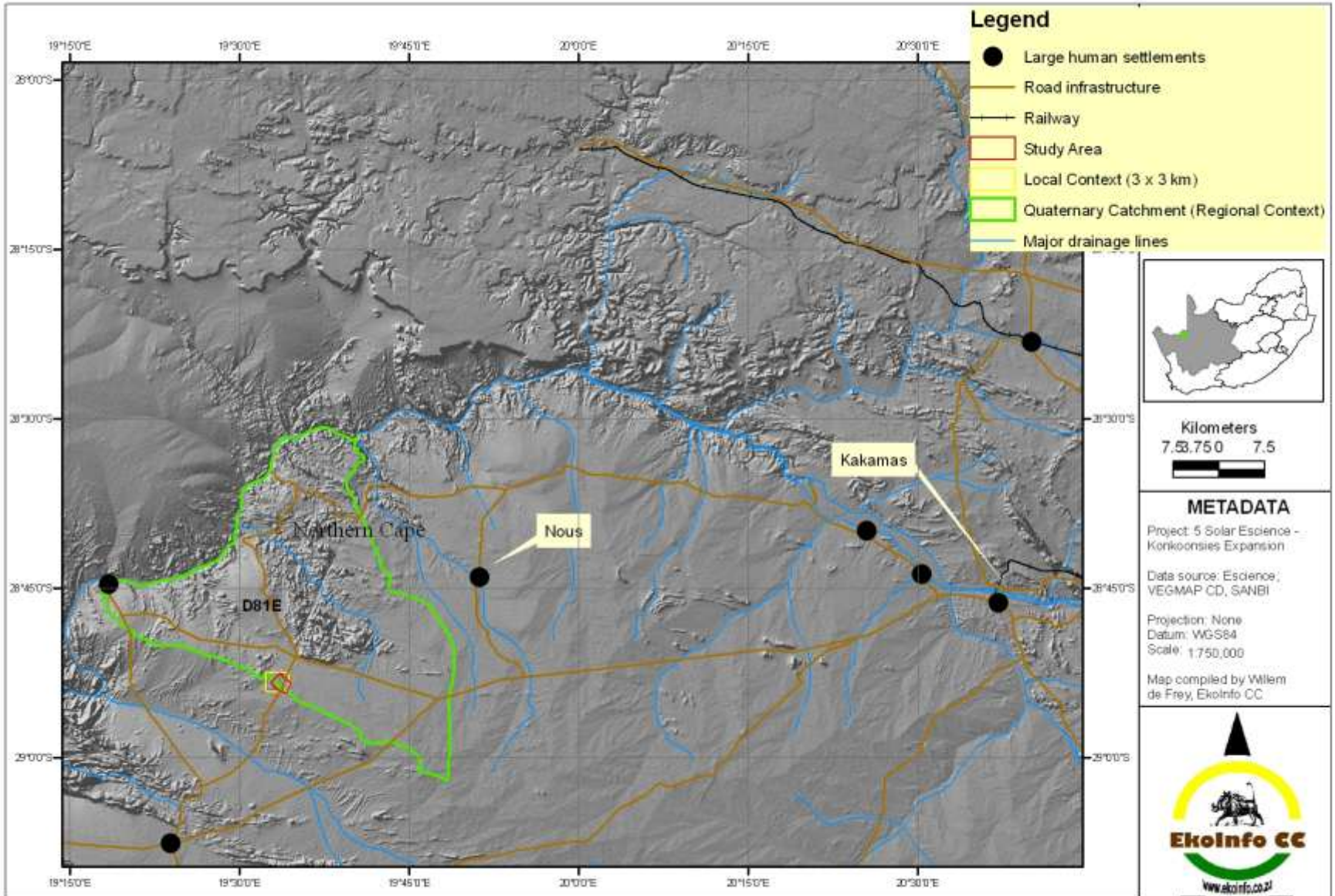

Figure 1: National and provincial orientation of the proposed solar panel power station in the Northern Cape, South Africa

g. Local level – 1: 50 000 or larger scale aerial image from Google Earth

4. The absence of 5 m or less contours significantly hampered the ability to assess the influence of the topography on the distribution of vegetation and the potential location of drainage zones and wetlands.

3 STUDY AREA

This site of 524 ha is located west of the town of Kakamas (Figure 1); it represents agricultural land with a single non-perennial drainage line draining towards north, in the most northern corner (Figure 2.A). A gravel road separates the area in a western and eastern area. On the Google Earth Image (Figure2.B), an ESKOM substation (Paulputs) is located along the northeastern boundary of the western area. Large outcrops occur towards the northwestern boundary. Both a low and high voltage power line transects the area towards the south. Two watering points for domestic animals also occur within the area. In the eastern area sand covered ridge occurs along the northern boundary, while the rest of the area is flat and covered with shrubs.

The vegetation consists mainly of sparsely distributed shrubs with grasses and forbs in between (Photo plate 1 & 2), in the northeastern corner a clump of thorn trees (*Acacia melifera*) occurs in association with drainage line

4 ENVIRONMENTAL OVERVIEW

An environmental overview is provided of the site to assist in understanding the ecological drivers at landscape level, which influence the distribution of vegetation and therefore habitat of animals in the area. This section follows the ecological sequence namely: geology, climate, topography, soil, vegetation and human influences.

4.1 Geology

The geology present in the study area consists of rocks from the Mokolian Era (old – 1 billion years ago) and quaternary period (young – 23 million years ago)), consisting of a mosaic of sedimentary (young), igneous and metamorphic rock (older) (Figure 3) (Viljoen & Reimold 1999, Johnson, Anhaeusser & Thomas 2006).

The igneous and metamorphic rock represents inliers in a sea of younger sedimentary deposits (Read & Watson 1983).

The geological composition in conjunction with the climate influences the topography of the landscape in which these two sites occur, with igneous rock tending to form the higher lying areas (outcrops) and the sedimentary rocks forming the plains due to mechanical weathering in arid climates (Read & Watson 1983, Strahler & Strahler 1987).

4.2 Climate

The study area is located within the Southern part of Namibia and Namib, Hot Desert Climate Zone (SWAs) (Figure 4), with rainfall in summer and autumn, representing the Köppen-Geiger System of Climate Classification region: BWhw. The BWhw climate region represents Dry climates (B), more specifically desert climate (W), being dry and hot with the mean annual temperature above 18° (h), with the dry season in the winter (w) (Strahler & Strahler 1987).

Figure 5 provides an overview of the mean rainfall and temperature expected to occur at the site with the town of Kakamas providing the reference weather information.

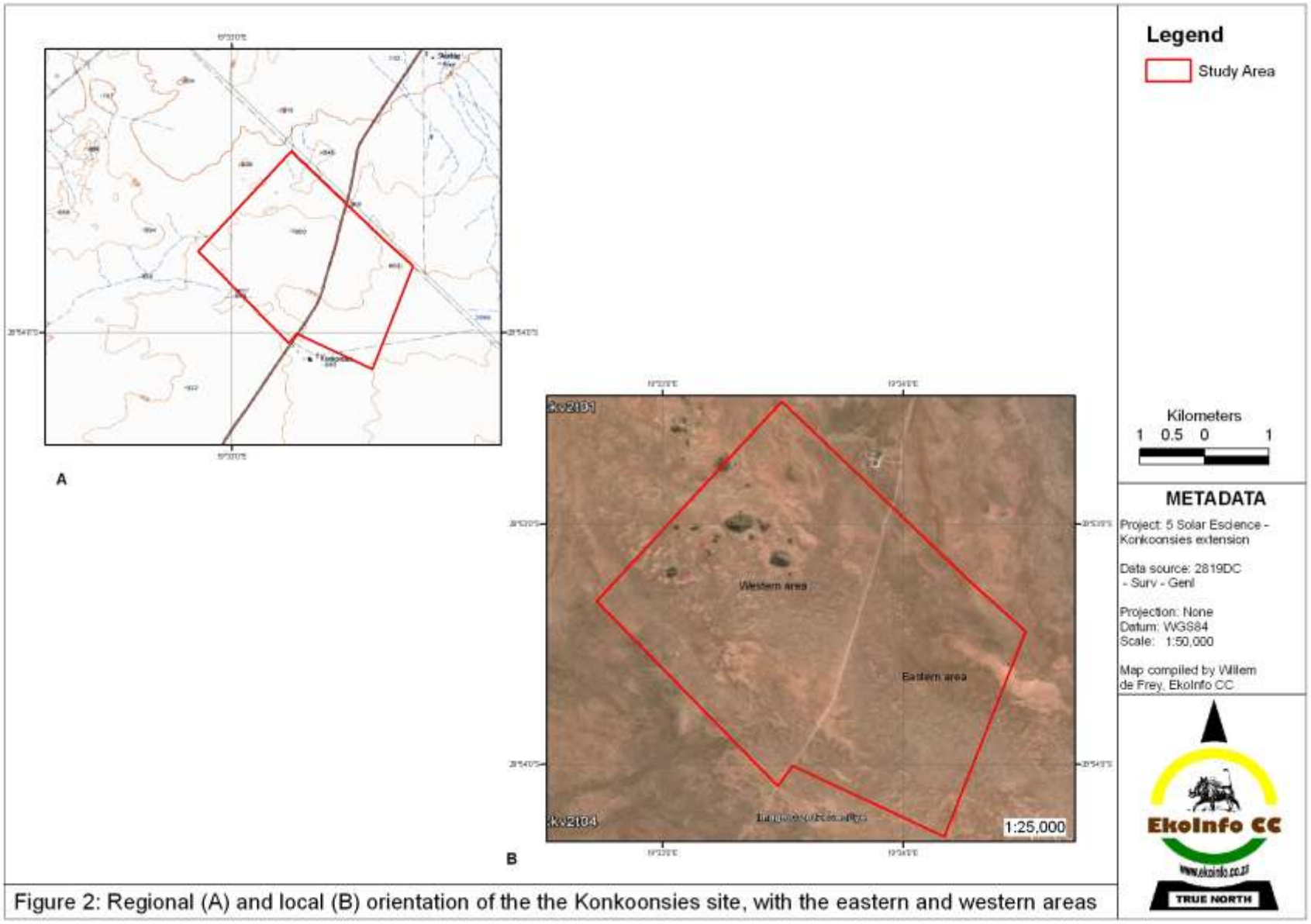

Figure 2: Regional (A) and local (B) orientation of the the Konkoonsies site, with the eastern and western areas




Photos towards the north, east, south and west from the large outcrop in the centre of the area




Photos towards the north, east, south and west from the northwestern corner of the area, associated with the drainage line




Photos towards the north, east, south and west from the southwestern corner of the area

Photo plate 1: Overview of the western section observed during the January 2011 site visit




Photos from along the northern boundary towards the north, east, south and west




Photos from the centre of the eastern area towards the north, east, south and west




Photos from the southern section of the eastern area towards the north, east, south and west

Photo plate 2: Overview of the western section observed during the Mach 2012 site visit

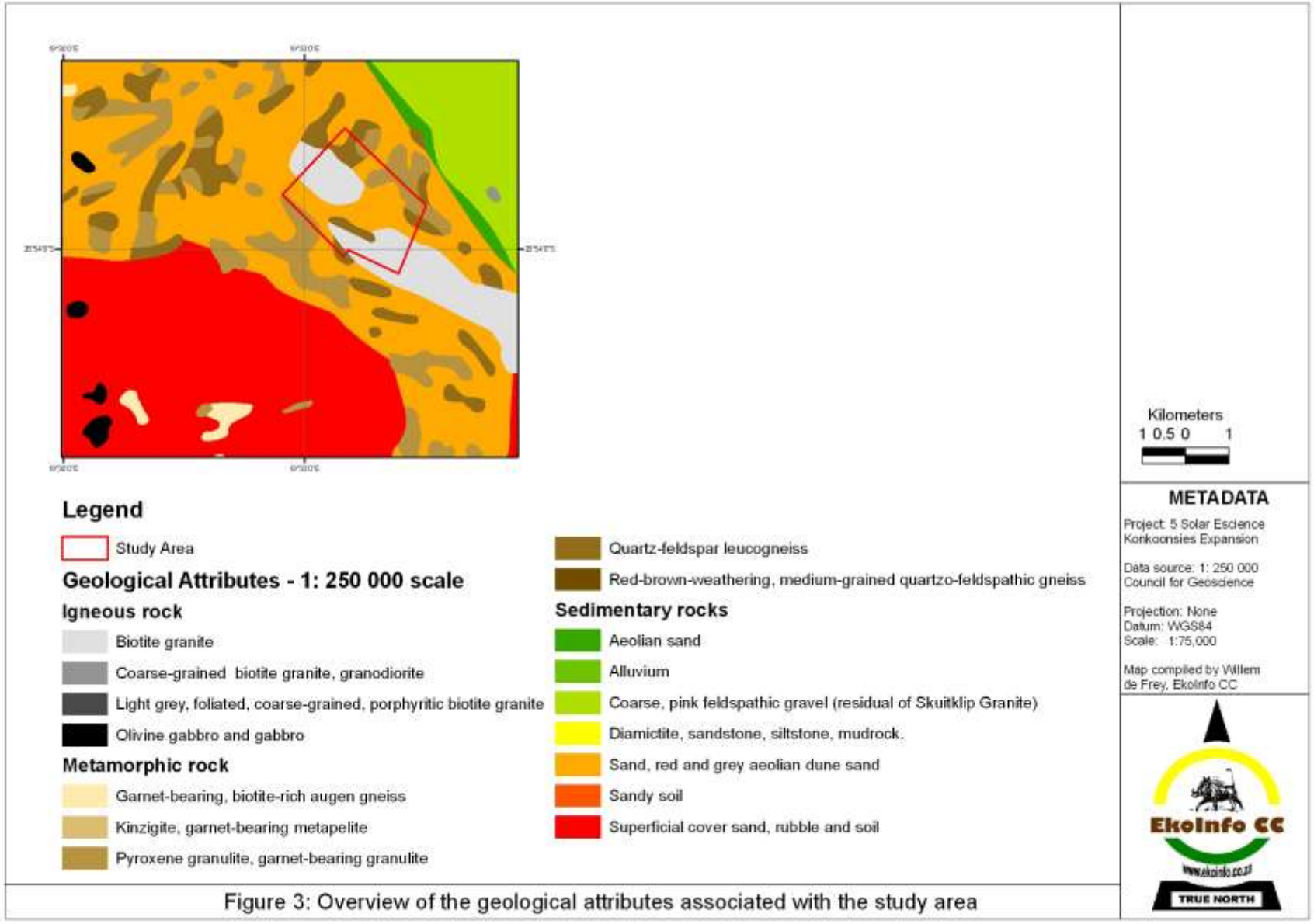

Figure 3: Overview of the geological attributes associated with the study area

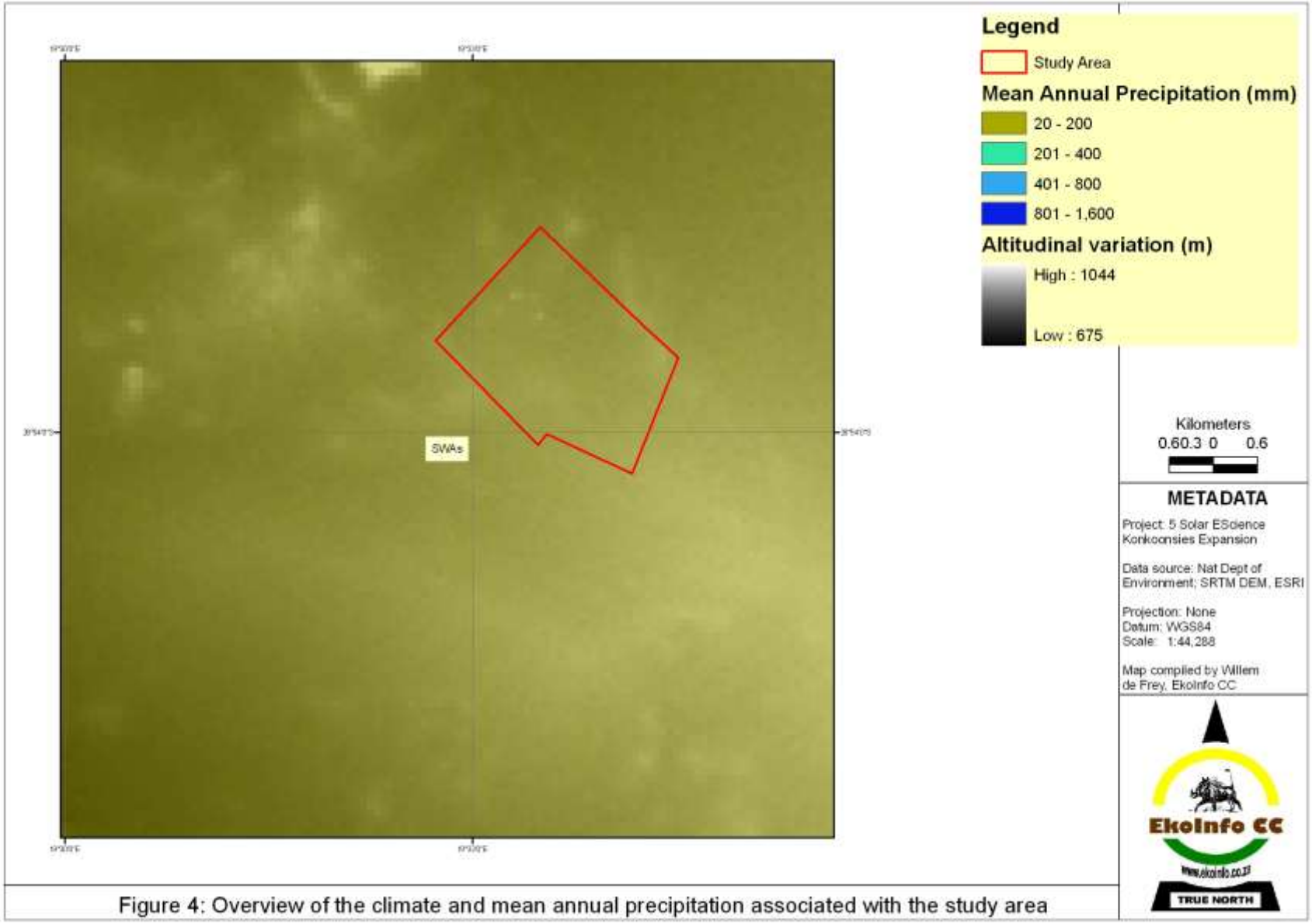

Figure 4: Overview of the climate and mean annual precipitation associated with the study area

Kakamas normally receives about 62mm of rain per year, with most rainfall occuring mainly during autumn. The chart below (lower left) shows the average rainfall values for Kakamas per month. It receives the lowest rainfall (0mm) in June and the highest (19mm) in March. The monthly distribution of average daily maximum temperatures (centre chart below) shows that the average midday temperatures for Kakamas range from 20°C in July to 33°C in January. The region is the coldest during July when the mercury drops to 3.1°C on average during the night. Consult the chart below (lower right) for an indication of the monthly variation of average minimum daily temperatures.

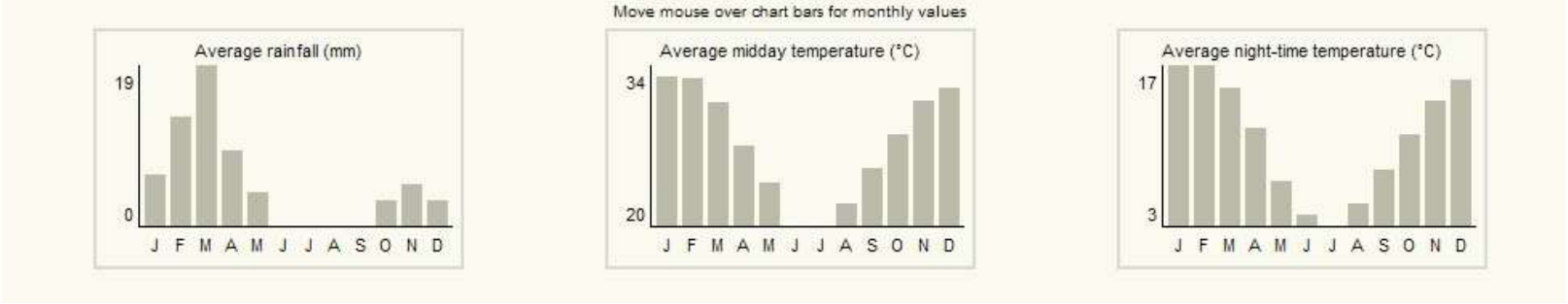

Figure 5: Overview of the mean annual rainfall and temperature per month for the closest town Kakamas

It is therefore clear that the average rainfall in the area is below 100 mm per year and therefore the main agent of landform development in the landscape is mechanical weathering, of which wind is the active agent (Read & Watson 1983, Strahler & Strahler 1987).

4.3 Topography and drainage

The study area is located below 1 000 metres above sea level (m.a.s.l.) (Figure 6); with the southern section located at 900 m.a.s.l, and the northern section at 800 m.a.s.l.

Non-perennial drainage lines drain the area towards the north and west.

A slope analysis of both sites based on the SRTM Digital Elevation Model (DEM)[2] which have a field proven vertical accuracy of 5m, indicates the presences of slopes with slopes of more than 5° associated with ridges (Figure 7). These slopes correlate with the outcrops, visible on the Google Image.

Using SAGA GIS[3]'s standard terrain analysis in conjunction with the available SRTM DEM, it is possible to model; the probability for water to accumulate in an area, as well as the direction this concentrated/ accumulated water will drain (Figure 8). From this analysis it is apparent that due to the flatness/ levelness of the overall landscape, water should it occur would tend to pond/ accumulate throughout the landscape depending on the nature of the soil and level of vegetation cover.

It should be noted that higher resolution topographic data such as 1 m contours would provide a much better model of the potential zones of water accumulation/ concentration within the sites. This could be of significance in spite of the fact that the sites are located in a low rainfall area; the issue here is sporadic catastrophic rainfall events, which could result in localised flooding due to the low density of vegetation and flat terrain (Strahler & Strahler 1987). Thus areas which might be without any pronounced signs of water, could suddenly become wetlands, as permanent water/ saturated soils is not a minimum requirement of wetland classification, but an indicator of a specific zone. Therefore the landscape could be dotted with temporary wetlands during and after high rainfall events, especially in areas where the soil is less permeable (fine textured soils or thin soil cover over rocks) (Photo plate 3).

4.4 Soils

The study area is associated with red apedal, freely drained soils with a high base status and is less than 300 mm deep (Land type Ag37) (Figure 9).

Red and yellow-brown apedal soils represent oxidic soils (Fey 2010). Soils with red and yellow-brown apedal B horizons develop from most parent materials under a wide range of climatic conditions. As, a general rule, however, red colours are more prevalent under warmer, drier circumstances and/ or in soils derived from more ferruginous (e.g. mafic) parent materials; conversely, yellow colours signify moister, cooler, more acidic environments and/ or a parent material lower in weatherable, iron-containing materials (Fey 2010). The main connotation associated with oxidic soils is the relatively free drainage and well-aerated condition of the B horizon. Yellower colours (from goethite) are generally associated with cooler, moister conditions than those linked with red colours (hematite) (Fey 2010).

Inspection of the Google Earth Images (Figure 2) reveals a mosaic of darker and lighter areas, with the darker red areas associated with well drained, warmer areas and the lighter/ yellower/ greyer areas hinting at less well drained/ more leached, cooler areas.

[2] http://srtm.usgs.gov/index.php
[3] http://www.saga-gis.org

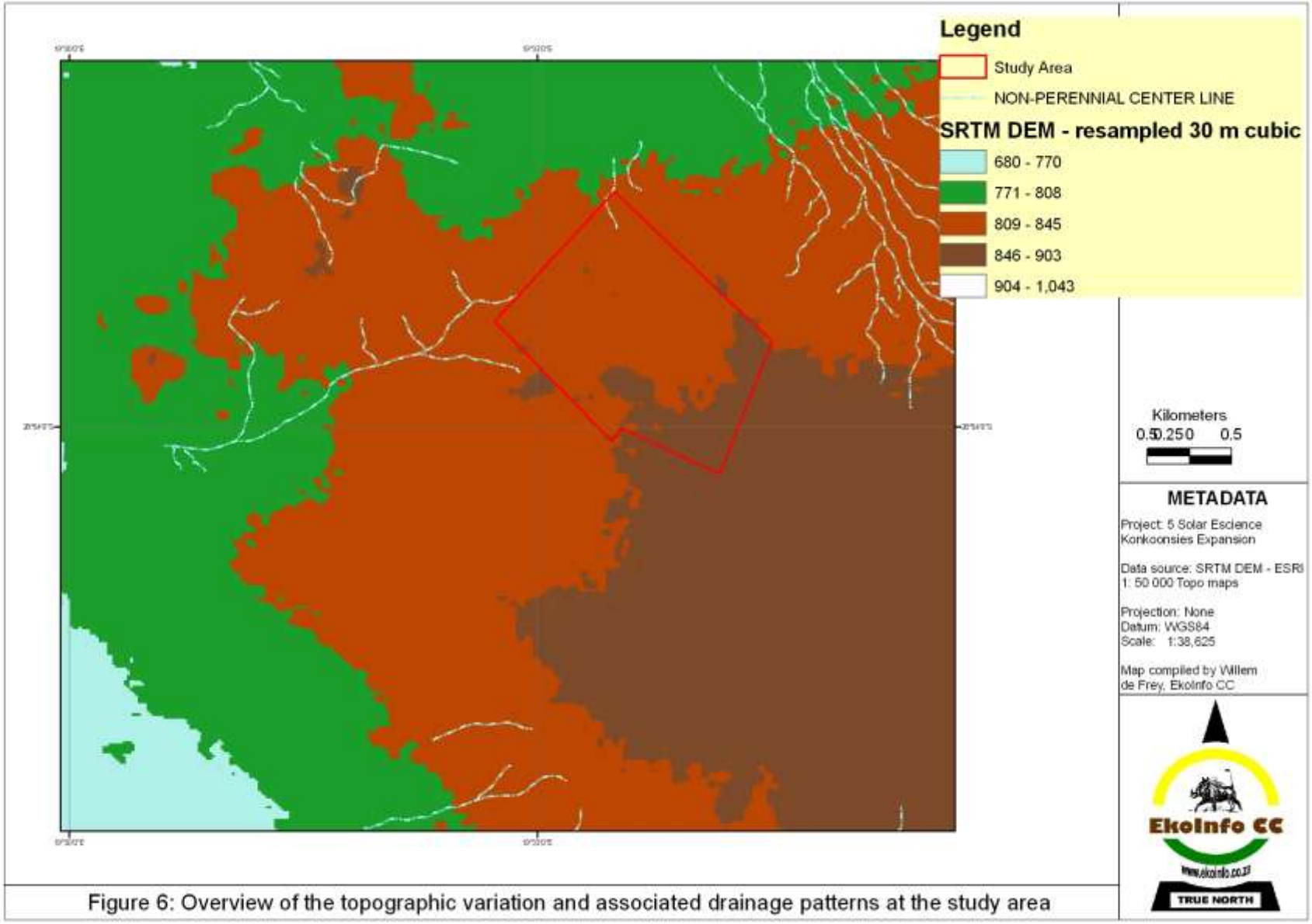

Figure 6: Overview of the topographic variation and associated drainage patterns at the study area

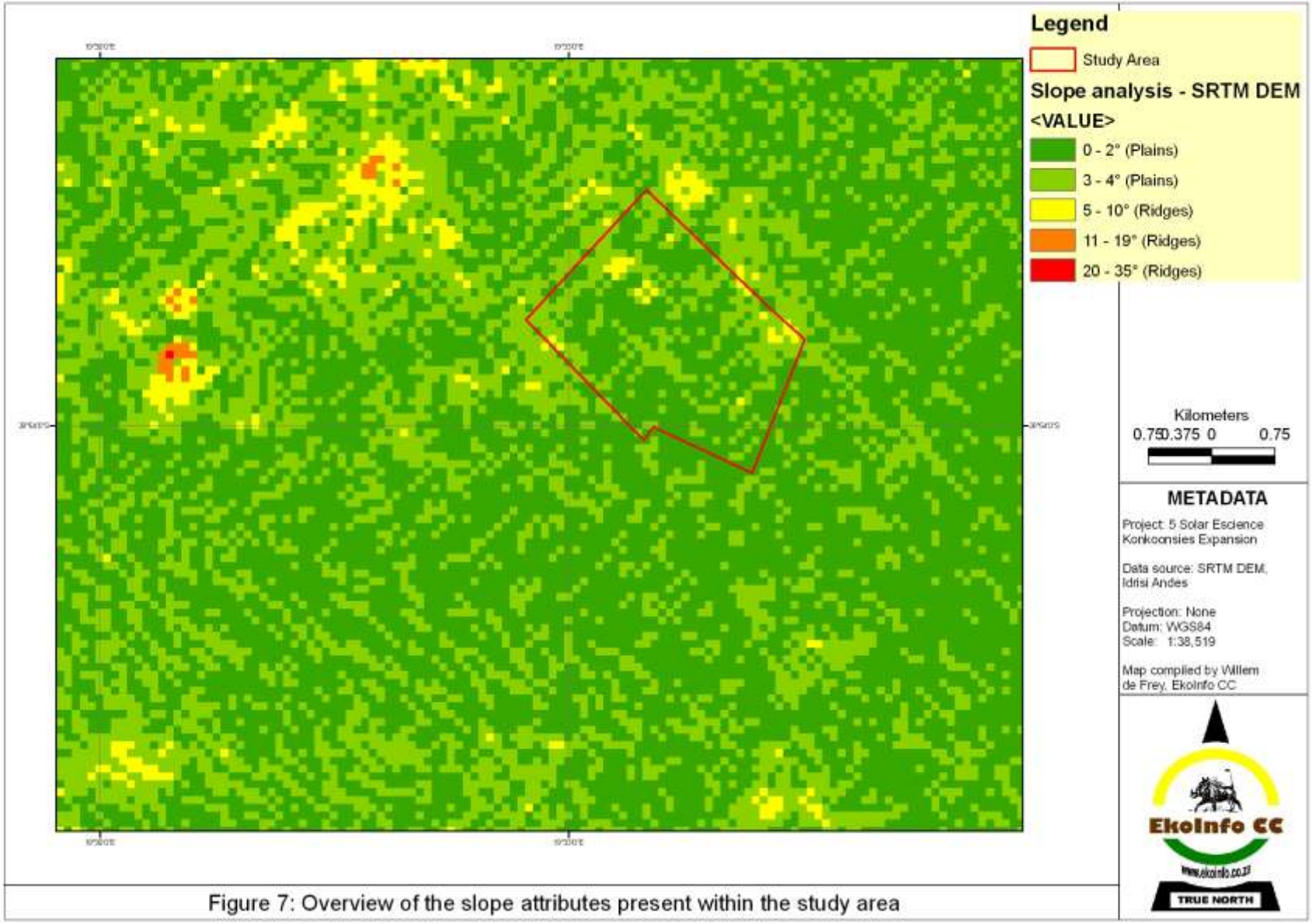

Figure 7: Overview of the slope attributes present within the study area

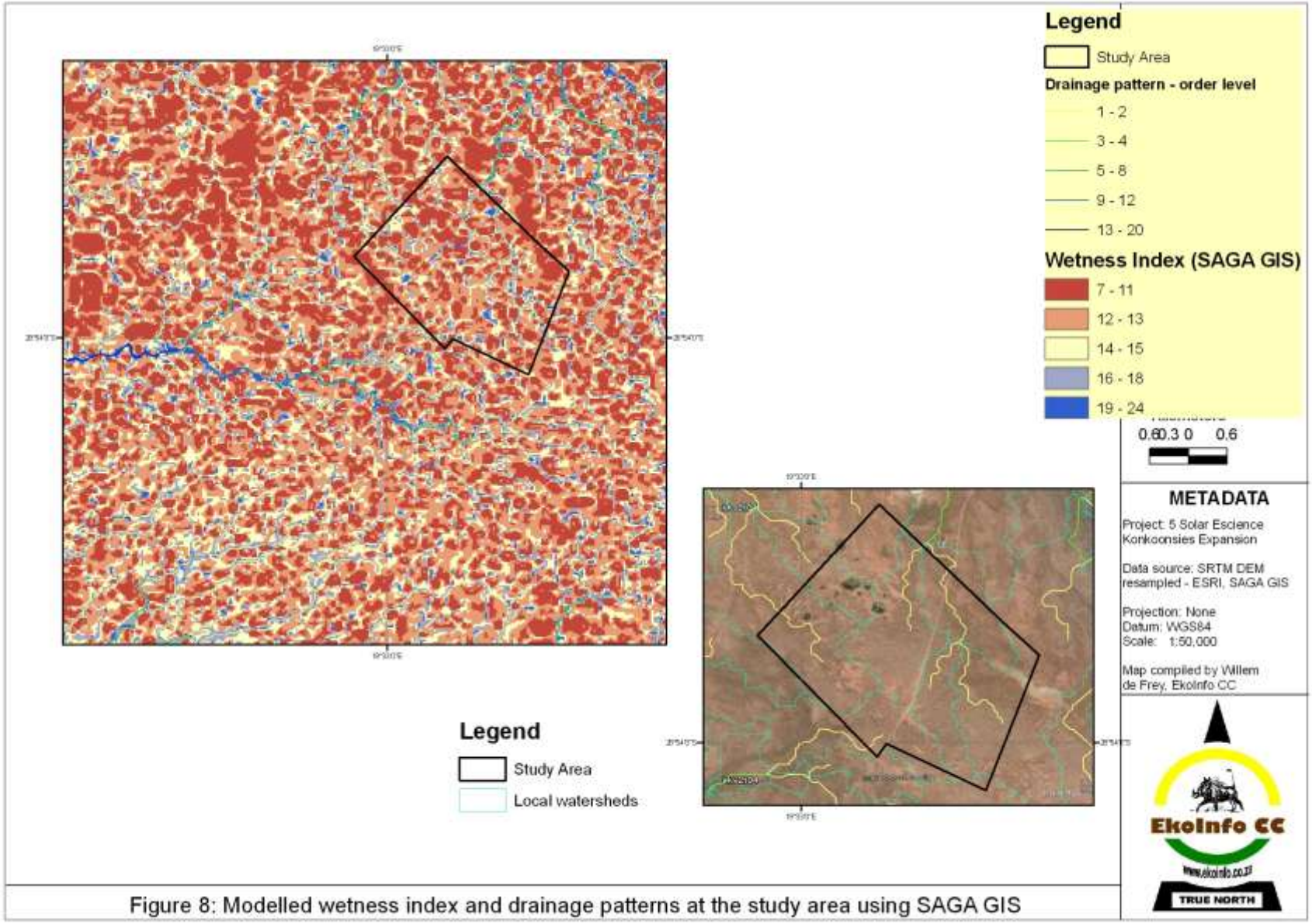

Figure 8: Modelled wetness index and drainage patterns at the study area using SAGA GIS



An example of a localised rainfall event, which results in the accumulation of water in depressions amongst the rocks or the movement of sediment within the normally dry streambeds (January 2011 survey – western area)

Photo plate 3: Overview of potential temporary wetland locations with the landscape

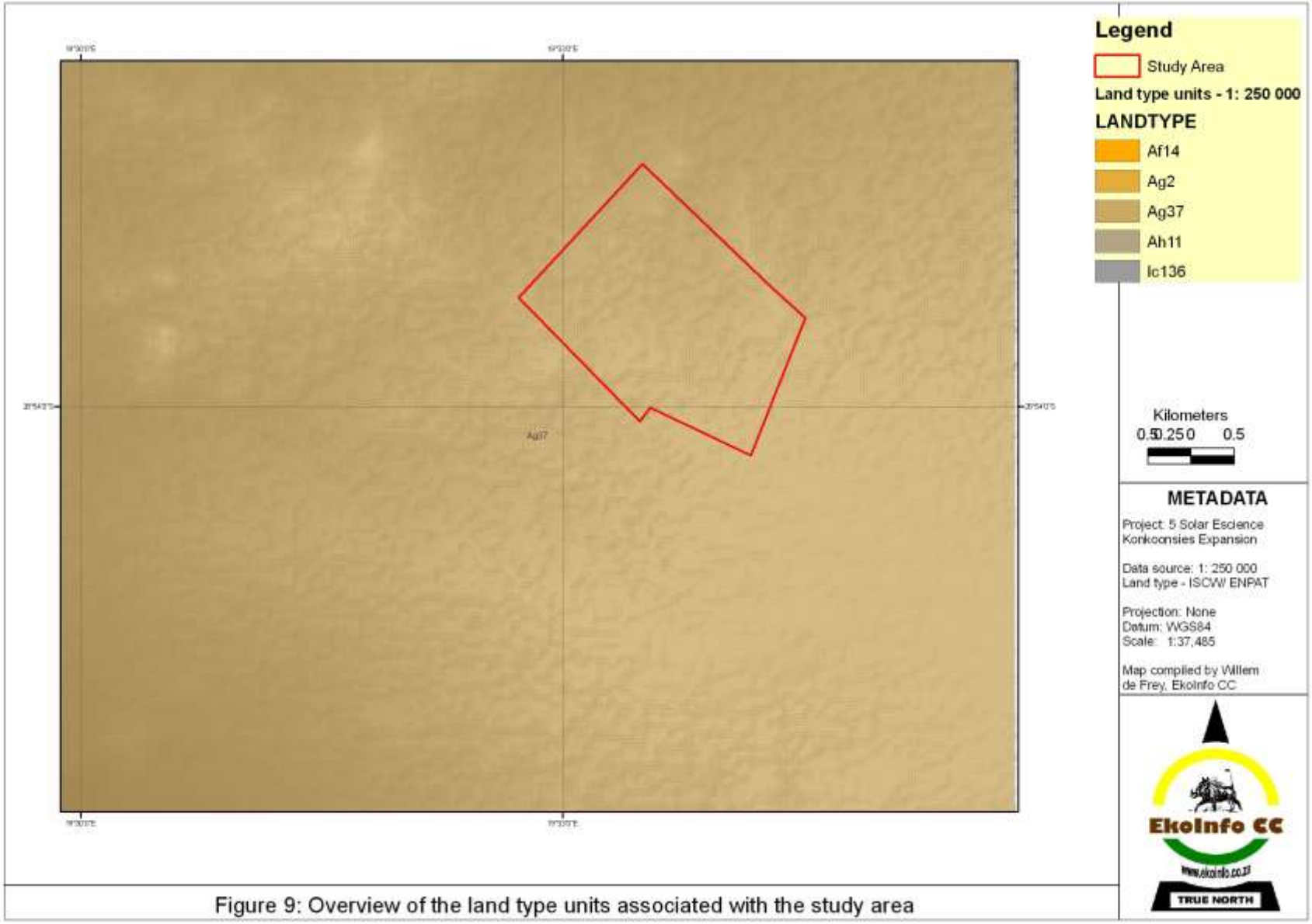

Figure 9: Overview of the land type units associated with the study area

It is expected that herbivores will favour the lower lying areas as the higher clay content should increase the nutrient levels and moisture retention ability of the soils, therefore representing the sweetveld at a local scale, with the sourveld occurring higher up in the landscape. The sweetveld areas tend to be overgrazed resulting in the encroachment of pioneer and alien invasive species. This trend is present within the study area, towards the northern corner in association with the non-perennial drainage line where a large stand of *Acacia melifera* shrubs occur (Photo plate 3)

It should be noted that on a national level, the drier western side of the country represents sweetveld compared to the wetter east, which represent sourveld (Bothma 1995). This implies that these areas are less prone to fires due to the lower density of vegetation and as a lower carrying capacity than the areas to the north; therefore they require intensive management to prevent overgrazing and veld degradation.

4.5 Regional vegetation

The study area is located within the Bushmanland Arid Grassland, which belong the Nama – Karoo Biome (Mucina & Rutherford 2006). The conservation status of both this regional vegetation unit is **least threatened**.

4.5.1 Bushmanland Arid Grassland

This regional vegetation unit is associated with: “extensive to irregular plains on slightly sloping plateau sparsely vegetated by grassland dominated by white grasses (Stipagrostis species) giving this vegetation type the character of semidesert ‘steppe’. In places low shrubs of Salsola change the vegetation structure. In years of abundant rainfall rich displays of annual herbs can be expected.

Biogeographically important taxon (Bushmanland endemic) is the succulent herb: *Tridentea dwequensis*, while other endemic taxa are the following succulent shrubs: *Dinteranthus pole-evansii, Larryleachia dinteri, L. marlothii, Ruschia kenhardtenis* and the following herbs: *Lotononis oligcephala, Nemesia maxii*.

As indicated above, its conservation status is least threatened, with a conservation target of 21%. Only small patches statutorily conserved in Augrabies Falls National Park and Goegab Nature Reserve. Very little of the area has been transformed. Erosion is very low and low.” (Mucina & Rutherford 2006).

Observations made during the site visit in January 2011 and March 2012 and the subsequent literature – and desktop review confirms that the study area is located within the Bushmanland Arid Grassland

4.5.2 Land cover/ human influences

From the available 2000 land cover classification system (Figure 11), it is evident that the study area is associated with shrubland and fynbos. This implies that the majority of the vegetation does not exceed 5 m in height, with typical height for the Nama-Karoo biome being in the order of 1 m (Mucina & Rutherford 2006). Small trees occur only along drainage lines or on rocky outcrops – habitats with special hydropedological microclimate characteristics (Mucina & Rutherford 2006).

Thus at a national level, no transformation is present within these sites and their immediate surrounding areas, therefore it can be stated that these sites form part of natural, intact landscapes.

It should be noted that the unimproved grassland indicated within the study area correlates better with stands of *Acacia melifera* present in these areas.

On a local scale, an ESKOM substation occurs as well as gravel roads and water holes for livestock.

If total transformation of the study area for the development of the proposed solar panel station and its associated infrastructure is assumed, it will contribute to loss of habitat in terms of the regional vegetation unit of less than 1% (Table 1). **Therefore, the construction of the solar panel station on its own will not significantly contribute to habitat loss on a regional scale.** Due to the presence of other power generation infrastructure (power lines), it is not possible to utilise the whole property and therefore the loss in habitat will even be less.

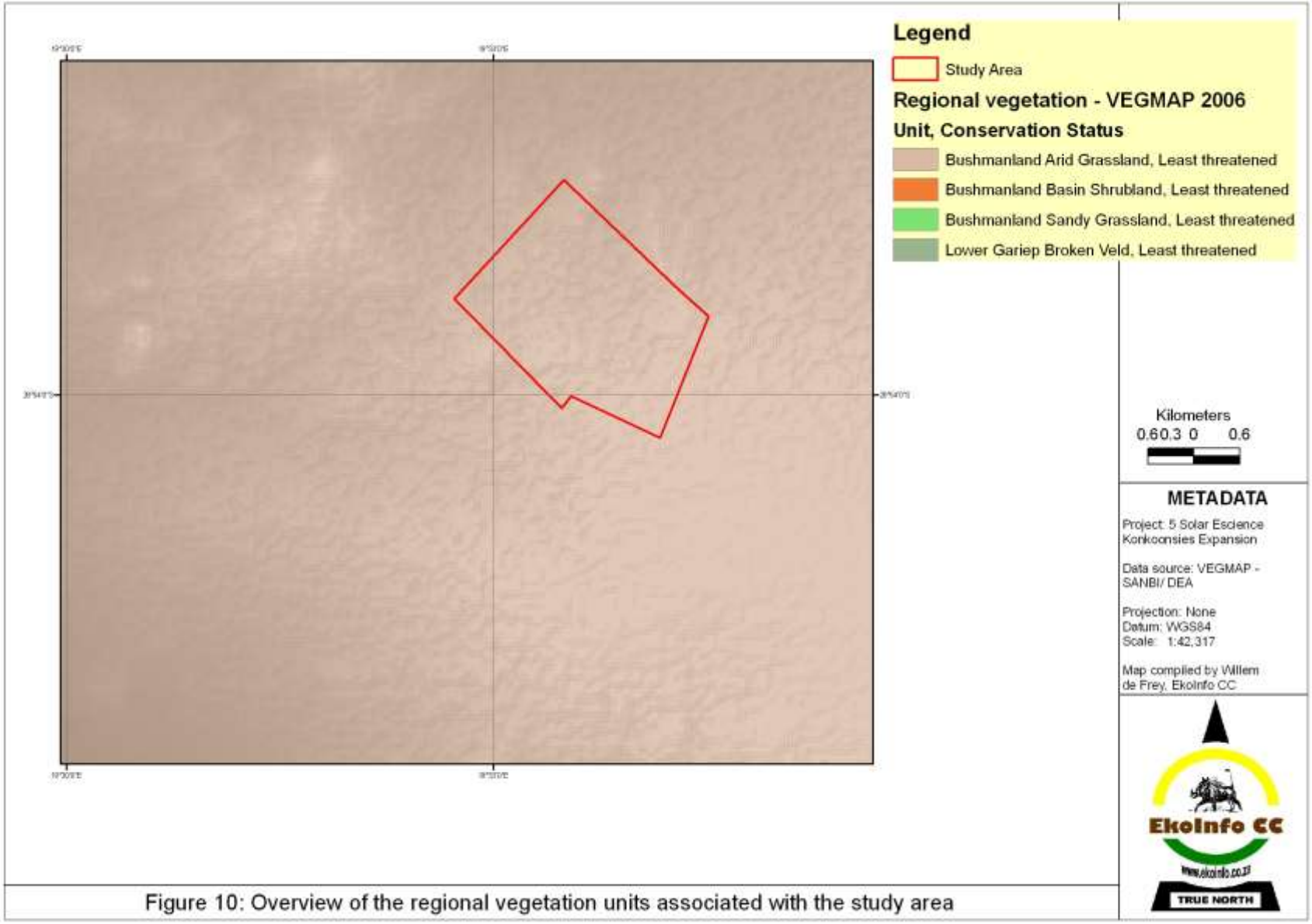

Figure 10: Overview of the regional vegetation units associated with the study area

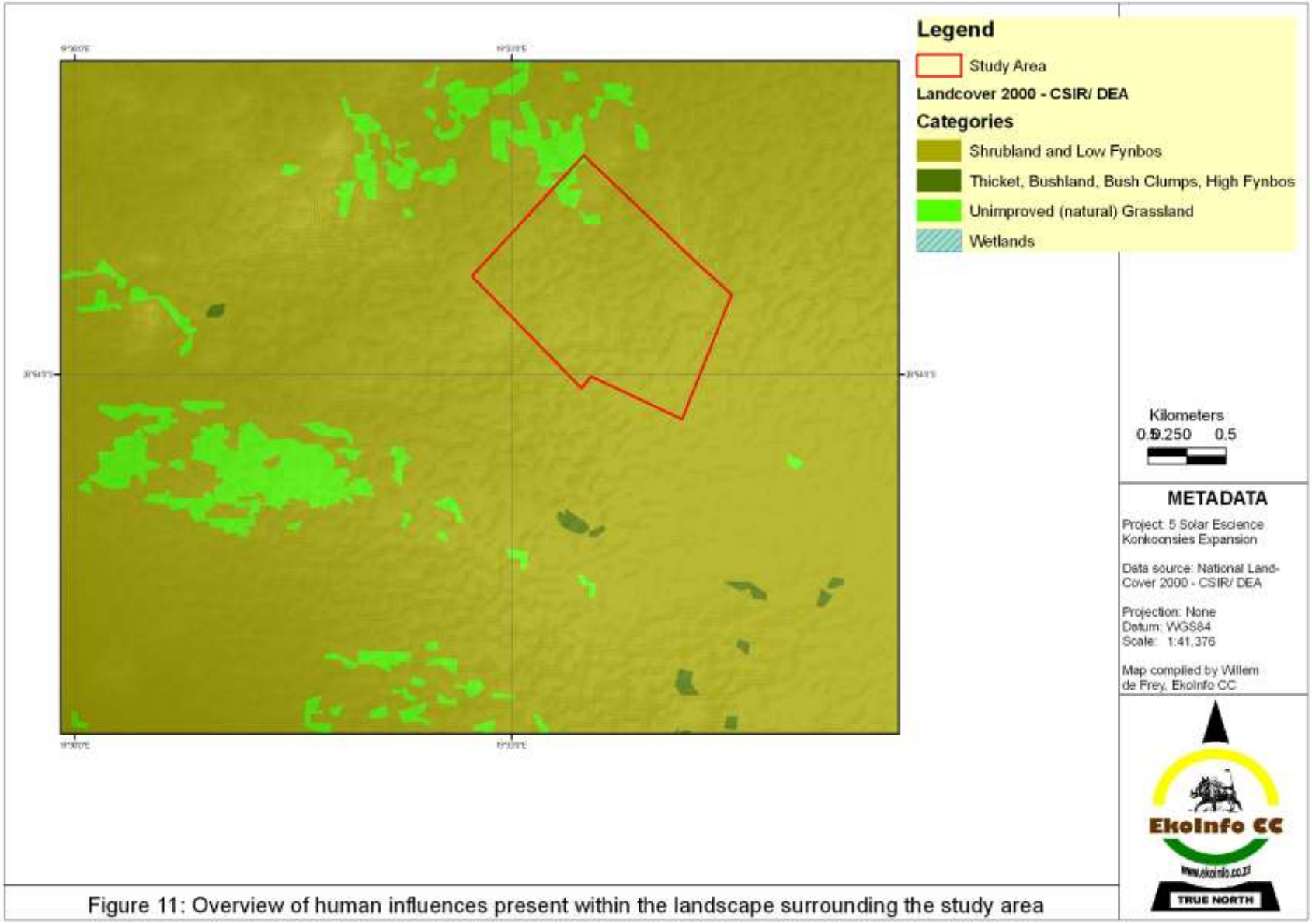

Figure 11: Overview of human influences present within the landscape surrounding the study area

Table 1: Overview of the contribution of habitat loss at the study area, assuming hundred percent (100%) transformation of the study area for solar panel infrastructure.

Biome	Regional vegetation	Km^2	Percentage remaining	Protection Status	Site Extent (ha)	Footprint Extent (ha)	Site extent (km2)	Footprint Extent (km2)	Total transformation assumed of study area percentage loss per Vegetation unit
Nama-Karoo Biome	Bushmanland Arid Grassland	45479	99.4%	Hardly protected	517	517	5.17	5.17	0.01%

5 RESULTS

These results reflect the **combined observations** made during the site visits in **January 2011 and March 2012**, as well as information obtained from the literature, desktop review and other specialist contributions (Appendix D).

5.1 Ecosystem diversity

The literature review indicated that the study area is located within a single regional vegetation unit (ecosystem) on a national scale.

However at a local scale (farm level), the local variation in altitude, slope, aspect and soil conditions results in local vegetation communities or ecosystem. Although a detailed assessment of these local vegetation communities was beyond the scope of this report, satellite imagery was used to highlight the local ecosystem diversity within the area (Figure 12) and on site (Figure 13).

At a regional level using Landsat 7 bands[4] 1, 2, 3, 4, 5 and 7 in an unsupervised classification, the cluster within the site of which there is more than 10% of both in the landscape and within the site, which should have the least influence if it is transformed, will be cluster 3 (Table 2).

If the same principal is applied at a local scale (farm level), using only band 2, 3 and 7 (Figure 13), the cluster with the potential to have the least influence should a portion of it be transformed is cluster one (Table 3).

Figure 14 shows the overlay of both the regionally and locally potential areas of least influence. If the proposed solar panel station footprints are located within the areas where these two layers overlap, then in principal the construction of these stations will have the least influence on both regional and local level.

Figure 15 shows the distribution and extent of only the overlapping potential areas of least influence. The overlapping areas at the site cover 175 ha of the site (Table 4). The overlapping areas of least influence represent 34% of the total study areas (517 ha) (Table 4).

5.2 Species of concern/ species diversity

As a detailed species account of the species present at the site was beyond the scope of the document, species information was obtained from SANBI's website Plants of Southern Africa (POSA)[5] as well as the PRECIS officer at SANBI.

With the exception of one, the nine quarter degree grids associated with the study area had been poorly sampled (Table 5), according to SANBI's data objectives, because they reflect less than 200 species per grid, these grids needs to be surveyed in more detail at some stage.

Between the nine grids, a total of 407 species were recorded (Appendix B), representing 34 families and 77 genera. The following six (6) families contain more than 50% of the species: Asteraceae, Poaceae, Fabaceae, Mesembryanthemaceae, Scrophulariaceae, Acanthaceae. The following 59 genera contain more than 50% of the species: Abutilon, Acacia, Acanthopsis, Aizoon, Albuca, Aloe, Anacampseros, Aptosimum, Aristida, Asparagus, Avonia, Berkheya, Blepharis, Cleome, Commiphora, Conophytum, Crassula, Cucumis, Cyperus, Diascia, Dimorphotheca, Dinteranthus, Diospyros, Drosanthemum, Enneapogon, Eragrostis, Eriocephalus, Euphorbia, Euryops, Felicia, Galenia, Helichrysum, Hermannia, Indigofera, Jamesbrittenia, Kohautia, Lapeirousia, Lasiopogon, Lessertia, Limeum, Lotononis, Lycium, Manulea, Melolobium, Mesembryanthemum, Microloma, Monechma, Nemesia, Nicotiana, Ornithoglossum, Osteospermum, Pharnaceum, Polygala, Pteronia, Salsola, Searsia, Senecio, Stipagrostis, Zygophyllum.

[4] Band 1 – Visible Blue, Band 2 – Visible Green, Band 3 – Visible Red, Band 4 – Near Infrared, Band 5 – Mid Infrared, Band 7 – Mid Infrared
[5] http://posa.sanbi.org/searchspp.php

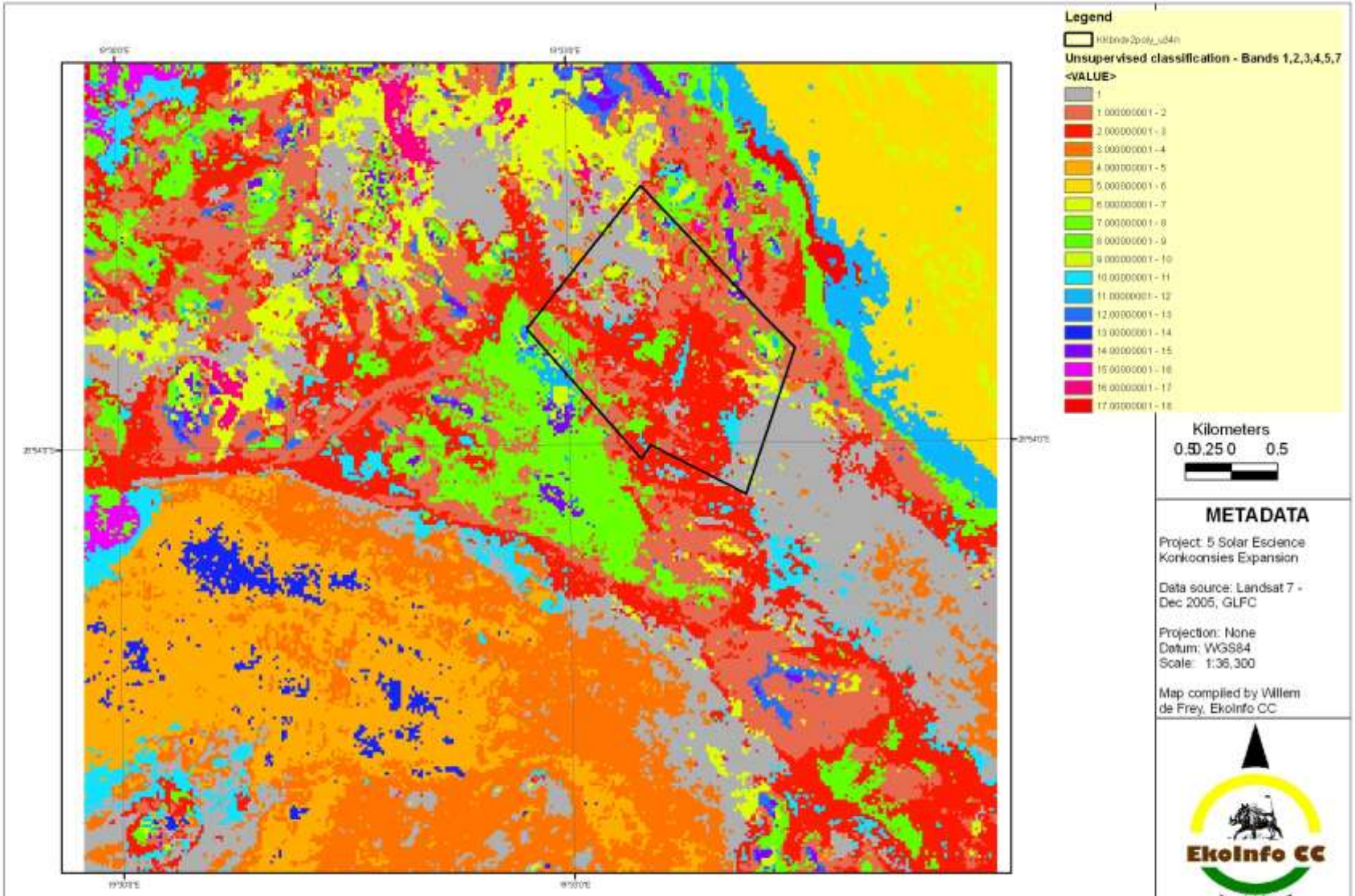

Figure 12: Overview of the potential ecosystem diversity associated with the study area based on satellite imagery

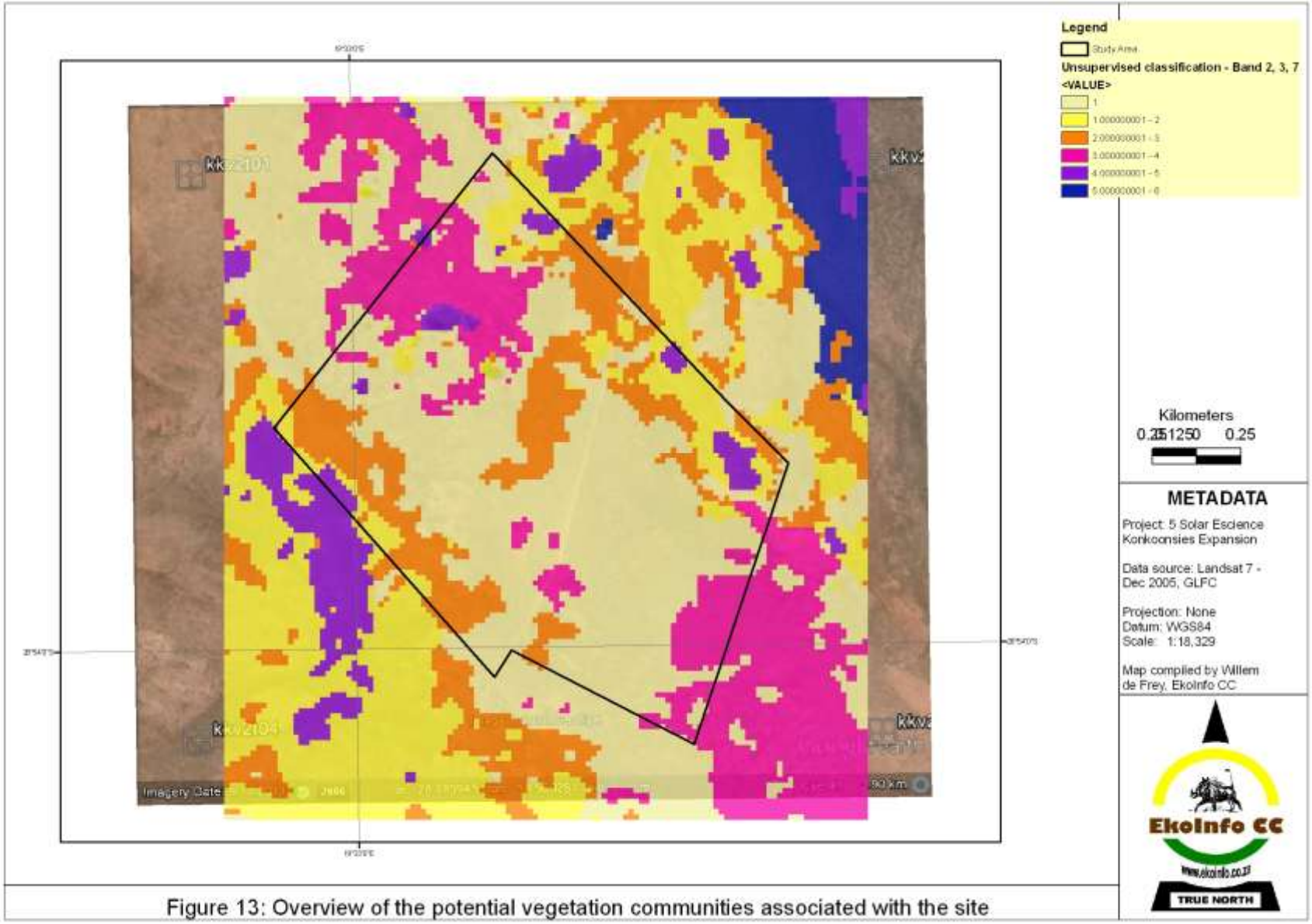

Figure 13: Overview of the potential vegetation communities associated with the site

Table 2: Overview of the extent and percentage cover of the unsupervised satellite image clusters associated with the site (Source: Landsat 7, Bands 1, 2, 3, 4, 5, 7 – Regional scale)

		Landscape		Site			
Category	**Cluster no**	**Hectares**	**% Cover**	**Hectares**	**% Cover**	**% of landscape**	**Cluster status**
1	Cluster 1	1679	15%	93	18%	6%	
2	Cluster 2	1458	13%	125	24%	9%	
3	Cluster 3	1457	13%	192	37%	13%	Least influence
4	Cluster 4	1288	12%	1	0%	0%	
5	Cluster 5	1027	9%		0%	0%	
6	Cluster 6	745	7%	1	0%	0%	
7	Cluster 7	576	5%	21	4%	4%	
8	Cluster 8	565	5%	19	4%	3%	
9	Cluster 9	493	4%	33	6%	7%	
10	Cluster 10	460	4%	8	1%	2%	
11	Cluster 11	372	3%	16	3%	4%	
12	Cluster 12	295	3%	3	1%	1%	
13	Cluster 13	137	1%	1	0%	1%	
14	Cluster 14	130	1%		0%	0%	
15	Cluster 15	124	1%	4	1%	3%	
16	Cluster 16	116	1%		0%	0%	
17	Cluster 17	82	1%	0	0%	0%	
18	Cluster 18	40	0%		0%	0%	
	TOTALS	11045	100%	517	100%	5%	

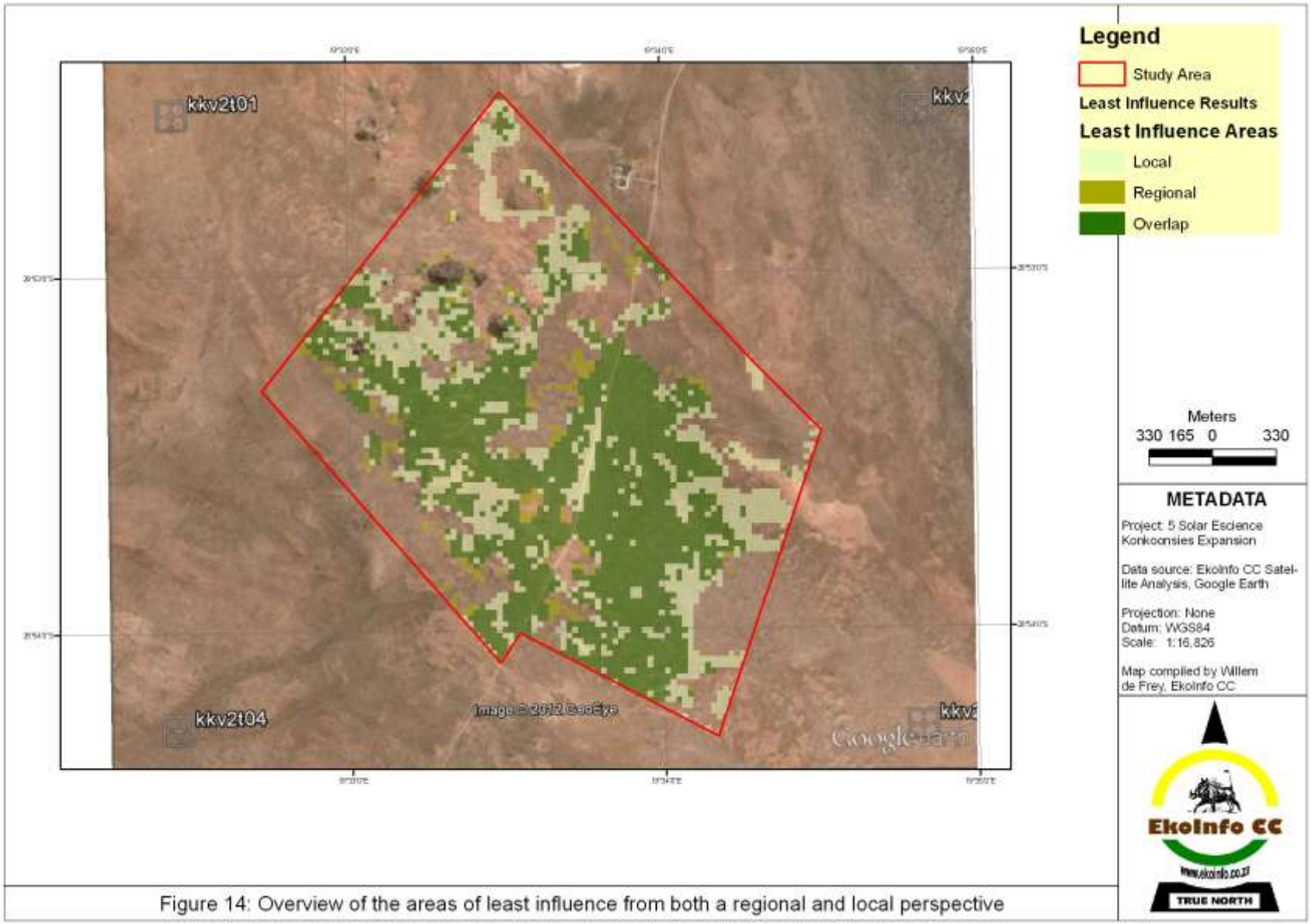

Figure 14: Overview of the areas of least influence from both a regional and local perspective

Table 3: Overview of the extent and percentage cover of the unsupervised satellite image clusters associated with the site (Source: Landsat 7, Bands 2, 3, 7 – local scale)

Legend	Surrounding Area		Site		Cluster status
	Hectares	% Cover	Hectares	% Cover	
Cluster 1	543	37%	281	54%	Least influence
Cluster 2	316	21%	45	9%	
Cluster 3	235	16%	98	19%	
Cluster 4	239	16%	77	15%	
Cluster 5	90	6%	16	3%	
Cluster 6	58	4%			
TOTALS	1481	100%	517	100%	

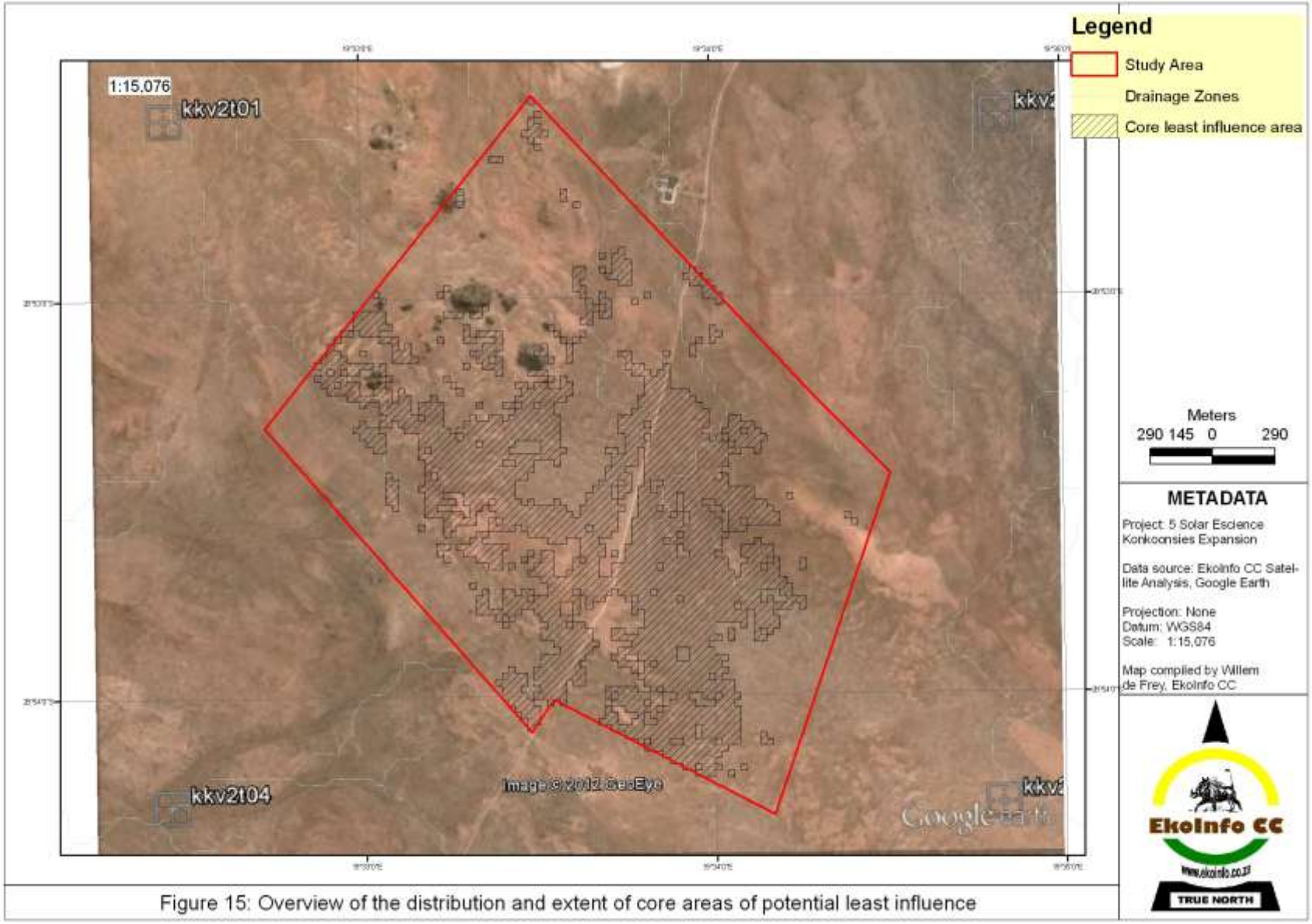

Figure 15: Overview of the distribution and extent of core areas of potential least influence

Table 4: Overview of the area available at the site, where both regionally and locally least influence areas overlap

Description	Hectares	% Cover	% of total area (517 ha[6])
Local least influence	106	36%	21%
Regional least influence	18	6%	3%
Local and regional least influence overlap	175	58%	34%
TOTALS	299	100%	58%

[6] There appears to be a discrepancy between the actual extent of the study area (524 ha) and model results (517 ha), but this discrepancy is less than 1.5% and due to the model making use of 30 m pixels, while the property boundaries are based on a vector file.

Table 5: Overview of the number of species recorded per nine quarter degree grid from PRECIS at SANBI

Quarter degree grid	No of species per grid
2819CB	45
2819CD	21
2819DA	92
2819DB	81
2819DC	**43**
2819DD	23
2919AB	293
2919BA	21
2919BB	24
Average	71

The majority of the 407 species belong to one of the following major growth forms, either forbs or woody (Table 6), with forbs being the most dominant growth form.

5.2.1 Threatened Red Data flora of the Northern Cape

According to the latest Red Data flora information available from SANBI, 234 species are considered to be threatened (Vulnerable, Endangered, Critical Endangered). Of these 234 species, 187 species (80%) are Vulnerable (Table 7), 33 species (14%) are Endangered and 14 species (6%) are Critically Endangered. These 234 species are representative of 30 families (Table 8), of which the following eight (8) families contains more than 75% of the species: Iridaceae, Mesembryanthemaceae, Asteraceae, Amaryllidaceae, Hyacinthaceae, Fabaceae, Asphodelaceae, Eriospermaceae. A total of 105 genera (Table 9) represent these 234 threatened plants from the Northern Cape, of which the following 16 genera contain 50% of the species: *Romulea, Babiana, Eriospermum, Lithops, Moraea, Lachenalia, Conophytum, Geissorhiza, Hesperantha, Oxalis, Cheiridopsis, Aloe, Lotononis, Crassula, Strumaria, Gethyllis*.

The majority of these threatened plants represent either forbs or woody species (shrubs and/ or trees) (Table 10), of which the dominant growth form is forbs.

Environmental data about these species were obtained from SANBI's PRECIS officer, which represented 1 421 records. From these records a profile was created of the habitat preference of these 234 species based on altitude, geology, aspect, soil, substrate, moisture, vegetation, exposure and biological effects (Tables 11 – 19).

Based on this information it is concluded the majority of threatened plants within the Northern Cape, occurs at an altitude of between 500 – 1 000 metres above sea level, either on igneous or sedimentary rock, and often on granites, at any aspect, on coarse textured soils and rocky areas, seldom in association with water, either in the Fynbos or Karoo biomes, often in full sun, mainly in the agricultural/ rural areas.

Therefore, it is highly likely that threatened flora could occur within the study area, due to the fact that it is located within the 500 – 1 000 m altitudinal range (Section 4.3. Topography and drainage); and granite outcrops are present within the study area.

It is clear from an overview of the periods (months) when the majority of these threatened species, either flowers or bear fruit, that the original site visit (January 2011) was outside the optimal periods, while the current survey (March 2012) was better, because the most optimal period is August/ September and March/ April (Table 20).

Based on the available information, it is concluded that the following two threatened species which are associated with altitudinal heights of between 500 m and 1 000 m.a.s.l. and on granite could occur within the study area: *Geissorhiza kamiesmontana* Goldblatt, *Otholobium hamatum* (Harv.) C.H.Stirt. Both these species are considered to be vulnerable, however the following four vulnerable species had been recorded with the topocadastral grids adjacent to the study area (Table 21): *Avonia herreana* (Poelln.) G.D.Rowley, *Avonia recurvata* (Schönland) G.D.Rowley subsp. buderiana (Poelln.) G.Will., *Caesalpinia bracteata* Germish. and *Lithops olivacea* L.Bolus,

The most optimal period to survey for these species appears to be August to December (Table 22).

Table 6: Overview of the growth forms associated with the vegetation at the study area and surroundings

Growth forms	No of species	Major growth forms		
		Gramnoid	Forbs	Woody
Herb	102		102	
Graminoid	43	43		
Shrub	41			41
Succulent	30			30
Dwarf shrub	26			26
Shrub, tree	22			22
Herb, succulent	22		22	
Dwarf shrub, shrub	18		18	
Shrub, succulent	13		13	
Dwarf shrub, herb	11		11	
Dwarf shrub, succulent	11		11	
Geophyte	10		10	
Dwarf shrub, herb, shrub	5		5	
Dwarf shrub, shrub, succulent	5		5	
Geophyte, herb	5		5	
Parasite, shrub, succulent	5		5	
Bryophyte	4		4	
Herb, shrub	4		4	
Shrub, succulent, tree	3		3	
Climber, herb, succulent	2		2	
Cyperoid, helophyte, herb	2	2		
Cyperoid, herb, mesophyte	2	2		
Suffrutex	2		2	
Climber	1		1	
Climber, herb	1		1	
Climber, herb, succulent, suffrutex	1		1	
Climber, succulent	1		1	
Geophyte, herb, lithophyte	1		1	
Shrub, suffrutex	1		1	
Helophyte, herb	1		1	
Dwarf shrub, herb, succulent	1		1	
Dwarf shrub, parasite, shrub	1		1	
Scrambler, shrub	1		1	
Herb, hydrophyte	1		1	
Tree	1			1
Geophyte, herb, succulent	1		1	
Geophyte, succulent	1		1	
Dwarf shrub, graminoid, shrub	1		1	
Totals	403	47	236	120

Table 7: Overview of the number of threatened Red Data flora per category for the Northern Cape

Threatened categories	No of species	% of total
Vulnerable (VU)	187	80%
Endangered (EN)	33	14%
Critical Endangered (CR)	14	6%
Totals	234	100%

Table 8: Overview of the plant families in which the threatened 234 species in the Northern Cape occur

Family	No of species	% of total	Cumulative %
Iridaceae	60	26%	26%
Mesembryanthemaceae	40	17%	43%
Asteraceae	18	8%	50%
Amaryllidaceae	17	7%	58%
Hyacinthaceae	14	6%	64%
Fabaceae	11	5%	68%
Asphodelaceae	10	4%	73%
Eriospermaceae	10	4%	77%
Scrophulariaceae	6	3%	79%
Oxalidaceae	6	3%	82%
Orchidaceae	5	2%	84%
Crassulaceae	5	2%	86%
Poaceae	4	2%	88%
Apiaceae	3	1%	89%
Geraniaceae	3	1%	91%
Rhamnaceae	3	1%	92%
Portulacaceae	3	1%	93%
Rosaceae	2	1%	94%
Proteaceae	2	1%	95%
Colchicaceae	2	1%	96%
Tecophilaeaceae	1	0%	96%
Isoetaceae	1	0%	97%
Malvaceae	1	0%	97%
Cyperaceae	1	0%	97%
Campanulaceae	1	0%	98%
Rutaceae	1	0%	98%
Molluginaceae	1	0%	99%
Apocynaceae	1	0%	99%
Polygalaceae	1	0%	100%
Aizoaceae	1	0%	100%
Totals	234		

Table 9: Overview of the 105 genera which represents the 234 threatened flora within the Northern Cape

Genus	No of species	% of total	Cumulative %
Romulea	18	8%	8%
Babiana	11	5%	12%
Eriospermum	10	4%	17%
Lithops	9	4%	21%
Moraea	9	4%	24%
Lachenalia	8	3%	28%
Conophytum	8	3%	31%
Geissorhiza	6	3%	34%
Hesperantha	6	3%	36%
Oxalis	6	3%	39%
Cheiridopsis	5	2%	41%
Aloe	5	2%	43%
Lotononis	4	2%	45%
Crassula	4	2%	47%
Strumaria	4	2%	48%
Gethyllis	4	2%	50%
Gladiolus	3	1%	51%
Pelargonium	3	1%	53%
Phylica	3	1%	54%
Disa	3	1%	55%
Bulbinella	3	1%	56%
Brunsvigia	3	1%	58%
Drimia	3	1%	59%
Diascia	2	1%	60%
Daubenya	2	1%	61%
Euryops	2	1%	62%
Colchicum	2	1%	62%
Cliffortia	2	1%	63%
Haemanthus	2	1%	64%
Helictotrichon	2	1%	65%
Lampranthus	2	1%	66%
Avonia	2	1%	67%
Leipoldtia	2	1%	68%
Athanasia	2	1%	68%
Sparaxis	2	1%	69%
Schwantesia	2	1%	70%
Othonna	2	1%	71%
Helichrysum	1	0%	71%
Carex	1	0%	72%
Centella	1	0%	72%

Genus	No of species	% of total	Cumulative %
Cephalophyllum	1	0%	73%
Stapelia	1	0%	73%
Tetragonia	1	0%	74%
Clivia	1	0%	74%
Bulbine	1	0%	74%
Selago	1	0%	75%
Secale	1	0%	75%
Corycium	1	0%	76%
Cotula	1	0%	76%
Crocosmia	1	0%	76%
Cullumia	1	0%	77%
Chrysocoma	1	0%	77%
Antithrixia	1	0%	78%
Wooleya	1	0%	78%
Amaryllis	1	0%	79%
Amphiglossa	1	0%	79%
Amphithalea	1	0%	79%
Anacampseros	1	0%	80%
Anginon	1	0%	80%
Caesalpinia	1	0%	81%
Annesorhiza	1	0%	81%
Rennera	1	0%	82%
Arctotheca	1	0%	82%
Aspalathus	1	0%	82%
Wiborgia	1	0%	83%
Wahlenbergia	1	0%	83%
Tylecodon	1	0%	84%
Brownanthus	1	0%	84%
Trachyandra	1	0%	85%
Anisodontea	1	0%	85%
Lapeirousia	1	0%	85%
Heterorhachis	1	0%	86%
Isoetes	1	0%	86%
Ixia	1	0%	87%
Jacobsenia	1	0%	87%
Jamesbrittenia	1	0%	88%
Jordaaniella	1	0%	88%
Cyanella	1	0%	88%
Muraltia	1	0%	89%
Namaquanula	1	0%	89%
Monilaria	1	0%	90%
Leucadendron	1	0%	90%
Leucoptera	1	0%	91%

Genus	No of species	% of total	Cumulative %
Leucospermum	1	0%	91%
Mitrophyllum	1	0%	91%
Meyerophytum	1	0%	92%
Namaquanthus	1	0%	92%
Ferraria	1	0%	93%
Manulea	1	0%	93%
Psammotropha	1	0%	94%
Dinteranthus	1	0%	94%
Prionanthium	1	0%	94%
Disperis	1	0%	95%
Podalyria	1	0%	95%
Hessea	1	0%	96%
Ottosonderia	1	0%	96%
Xiphotheca	1	0%	97%
Freesia	1	0%	97%
Otholobium	1	0%	97%
Ornithogalum	1	0%	98%
Gnaphalium	1	0%	98%
Oedera	1	0%	99%
Agathosma	1	0%	99%
Cylindrophyllum	1	0%	100%
Phyllopodium	1	0%	100%
Totals	234	100%	

Table 10: Overview of the growth forms associated with the 234 threatened plant species in the Northern Cape

Growth forms	No of species	Major Growth Forms		
		Gramnoids	Forbs	Woody
Geophyte, herb	65		65	
Geophyte	48		48	
Succulent	40		40	
Dwarf shrub	17			17
Shrub	14			14
Herb	11		11	
Herb, succulent	6		6	
Geophyte, succulent	5		5	
Graminoid	4	4		
Dwarf shrub, shrub	3			3
Dwarf shrub, succulent	3			3
Geophyte, herb, succulent	2		2	
Dwarf shrub, geophyte, succulent	2		2	
Dwarf shrub, herb, succulent	2		2	
Geophyte, herb, hydrophyte	2		2	
Succulent, tree	2			2
[No lifeform defined]	1			
Tree	1			1
Herb, tenagophyte	1			
Dwarf shrub, scrambler, succulent	1			1
Shrub, succulent	1			1
Shrub, tree	1			1
Cyperoid, herb, mesophyte	1	1		
Geophyte, hydrophyte	1		1	
Totals	234	5	184	43

Table 11: Overview of the altitudinal attributes associated with the 234 threatened plants in the Northern Cape

Altitude Class	No of records	% frequency	Relevance
0 - 500 m	16	13%	
500 - 1000 m	62	49%	Both sites
1000 - 1500 m	42	33%	
1500 - 2000 m	6	5%	
Totals	126	100%	

Table 12: Overview of the geological attributes associated with the 234 threatened plants in the Northern Cape

Lithological units	No of records	% Frequency	Petrological Units		
			Igneous	Sedimentary	Metamorphic
Dolerite	14	11%	14		
Gneiss	1	1%	1		
Granite	40	33%	40		
Mica schist	1	1%			1
Quartzite	19	16%			19
Sandstone	20	16%		20	
Shale	17	14%		17	
Tillite	6	5%		6	
TMS	4	3%		4	
Totals	122	100%	55	47	20
			45%	39%	16%

Table 13: Overview of the aspect attributes associated with the 234 threatened plants in the Northern Cape

Aspect classes	No of records	% frequency
East	16	20%
Level	5	6%
North	10	13%
Northeast	3	4%
Northwest	5	6%
South	16	20%
Southeast	4	5%
Southwest	4	5%
West	16	20%
TOTALS	79	100%

Table 14: Overview of the soil attributes associated with the 234 threatened plants in the Northern Cape

Soil texture classes	No records	% frequency	Derived broad soil texture classes				
			Very fine	Fine	Coarse	Very coarse	Surface rock/ pebbles
Clay	3	1%	3				
Calcrete	2	1%		2			
Clay	30	14%	30				
Clay loam	2	1%		2			
Gravel	20	9%					20
Gravel	4	2%					4
Humus-rich	2	1%					
Loam	39	18%			39		
Sand	96	43%				96	
Sandy clay	5	2%		5			
Sandy loam	18	8%			18		
Totals	221	100%	33	9	57	96	24
			15%	4%	26%	43%	11%

Table 15: Overview of the substrate attributes associated with the 234 threatened plants in the Northern Cape

Substrate categories	No of records	% Frequency	Derived habitat classes		
			Water	Soil	Rocky
Bare rock	11	5%			11
Gravel	2	1%			2
In water	2	1%	2		
Roots	2	1%		2	
Soil	106	48%		106	
Soil	1	0%		1	
Stony soil/ rocky	10	5%			10
Stony soil/rocky	86	39%			86
Totals	220	100%	2	109	109
			1%	50%	50%

Table 16: Overview of the moisture attributes associated with the 234 threatened plants in the Northern Cape

Moisture description	No of records	% frequency	Derived ecosystem types	
			Wet/Moist/Aquatic	Dry/Well - drained/ Terrestrial
Arid	1	1%		1
Dry	5	4%		5
Free-standing water	1	1%	1	
Moist/damp	37	27%	37	
Moist/damp well-drained	2	1%	2	
Permanently waterlogged	1	1%	1	
Poorly-drained	3	2%	3	
Seasonally waterlogged	8	6%	8	
Unknown	1	1%		
Well-drained	71	52%		71
Wet	6	4%	6	
Totals	136	100%	58	77
			43%	57%

Table 17: Overview of the moisture attributes associated with the 234 threatened plants in the Northern Cape

Vegetation description	No of records	% Frequency	Derived biome types				
			Fynbos	Karoo	Grassland	Woodland	Forest
Karroo	9	6%		9			
Closed shrubland	3	2%				3	
Closed woodland	3	2%				3	
Desert	1	1%		1			
Forest	1	1%					1
Fynbos	56	38%	56				
Grassland	7	5%			7		
Karroo	32	22%		32			
Nama karroo	6	4%		6			
Open shrubland	2	1%				2	
Open woodland	3	2%				3	
Succulent karroo	24	16%		24			
Totals	147	100%	56	72	7	11	1
			38%	49%	5%	7%	1%

Table 18: Overview of the exposure attributes associated with the 234 threatened plants in the Northern Cape

Exposure description	No of records	% Frequency	Exposure classes	
			Shade	Sun
Full sun	60	80%		60
Light shade	2	3%	2	
Medium shade	1	1%	1	
Partial shade	11	15%	11	
Shade	1	1%	1	
Totals	75	100%	15	60
			20%	80%

Table 19: Overview of the biological effect attributes associated with the 234 threatened plants in the Northern Cape

Biological effect description	No of records	% Frequency	Derived ecological status		Derived human activity	
			Natural	Transformed	Human settlement	Agriculture
abandoned land	6	5%		6		6
cultivated land	1	1%		1		1
disturbed-other	2	2%	2			2
garden	11	9%		11	11	
grazed	14	11%	14			14
No effect seen	52	42%	52			52
plantation	1	1%		1		1
recently burned	5	4%	5			5
roadside/railway	2	2%		2	2	
roadside/railwayside	29	24%		29	29	
Totals	123	100%	73	50	42	81
			59%	41%	34%	66%

Table 20: Overview of the months in which the majority of the 234 threatened plants of the Northern Cape are expected to flower or bear fruit

Month	No of species with flowers	No of species with fruit
July	37	13
August	81	28
September	85	38
October	70	27
November	39	21
December	27	10
January	15	6
February	21	12
March	36	13
April	43	20
May	35	16
June	24	11

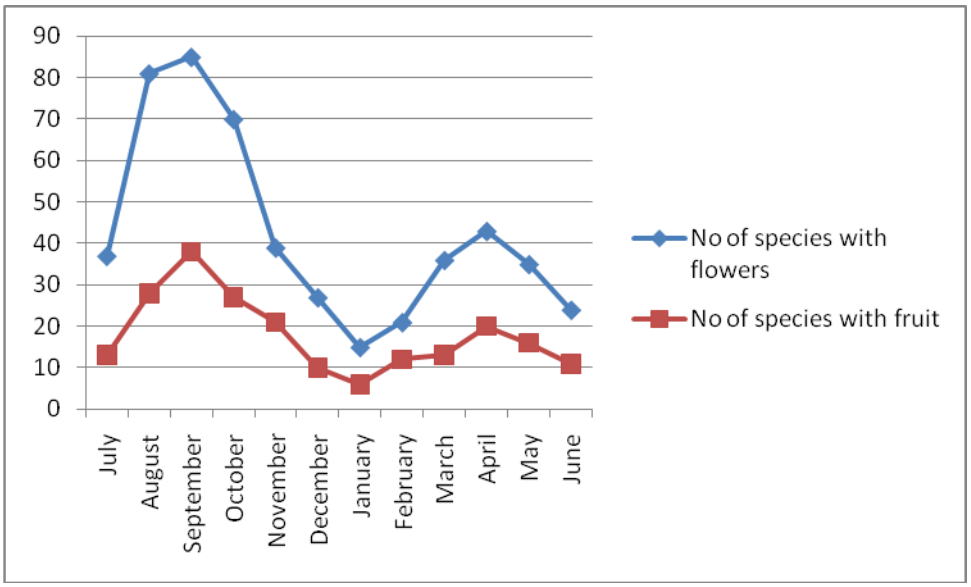

Table 21: List of potential threatened plants from the Northern Cape, which had been recorded in adjacent topocadastral grids to the study area

Family	Species	Threat status	GRIDS
FABACEAE	Caesalpinia bracteata Germish.	Vulnerable	2819DA
MESEMBRYANTHEMACEAE	Lithops olivacea L.Bolus	Vulnerable	2819CB
MESEMBRYANTHEMACEAE	Lithops olivacea L.Bolus	Vulnerable	2919AB
PORTULACACEAE	Avonia herreana (Poelln.) G.D.Rowley	Vulnerable	2919AB
PORTULACACEAE	Avonia recurvata (Schönland) G.D.Rowley subsp. buderiana (Poelln.) G.Will.	Vulnerable	2819CD
PORTULACACEAE	Avonia recurvata (Schönland) G.D.Rowley subsp. buderiana (Poelln.) G.Will.	Vulnerable	2919AB

Table 22: Overview of the optimal months in which to verify the presence of three of the four vulnerable plants recorded in the topocadastral grids adjacent to the study area

Name	Month	Flowers	Fruits
Avonia herreana (Poelln.) G.D.Rowley	11	present	present
Avonia recurvata (Schönland) G.D.Rowley ssp. recurvata	3	present	present
Avonia recurvata (Schönland) G.D.Rowley ssp. recurvata	9	present	
Avonia recurvata (Schönland) G.D.Rowley ssp. recurvata	12	present	
Avonia recurvata (Schönland) G.D.Rowley ssp. recurvata	11	present	
Avonia recurvata (Schönland) G.D.Rowley ssp. recurvata	12	present	
Avonia recurvata (Schönland) G.D.Rowley ssp. recurvata	12	present	
Avonia recurvata (Schönland) G.D.Rowley ssp. recurvata	11	present	absent
Caesalpinia bracteata Germish.	8	present	
Caesalpinia bracteata Germish.	9	present	present
Caesalpinia bracteata Germish.	3	present	
Caesalpinia bracteata Germish.	9	present	present
Caesalpinia bracteata Germish.	9	present	present

5.2.2 Protected plants of the Northern Cape

In the absence of a species list based on a detail ecological survey, it is not possible to provide a comprehensive list of the protected species in terms of the Northern Cape Nature Conservation Act (9 of 2009), which could occur within the study area. However, the following four specially protected and protected species, where recorded in the topocadastral grids adjacent to the study area (Table 23): *Caesalpinia bracteata* (Germish.), *Hoodia gordonii*, *Monechma saxatile* (Munday) and *Nymania capensis* (Thunb.) (Lindb.). Therefore it is highly likely that this species as well as other protected species occur within the study area. Permission to remove or destroy them will have to be obtained from Northern Cape's Directorate Nature Conservation. The presence of *Hoodia gordonii* was confirmed along the northern boundary of the eastern area, while no protected plants were recorded within the western area (Appendix D). It should also be noted that all species in the following plant families, which had been recorded within the topocadastral grids associated with the study area (Appendix C), are protected: Aizoaceae, Amaryllidaceae, Apocynaceae, Crassulaceaea, Iridaceae and Mesembryanthemeaceae. This represents 65 species, of which a single species Trianthema parvifolia var parvifolia was observed in the western area (Appendix D).

The following two protected tree species in terms of the National Forests act (No 84 of 1998), *Boscia albitrunca* (Shepherd's tree) and *Acacia erioloba* (Camel Thorn) were recorded in the following topocadastral grids adjacent to the study area: 2819DA, 2819DB, 2919AB, 2819CD, 2819DD. A permit would have to be obtained from the Department of Water Affairs to destroy or remove these specimens. The presence of *Boscia albitrunca* had been confirmed during both the January 2011 and March 2012 site visits.

5.2.3 Medicinal plants

In the absence of a comprehensive list of species for the study area, it is not possible to list all the medicinal plants that could occur in the area; however the following species, *Hoodia gordonii* (Le Roux 2005) was recorded at the site along the northern boundary of the eastern area. In addition to the observed plant with medicinal properties the following plants with medicinal properties were recorded in the topocadastral grids associated with the study area: *Acacia karroo* Hayne, *Bowiea volubilis* Harv. ex Hook.f., *Cotyledon orbiculata*, *Datura stramonium* L., Dicoma capensis Less., *Euclea undulata*, *Viscum capense*, *Ziziphus mucronata*.

5.2.4 Alien invasive plants

The following three alien invasive species were recorded with the topocadastral grids associated with the study area: *Datura stramonium* L. , *Nicotiana glauca* R.C. Grah. , *Prosopis glandulosa.* These species are classified as either category 1 and 2 in terms of the Conservation of Agricultural Resources Act (No 43 of 1983). Category 2 species implies species which are:" plants that are useful for commercial plant production purposes but are proven plant invaders under uncontrolled conditions outside demarcated areas", while category 1 species are: "are weeds and serve no useful economic purpose and possess characteristics that are harmful to humans, animals or the environment." Therefore these species needs to be controlled and eradicated. No species listed as alien invasive in terms of the Northern Cape Nature Conservation Act (9 of 2009) was recorded in the adjacent topocadastral grids.

It is highly likely that other alien invasive species occur within the study area, but this could not be confirmed without a detail survey.

Table 23: Overview of specially protected and protected species recorded within the topocadastral grids adjacent to the study area in terms of the Northern Cape Conservation Act (9 of 2009)

Schedule information – botanical and common names	Growth forms	GRIDS	Protection level	Schedule
Caesalpinia bracteata (Germish.)	Shrub	2819DA	Protected	2
Hoodia gordonii Kougoed	Shrub, succulent	2819DB	Specially protected	1
Hoodia gordonii Kougoed	Shrub, succulent	2919BB	Specially protected	1
Monechma saxatile (Munday)	Dwarf shrub, shrub	2919AB	Protected	2
Nymania capensis (Thunb.) (Lindb.) Chinese Lantern Klapperbos	Shrub, tree	2819DA	Protected	2
Nymania capensis (Thunb.) (Lindb.) Chinese Lantern Klapperbos	Shrub, tree	2919AB	Protected	2
Nymania capensis (Thunb.) (Lindb.) Chinese Lantern Klapperbos	Shrub, tree	2919BA	Protected	2

6 RECOMMENDATIONS

Based on the information available and the nature of the project, the following recommendations are made:

1. Due to the untransformed nature of the landscape, new infrastructure should be kept close to existing infrastructure as practically possible to prevent additional habitat fragmentation
2. The outcrops should be avoided, a minimum buffer of 100 m from the base of the outcrops should be sufficient.
3. Due to the critical function of vegetation to stabilise the soils within an arid landscape, unnecessary destruction of vegetation should be avoided at all cost.
    a. Should the proposed activity have a detrimental impact on the vegetation cover in the area, steps should be taken immediately to address and stabilise it.
    b. Failure to address the loss of vegetation would enhance/ accelerate deflation, which could result in a deflation hollow/ blowout (Strahler & Strahler 1987)
    c. The absence of vegetation would also increase the abrasion potential of the wind (Strahler & Strahler 1987).
    d. It should be noted, that because this is an arid environment, it is far more difficult to address vegetation loss and to facilitate rehabilitation than in more humid environments. THUS PREVENTION IS BETTER THAN CURE!
4. To ensure environmental legal compliance in terms of
    a. the national Forests Act
    b. the provincial Nature and Environmental Conservation Ordinance
    c. the national Conservation of Agricultural Resources Act
    d. the National Environmental Management Biodiversity Act
    e. it is strongly recommended that a detail vegetation survey be completed by a regional vegetation specialist during the optimal flowering period (April/ May, August/ September), prior to construction to:
        i. identify all those species for which permits are required to allow their removal or destruction
        ii. identify plant specimens, which would qualify for plant rescue or for which seed should be obtained to assist with their re-establishment
        iii. document qualitative and quantitative, the species present, their composition and ecological drivers, to facilitate future rehabilitation of the area, should the activity be stopped and closure required, without this information no baseline information would be available to facilitate and monitor/ measure the success of the rehabilitation process.
5. Effective storm water management should form a critical component of the design of the areas, as the increased runoff from the infrastructure will enhance the effect of localised rainfall events on the drainage areas present in the area, this include the runoff to be generated from maintaining the solar panels. The emphasis should be on water retention and flow reduction to prevent the displacement of vegetation and subsequent excessive erosion.
6. To facilitate baseline data collection and future monitoring, it is strongly recommended that high resolution aerial photographs be taken prior to construction, repeated once during construction and on completion of construction and thereafter at least once a year for the duration of the activity; without this information it would not be possible to identify areas of:
    a. vegetation loss
    b. ponding
    c. erosion
    d. encroachment/ disturbance
    e. rehabilitation/ restoration and/ or their progress/ success
7. Should ornamental gardens be established for what so ever reason, then only regionally indigenous species should be used!
8. The rate of habitat loss and fragmentation remains a concern, especially with regards to the fauna, as it is evident that the infrastructure is being placed in largely untransformed landscapes. The displacement of species from potential water sources, whether temporary or permanent should be considered.

7 REFERENCES

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8 APPENDIX A – ABRIDGE CV, PRINCIPLE CONSULTANT

Name of firm: EkoInfo cc Environmental and Wildlife Management Consultancy
Name of staff: WILLEM HENDRIK DE FREY
Profession: Environmental and Wildlife Management consultant
Years with firm: Since 1995
Nationality: RSA
Membership of professional societies:
The South African Council for Natural Scientific Professions (Reg no 400100/02)
Categories: Botanical Science and Ecological Science
Currently in the process of affiliating to:
South African Association of Botanist (SAAB)
Grassland Society of Southern Africa
South African Institute of Ecologist and Environmental Scientists (SAIE)

KEY QUALIFICATIONS:

Mr W de Frey has been involved in the discipline of ecology since 1989. During this period he prepared himself for a profession in environmental and wildlife management, by attending courses in chemistry, geology, pedology and statistics, while majoring in Botany and Zoology. His working knowledge was obtained while completing projects for his post-graduate studies in wildlife management in both the Savanna and Grassland Biomes. In addition to his academic publications, he has contributed to numerous reports regarding EMPR's, EIA's, vegetation - and soil surveys and monitoring since the registration of his own consultation close corporation in 1995. He is actively involved in the management and marketing of his close corporation while completing tasks in his field of expertise namely soil, vegetation science and Geographical Information Systems. Mr W de Frey is task orientated with consideration of people's needs and safety. He beliefs in a holistic approach to environmental and wildlife management and has therefore established a network with individuals in related fields. He is also assisting previously disadvantaged persons in establishing a presence in the environmental industry, namely Lordwick Makhura of Baagi Environmental Consultancy CC and a joint venture company Bonolo Biodiversity And Environmental Management consisting of Baagi Environmental Consultancy CC and Disa Mphago Community Helpers CC.

EDUCATION:

1992 BSc Botany & Zoology, University of Pretoria

Course	Content	Level
Chemistry	Organic and Inorganic chemistry	1st year
Geology	Introduction/ Geomorphology, Stratigraphy, Structural, Sedimentology Palaeontology, Crystallography	1st and 2nd year
Pedology	Introduction, soil classification, soil fertility, soil ecology, soil physics	1st and 2nd year
Botany	Morphology, Anatomy, Physiology, Taxonomy, Mycology, Ecology, Reproductive biology	1st, 2nd and 3rd year
Zoology	Taxonomy (Vertebrates and Invertebrates), Physiology (mainly vertebrates), Ecology (mainly vertebrates), Animal behaviour (mainly vertebrates)	1st, 2nd and 3rd year
Statistics	Sampling methods, Statistical Analysis, Probabilities	1st year

1993 BSc (Hons) (Cum laude) Wildlife Management, University of Pretoria
Dissertation: 'N HOLISTIESE EKOLOGIESE BENADERING TOT DIE DRAKRAGBEPALING VAN 'N GEMENGDE WILD- EN BEESBOERDERY IN DIE UBOMBO DISTRIK, MET ENKELE BESTUURS AANBEVELINGS, 1993
1999 MSc (Cum laude) Wildlife Management, University of Pretoria
Thesis: PHYTOSOCIOLOGY OF THE MPUMALANGA HIGH ALTITUDE GRASSLANDS, 1999

COURSES/ WORKSHOPS ATTENDED

1. Red List And Threatened Species Assessment Training Workshop, Hosted by the Conservation Breeding Specialist Group Southern Africa & Endangered Wildlife Trust, December 2003
2. National State of the Environment Workshop, Hosted by DEAT and SRK, ESKOM Convention Centre – November 2004
3. Gauteng Red Data Flora Workshop, Hosted by SANBI and GDACE – November 2005
4. Gauteng Flora Minimum Requirement Workshop, Hosted by GDACE Nature Conservation – August 2007

EMPLOYMENT RECORD:

1986 – 1987
5 Signals Regiment, SADF

1998 – 1993 – Partime
Council of Geoscience, Palaeontology Section
University of Pretoria, Botany Department
Academy of Marksmanship, Range Officer
U Huisoppasser, Own enterprise
1994 – 1995
University of Pretoria, Botany Department, Assistant researcher

1995 – present

EkoInfo cc Environmental and Wildlife Management Consultancy, Founding member and consultant

Overall EkoInfo CC's principal consultant completed or administrated more than 58 vegetation studies as part of Environmental Impact Assessments within all of South Africa's nine provinces and adjacent countries such as Botswana and Mozambique with a focus on either terrestrial vegetation and/ or wetlands. Some projects were on provincial level such as the Mpumalanga and Gauteng Degradation Projects coordinated by the Institute for Soil, Climate and Water and sponsored by National Department of Agriculture. The majority of projects were on local scale from 5 ha to 50 000 ha or more for local developers and corporate institutions (SASOL, Anglo Coal, BHP Billington, Ingwe Coal, Deneys Rietz Attorneys, ESKOM) facilitated independently or as a subcontractor/ specialist for the following institutions: Oryx Environmental CC, African EPA, Arcuss Gibb, Digby Wells and Associates, Nature and Business Alliance and Eyethu Engineers, Strategic Environmental Focus.

COMMUNITY SERVICE

1. Substitute lecture – 2nd & 3rd year Botany Practical (Vegetation Survey Methods), University of Pretoria -1994 & 1995
2. Guest lecture – Wetland Vegetation Communities (2nd year students), Department of Landscape Architecture, University of Pretoria – 1996 & 1997
3. Guest lecture – Principles of Ecology (1st year students), Department of Landscape Architecture, University of Pretoria – 2002
4. Guest lecture – Principles of vegetation survey and mapping for EIA's (3rd year students), Department of Landscape Architecture, University of Pretoria – 2003
5. Referee – ILASA Merits Awards (Environmental Planning), Institute for Landscape Architects of South Africa - 2003

LANGUAGES:

Language	Capability
English & Afrikaans	Speak, Read, Write - sufficient
Sepedi (Northern Sotho)	Speak, Read, Write – insufficient

9 APPENDIX B – DATA RECORDED DURING THE MARCH 2012 SITE VISIT

Plot no	Photo no	Photo direction	Video	Flora	Fauna
1	112, 113, 114, 115, 116	n,e, s, w, soil, 3 hoodia ind	TRUE	outcrop - Stip cil, Lycium cinerium, acac mel, , stip obt, hoodia gordonii, rhig tri	
2	120, 121, 122, 123, 124	n,e, s, w, soil	FALSE	Stip cil, stip obt, lycium cine, rhig tri	Duiker, jackals, suricates
3	125, 126, 127, 128, 129	n,e, s, w, soil	FALSE	stip cil, lycium cin,rhig tri, stip obt, protasparagus spp	
4	130, 131, 132, 133, 134	n,e, s, w, soil	FALSE	Boscia albu, rhig tri, stip cil, stip obt	
5	135, 136, 137, 138, 139	n,e, s, w, soil,hoodia, bosc alb, hoodia	FALSE	flat, rocky - rhig tri, stip obt, indogofera pungens	Jackal, suricates

10 APPENDIX C – SANBI PRECIS RECORDED SPECIES

Family	Species	Growth forms	No of species per grid	% Frequency (100% = 9 grids)
ACANTHACEAE	Acanthopsis disperma	Herb	4	44%
ACANTHACEAE	Acanthopsis hoffmannseggiana	Herb	1	11%
ACANTHACEAE	Barleria lancifolia	Dwarf shrub, herb, shrub	1	11%
ACANTHACEAE	Barleria lichtensteiniana	Herb	2	22%
ACANTHACEAE	Blepharis macra	Dwarf shrub	1	11%
ACANTHACEAE	Blepharis mitrata	Dwarf shrub, herb	4	44%
ACANTHACEAE	Blepharis pruinosa	Dwarf shrub, herb, shrub	1	11%
ACANTHACEAE	Justicia thymifolia	Dwarf shrub, shrub	1	11%
ACANTHACEAE	Monechma divaricatum	Shrub, suffrutex	1	11%
ACANTHACEAE	Monechma incanum	Dwarf shrub, shrub	1	11%
ACANTHACEAE	Monechma saxatile	Dwarf shrub, shrub	1	11%
ACANTHACEAE	Monechma spartioides	Dwarf shrub, shrub	4	44%
ACANTHACEAE	Petalidium lucens	Dwarf shrub, shrub	1	11%
ACANTHACEAE	Petalidium setosum	Dwarf shrub, shrub	2	22%
AIZOACEAE	Aizoon asbestinum	Herb, succulent	1	11%
AIZOACEAE	Aizoon canariense	Herb, succulent	6	67%
AIZOACEAE	Galenia africana	Shrub	2	22%
AIZOACEAE	Galenia fruticosa	Dwarf shrub, succulent	2	22%
AIZOACEAE	Galenia sarcophylla	Dwarf shrub, herb, succulent	2	22%
AIZOACEAE	Galenia secunda	Dwarf shrub	1	11%
AIZOACEAE	Galenia squamulosa	Dwarf shrub, succulent	1	11%
AIZOACEAE	Tetragonia microptera	Herb, succulent	1	11%
AIZOACEAE	Tetragonia reduplicata	Dwarf shrub, succulent	2	22%
AIZOACEAE	Trianthema parvifolia	Herb, succulent	4	44%

Family	Species	Growth forms	No of species per grid	% Frequency (100% = 9 grids)
ALLIACEAE	Tulbaghia tenuior	Herb	1	11%
AMARANTHACEAE	Calicorema capitata	Dwarf shrub, shrub	1	11%
AMARANTHACEAE	Hermbstaedtia glauca	Shrub	3	33%
AMARANTHACEAE	Sericocoma avolans	Dwarf shrub	4	44%
AMARYLLIDACEAE	Brunsvigia namaquana	Geophyte	1	11%
ANACARDIACEAE	Searsia burchellii	Shrub, tree	3	33%
ANACARDIACEAE	Searsia populifolia	Shrub, tree	5	56%
ANACARDIACEAE	Searsia undulata	Shrub	1	11%
APOCYNACEAE	Fockea sinuata	Climber, herb, succulent	1	11%
APOCYNACEAE	Gomphocarpus filiformis	Shrub	1	11%
APOCYNACEAE	Hoodia flava	Shrub, succulent	1	11%
APOCYNACEAE	Hoodia gordonii	Shrub, succulent	2	22%
APOCYNACEAE	Microloma incanum	Shrub	3	33%
APOCYNACEAE	Microloma sagittatum	Climber	1	11%
APOCYNACEAE	Pergularia daemia		1	11%
APOCYNACEAE	Quaqua mammillaris	Shrub, succulent	1	11%
APOCYNACEAE	Sarcostemma viminale	Climber, succulent	1	11%
APOCYNACEAE	Sarcostemma viminale	Shrub, succulent	1	11%
APOCYNACEAE	Tridentea dwequensis	Succulent	1	11%
ASPARAGACEAE	Asparagus denudatus	Shrub	1	11%
ASPARAGACEAE	Asparagus pearsonii	Suffrutex	1	11%
ASPARAGACEAE	Asparagus retrofractus	Scrambler, shrub	1	11%
ASPARAGACEAE	Asparagus suaveolens	Shrub	1	11%
ASPHODELACEAE	Aloe claviflora	Herb, succulent	2	22%
ASPHODELACEAE	Aloe variegata	Herb, succulent	1	11%
ASPHODELACEAE	Bulbine frutescens	Dwarf shrub, succulent	1	11%
ASPHODELACEAE	Bulbine longifolia	Geophyte, herb, succulent	1	11%

Family	Species	Growth forms	No of species per grid	% Frequency (100% = 9 grids)
ASPHODELACEAE	Haworthia venosa	Succulent	1	11%
ASTERACEAE	Amellus tridactylus	Herb	2	22%
ASTERACEAE	Arctotis leiocarpa	Herb	4	44%
ASTERACEAE	Berkheya annectens	Dwarf shrub	1	11%
ASTERACEAE	Berkheya canescens	Shrub	1	11%
ASTERACEAE	Berkheya spinosissima	Shrub	2	22%
ASTERACEAE	Dicoma capensis	Herb	1	11%
ASTERACEAE	Didelta carnosa	Dwarf shrub, succulent	1	11%
ASTERACEAE	Dimorphotheca polyptera	Herb	2	22%
ASTERACEAE	Dimorphotheca sinuata	Herb	2	22%
ASTERACEAE	Eriocephalus ambiguus	Shrub	1	11%
ASTERACEAE	Eriocephalus merxmuelleri	Shrub	1	11%
ASTERACEAE	Eriocephalus pauperrimus	Shrub	1	11%
ASTERACEAE	Eriocephalus scariosus	Shrub	1	11%
ASTERACEAE	Euryops dregeanus	Dwarf shrub, shrub	2	22%
ASTERACEAE	Euryops subcarnosus	Dwarf shrub, shrub	1	11%
ASTERACEAE	Felicia australis	Herb	1	11%
ASTERACEAE	Felicia filifolia	Shrub	1	11%
ASTERACEAE	Felicia hirsuta	Shrub	2	22%
ASTERACEAE	Felicia muricata	Shrub	1	11%
ASTERACEAE	Foveolina dichotoma	Herb	3	33%
ASTERACEAE	Galeomma stenolepis	Herb	1	11%
ASTERACEAE	Gazania jurineifolia	Herb	1	11%
ASTERACEAE	Gazania lichtensteinii	Herb	2	22%
ASTERACEAE	Geigeria filifolia	Herb	2	22%
ASTERACEAE	Geigeria vigintisquamea	Herb	1	11%
ASTERACEAE	Gorteria corymbosa	Herb	3	33%

Family	Species	Growth forms	No of species per grid	% Frequency (100% = 9 grids)
ASTERACEAE	Helichrysum argyrosphaerum	Herb	3	33%
ASTERACEAE	Helichrysum herniarioides	Herb	5	56%
ASTERACEAE	Helichrysum obtusum	Dwarf shrub, herb	1	11%
ASTERACEAE	Helichrysum tinctum	Herb	1	11%
ASTERACEAE	Helichrysum zeyheri	Dwarf shrub, shrub	1	11%
ASTERACEAE	Hirpicium alienatum	Dwarf shrub	1	11%
ASTERACEAE	Hirpicium echinus	Herb	2	22%
ASTERACEAE	Ifloga molluginoides	Herb	4	44%
ASTERACEAE	Kleinia longiflora	Shrub, succulent	1	11%
ASTERACEAE	Lasiopogon glomerulatus	Herb	1	11%
ASTERACEAE	Lasiopogon muscoides	Herb	1	11%
ASTERACEAE	Leysera tenella	Herb	2	22%
ASTERACEAE	Monoculus hyoseroides	Herb	1	11%
ASTERACEAE	Myxopappus acutilobus	Herb	2	22%
ASTERACEAE	Nidorella resedifolia	Herb	1	11%
ASTERACEAE	Nolletia arenosa	Dwarf shrub	1	11%
ASTERACEAE	Osteospermum karrooicum	Shrub	1	11%
ASTERACEAE	Osteospermum pinnatum	Herb	3	33%
ASTERACEAE	Othonna furcata	Shrub, succulent	1	11%
ASTERACEAE	Pechuel-Loeschea leubnitziae	Shrub	1	11%
ASTERACEAE	Pegolettia retrofracta	Dwarf shrub	1	11%
ASTERACEAE	Pentzia argentea	Shrub	1	11%
ASTERACEAE	Pentzia lanata	Shrub	1	11%
ASTERACEAE	Pseudognaphalium luteo-album	Herb	1	11%
ASTERACEAE	Pteronia acuminata	Shrub	1	11%
ASTERACEAE	Pteronia ciliata	Shrub	1	11%
ASTERACEAE	Pteronia leucoclada	Shrub	1	11%

Family	Species	Growth forms	No of species per grid	% Frequency (100% = 9 grids)
ASTERACEAE	Pteronia mucronata	Shrub	1	11%
ASTERACEAE	Pteronia unguiculata	Shrub	1	11%
ASTERACEAE	Pulicaria scabra	Herb	1	11%
ASTERACEAE	Rosenia humilis	Shrub	1	11%
ASTERACEAE	Senecio arenarius	Herb	1	11%
ASTERACEAE	Senecio niveus	Dwarf shrub, herb, shrub	1	11%
ASTERACEAE	Senecio piptocoma	Herb	1	11%
ASTERACEAE	Senecio sisymbriifolius	Herb	3	33%
ASTERACEAE	Tripteris microcarpa	Herb	3	33%
ASTERACEAE	Tripteris sinuata	Shrub	1	11%
ASTERACEAE	Ursinia nana	Herb	2	22%
AYTONIACEAE	Plagiochasma rupestre	Bryophyte	1	11%
BIGNONIACEAE	Rhigozum trichotomum	Shrub	1	11%
BORAGINACEAE	Codon royenii	Herb	2	22%
BORAGINACEAE	Heliotropium curassavicum	Herb, succulent	1	11%
BORAGINACEAE	Trichodesma africanum	Herb	3	33%
BRASSICACEAE	Coronopus integrifolius	Herb	1	11%
BRASSICACEAE	Heliophila deserticola	Herb	6	67%
BRASSICACEAE	Heliophila trifurca	Herb	4	44%
BURSERACEAE	Commiphora gracilifrondosa	Shrub, succulent, tree	4	44%
BURSERACEAE	Commiphora namaensis	Shrub, succulent	1	11%
CAMPANULACEAE	Wahlenbergia psammophila	Herb	1	11%
CAPPARACEAE	Boscia albitrunca	Shrub, tree	2	22%
CAPPARACEAE	Cleome angustifolia	Herb	1	11%
CAPPARACEAE	Cleome foliosa	Herb	1	11%
CAPPARACEAE	Cleome oxyphylla	Herb	1	11%
CAPPARACEAE	Cleome paxii	Herb	1	11%

Family	Species	Growth forms	No of species per grid	% Frequency (100% = 9 grids)
CAPPARACEAE	Maerua gilgii	Shrub, tree	1	11%
CARYOPHYLLACEAE	Dianthus namaensis	Herb	2	22%
CELASTRACEAE	Gymnosporia buxifolia	Shrub, tree	1	11%
CELASTRACEAE	Gymnosporia linearis	Shrub, tree	1	11%
CHENOPODIACEAE	Chenopodium ambrosioides	Herb	1	11%
CHENOPODIACEAE	Chenopodium murale	Herb	1	11%
CHENOPODIACEAE	Salsola armata	Dwarf shrub	1	11%
CHENOPODIACEAE	Salsola barbata	Shrub	2	22%
CHENOPODIACEAE	Salsola kali	Herb	2	22%
CHENOPODIACEAE	Salsola zeyheri	Dwarf shrub	1	11%
COLCHICACEAE	Colchicum bellum	Geophyte	1	11%
COLCHICACEAE	Ornithoglossum undulatum	Geophyte	1	11%
COLCHICACEAE	Ornithoglossum vulgare	Geophyte	3	33%
CRASSULACEAE	Cotyledon orbiculata	Shrub, succulent	1	11%
CRASSULACEAE	Crassula corallina	Herb, succulent	3	33%
CRASSULACEAE	Crassula deltoidea	Herb, succulent	1	11%
CRASSULACEAE	Crassula mesembrianthemopsis	Herb, succulent	1	11%
CRASSULACEAE	Crassula sericea	Herb, succulent	2	22%
CRASSULACEAE	Tylecodon reticulatus	Dwarf shrub, shrub, succulent	1	11%
CRASSULACEAE	Tylecodon rubrovenosus	Dwarf shrub, shrub, succulent	1	11%
CUCURBITACEAE	Coccinia rehmannii	Climber, herb, succulent	1	11%
CUCURBITACEAE	Cucumis africanus	Herb	2	22%
CUCURBITACEAE	Cucumis rigidus	Dwarf shrub	1	11%
CUCURBITACEAE	Cucumis sagittatus	Climber, herb, succulent, suffrutex	1	11%
CYPERACEAE	Cyperus bellus	Cyperoid, herb, mesophyte	1	11%
CYPERACEAE	Cyperus marginatus	Cyperoid, helophyte, herb	2	22%
CYPERACEAE	Isolepis hemiuncialis	Cyperoid, helophyte, herb	1	11%

Family	Species	Growth forms	No of species per grid	% Frequency (100% = 9 grids)
CYPERACEAE	Scirpoides dioecus	Cyperoid, herb, mesophyte	1	11%
EBENACEAE	Diospyros acocksii	Shrub	3	33%
EBENACEAE	Diospyros lycioides	Shrub	1	11%
EBENACEAE	Euclea crispa	Shrub, tree	1	11%
EBENACEAE	Euclea undulata	Shrub, tree	1	11%
ERIOSPERMACEAE	Eriospermum bifidum	Geophyte	1	11%
EUPHORBIACEAE	Euphorbia gariepina	Shrub, succulent	2	22%
EUPHORBIACEAE	Euphorbia glanduligera	Herb	1	11%
EUPHORBIACEAE	Euphorbia gregaria	Shrub, succulent	1	11%
EUPHORBIACEAE	Euphorbia inaequilatera	Dwarf shrub, herb	1	11%
EUPHORBIACEAE	Euphorbia mauritanica	Shrub, succulent	2	22%
EUPHORBIACEAE	Euphorbia rudis	Dwarf shrub, succulent	1	11%
FABACEAE	Acacia erioloba	Shrub, tree	3	33%
FABACEAE	Acacia karroo	Shrub, tree	1	11%
FABACEAE	Acacia mellifera	Shrub, tree	1	11%
FABACEAE	Adenolobus garipensis	Shrub, tree	3	33%
FABACEAE	Caesalpinia bracteata	Shrub	1	11%
FABACEAE	Calobota spinescens	Shrub	2	22%
FABACEAE	Cullen tomentosum	Herb	1	11%
FABACEAE	Cyamopsis serrata	Herb	1	11%
FABACEAE	Dichilus pilosus	Dwarf shrub, herb	1	11%
FABACEAE	Indigastrum argyroides	Herb	3	33%
FABACEAE	Indigofera alternans	Herb	3	33%
FABACEAE	Indigofera heterotricha	Dwarf shrub, herb	3	33%
FABACEAE	Indigofera hololeuca	Herb	1	11%
FABACEAE	Indigofera pechuelii	Dwarf shrub, shrub	2	22%
FABACEAE	Lessertia annularis	Herb	1	11%

Family	Species	Growth forms	No of species per grid	% Frequency (100% = 9 grids)
FABACEAE	Lessertia incana	Dwarf shrub	1	11%
FABACEAE	Lessertia pauciflora	Herb	1	11%
FABACEAE	Lotononis falcata	Herb	1	11%
FABACEAE	Lotononis platycarpa	Herb	3	33%
FABACEAE	Lotononis rabenaviana	Herb	4	44%
FABACEAE	Melilotus albus	Herb	1	11%
FABACEAE	Melolobium candicans	Dwarf shrub, herb, shrub	2	22%
FABACEAE	Melolobium microphyllum	Dwarf shrub, shrub	1	11%
FABACEAE	Microcharis disjuncta	Herb	1	11%
FABACEAE	Pomaria lactea		3	33%
FABACEAE	Prosopis glandulosa	Shrub, tree	2	22%
FABACEAE	Prosopis velutina	Shrub, tree	2	22%
FABACEAE	Ptycholobium biflorum	Dwarf shrub, herb	1	11%
FABACEAE	Rhynchosia totta	Climber, herb	1	11%
FABACEAE	Schotia afra	Shrub, tree	1	11%
FABACEAE	Sutherlandia microphylla	Shrub	1	11%
FABACEAE	Tephrosia dregeana	Dwarf shrub, herb	1	11%
FABACEAE	Trigonella anguina	Herb	1	11%
FABACEAE	Trigonella hamosa	Herb	1	11%
FRANKENIACEAE	Frankenia pulverulenta	Herb	1	11%
GERANIACEAE	Monsonia parvifolia	Herb	3	33%
GERANIACEAE	Pelargonium xerophyton	Dwarf shrub, succulent	1	11%
GERANIACEAE	Sarcocaulon crassicaule	Dwarf shrub, succulent	1	11%
GERANIACEAE	Sarcocaulon salmoniflorum	Dwarf shrub, succulent	1	11%
GISEKIACEAE	Gisekia africana	Herb	2	22%
HYACINTHACEAE	Albuca acuminata	Geophyte	1	11%
HYACINTHACEAE	Albuca exuviata	Geophyte	1	11%

Family	Species	Growth forms	No of species per grid	% Frequency (100% = 9 grids)
HYACINTHACEAE	Albuca setosa	Geophyte	2	22%
HYACINTHACEAE	Bowiea volubilis	Geophyte, succulent	1	11%
HYACINTHACEAE	Ledebouria undulata	Geophyte	1	11%
IRIDACEAE	Babiana hypogaea	Geophyte, herb	1	11%
IRIDACEAE	Lapeirousia littoralis	Geophyte, herb	1	11%
IRIDACEAE	Lapeirousia plicata	Geophyte, herb	2	22%
IRIDACEAE	Moraea venenata	Geophyte, herb	1	11%
IRIDACEAE	Tritonia karooica	Geophyte, herb	1	11%
LAMIACEAE	Acrotome pallescens	Dwarf shrub	2	22%
LAMIACEAE	Stachys burchelliana	Shrub	1	11%
LOASACEAE	Kissenia capensis	Dwarf shrub	1	11%
LOPHIOCARPACEAE	Lophiocarpus polystachyus	Dwarf shrub, herb	2	22%
LORANTHACEAE	Septulina glauca	Parasite, shrub, succulent	1	11%
LORANTHACEAE	Septulina ovalis	Parasite, shrub, succulent	1	11%
LORANTHACEAE	Tapinanthus oleifolius	Parasite, shrub, succulent	3	33%
MALVACEAE	Abutilon dinteri	Herb, shrub	1	11%
MALVACEAE	Abutilon pycnodon	Herb, shrub	1	11%
MALVACEAE	Hermannia abrotanoides	Herb	1	11%
MALVACEAE	Hermannia gariepina	Dwarf shrub	3	33%
MALVACEAE	Hermannia grandiflora	Dwarf shrub, shrub	1	11%
MALVACEAE	Hermannia marginata	Herb	2	22%
MALVACEAE	Hermannia minutiflora	Dwarf shrub	3	33%
MALVACEAE	Hermannia pulchella	Dwarf shrub	1	11%
MALVACEAE	Hermannia spinosa	Dwarf shrub	3	33%
MALVACEAE	Hermannia stricta	Dwarf shrub, shrub	4	44%
MALVACEAE	Hibiscus elliottiae	Dwarf shrub, herb, shrub	1	11%
MALVACEAE	Radyera urens	Herb, shrub	4	44%

Family	Species	Growth forms	No of species per grid	% Frequency (100% = 9 grids)
MELIACEAE	Nymania capensis	Shrub, tree	3	33%
MESEMBRYANTHEMACEAE	Antimima vanzylii	Succulent	1	11%
MESEMBRYANTHEMACEAE	Aridaria noctiflora	Succulent	2	22%
MESEMBRYANTHEMACEAE	Brownanthus arenosus	Succulent	1	11%
MESEMBRYANTHEMACEAE	Brownanthus schenckii	Dwarf shrub, succulent	1	11%
MESEMBRYANTHEMACEAE	Conophytum fulleri	Succulent	1	11%
MESEMBRYANTHEMACEAE	Conophytum limpidum	Succulent	1	11%
MESEMBRYANTHEMACEAE	Conophytum praesectum	Succulent	1	11%
MESEMBRYANTHEMACEAE	Dinteranthus microspermus	Succulent	1	11%
MESEMBRYANTHEMACEAE	Dinteranthus puberulus	Succulent	1	11%
MESEMBRYANTHEMACEAE	Dinteranthus vanzylii	Succulent	1	11%
MESEMBRYANTHEMACEAE	Dinteranthus wilmotianus	Succulent	1	11%
MESEMBRYANTHEMACEAE	Drosanthemum albens	Succulent	1	11%
MESEMBRYANTHEMACEAE	Drosanthemum fulleri	Succulent	1	11%
MESEMBRYANTHEMACEAE	Drosanthemum luederitzii	Succulent	1	11%
MESEMBRYANTHEMACEAE	Drosanthemum subclausum	Succulent	1	11%
MESEMBRYANTHEMACEAE	Hereroa pallens	Succulent	1	11%
MESEMBRYANTHEMACEAE	Ihlenfeldtia excavata	Succulent	1	11%
MESEMBRYANTHEMACEAE	Ihlenfeldtia vanzylii	Succulent	1	11%
MESEMBRYANTHEMACEAE	Lapidaria margaretae	Succulent	1	11%
MESEMBRYANTHEMACEAE	Lithops olivacea	Succulent	2	22%
MESEMBRYANTHEMACEAE	Mesembryanthemum crystallinum	Succulent	3	33%
MESEMBRYANTHEMACEAE	Mesembryanthemum guerichianum	Succulent	1	11%
MESEMBRYANTHEMACEAE	Mesembryanthemum inachabense	Succulent	2	22%
MESEMBRYANTHEMACEAE	Phyllobolus latipetalus	Succulent	1	11%
MESEMBRYANTHEMACEAE	Phyllobolus lignescens	Succulent	3	33%
MESEMBRYANTHEMACEAE	Prenia tetragona	Succulent	2	22%

Family	Species	Growth forms	No of species per grid	% Frequency (100% = 9 grids)
MESEMBRYANTHEMACEAE	Psilocaulon articulatum	Succulent	2	22%
MESEMBRYANTHEMACEAE	Psilocaulon subnodosum	Succulent	3	33%
MESEMBRYANTHEMACEAE	Schwantesia pillansii	Succulent	1	11%
MOLLUGINACEAE	Hypertelis salsoloides	Dwarf shrub	3	33%
MOLLUGINACEAE	Limeum aethiopicum		4	44%
MOLLUGINACEAE	Limeum argute-carinatum	Herb	1	11%
MOLLUGINACEAE	Limeum myosotis	Herb	2	22%
MOLLUGINACEAE	Mollugo cerviana	Herb	1	11%
MOLLUGINACEAE	Pharnaceum albens	Dwarf shrub	1	11%
MOLLUGINACEAE	Pharnaceum brevicaule	Herb	1	11%
MOLLUGINACEAE	Pharnaceum croceum	Herb	1	11%
MOLLUGINACEAE	Suessenguthiella scleranthoides	Herb	1	11%
MONTINIACEAE	Montinia caryophyllacea	Shrub	3	33%
MORACEAE	Ficus cordata	Tree	1	11%
MORACEAE	Ficus ilicina	Shrub, succulent, tree	1	11%
NEURADACEAE	Grielum humifusum	Herb	2	22%
NEURADACEAE	Grielum sinuatum	Herb	1	11%
NYCTAGINACEAE	Phaeoptilum spinosum	Shrub	3	33%
OROBANCHACEAE	Alectra orobanchoides		1	11%
PEDALIACEAE	Rogeria longiflora	Suffrutex	2	22%
PHYLLANTHACEAE	Phyllanthus parvulus	Dwarf shrub, herb	1	11%
PLUMBAGINACEAE	Dyerophytum africanum	Shrub	3	33%
POACEAE	Aristida adscensionis	Graminoid	1	11%
POACEAE	Aristida congesta	Graminoid	1	11%
POACEAE	Aristida engleri	Graminoid	1	11%
POACEAE	Aristida parvula	Graminoid	1	11%
POACEAE	Aristida vestita	Graminoid	1	11%

Family	Species	Growth forms	No of species per grid	% Frequency (100% = 9 grids)
POACEAE	Brachiaria glomerata	Graminoid	1	11%
POACEAE	Cenchrus ciliaris	Graminoid	2	22%
POACEAE	Centropodia glauca	Graminoid	2	22%
POACEAE	Chloris virgata	Graminoid	1	11%
POACEAE	Cynodon dactylon	Graminoid	1	11%
POACEAE	Digitaria eriantha	Graminoid	1	11%
POACEAE	Ehrharta calycina	Graminoid	1	11%
POACEAE	Enneapogon cenchroides	Graminoid	1	11%
POACEAE	Enneapogon desvauxii	Graminoid	2	22%
POACEAE	Enneapogon scaber	Graminoid	2	22%
POACEAE	Eragrostis biflora	Graminoid	1	11%
POACEAE	Eragrostis brizantha	Graminoid	1	11%
POACEAE	Eragrostis gummiflua	Graminoid	1	11%
POACEAE	Eragrostis lehmanniana	Graminoid	1	11%
POACEAE	Eragrostis nindensis	Graminoid	2	22%
POACEAE	Eragrostis porosa	Graminoid	1	11%
POACEAE	Eragrostis procumbens	Graminoid	1	11%
POACEAE	Eragrostis rotifer	Graminoid	1	11%
POACEAE	Fingerhuthia africana	Graminoid	1	11%
POACEAE	Leucophrys mesocoma	Graminoid	2	22%
POACEAE	Melinis repens	Graminoid	1	11%
POACEAE	Odyssea paucinervis	Graminoid	1	11%
POACEAE	Oropetium capense	Graminoid	1	11%
POACEAE	Panicum arbusculum	Graminoid	1	11%
POACEAE	Phragmites australis	Graminoid	1	11%
POACEAE	Polypogon monspeliensis	Graminoid	2	22%
POACEAE	Schismus barbatus	Graminoid	1	11%

Family	Species	Growth forms	No of species per grid	% Frequency (100% = 9 grids)
POACEAE	Schmidtia kalahariensis	Graminoid	2	22%
POACEAE	Setaria verticillata	Graminoid	1	11%
POACEAE	Sporobolus nervosus	Graminoid	1	11%
POACEAE	Stipagrostis anomala	Graminoid	1	11%
POACEAE	Stipagrostis brevifolia	Dwarf shrub, graminoid, shrub	2	22%
POACEAE	Stipagrostis ciliata	Graminoid	3	33%
POACEAE	Stipagrostis hochstetteriana	Graminoid	4	44%
POACEAE	Stipagrostis obtusa	Graminoid	3	33%
POACEAE	Stipagrostis uniplumis	Graminoid	3	33%
POACEAE	Tragus berteronianus	Graminoid	1	11%
POACEAE	Tricholaena capensis	Graminoid	2	22%
POACEAE	Triraphis ramosissima	Graminoid	1	11%
POLYGALACEAE	Polygala guerichiana	Dwarf shrub, shrub	1	11%
POLYGALACEAE	Polygala leptophylla	Dwarf shrub	1	11%
POLYGALACEAE	Polygala seminuda	Dwarf shrub, herb	1	11%
POLYGONACEAE	Persicaria decipiens	Helophyte, herb	1	11%
PORTULACACEAE	Anacampseros baeseckei	Herb, succulent	2	22%
PORTULACACEAE	Anacampseros filamentosa	Herb, succulent	2	22%
PORTULACACEAE	Anacampseros karasmontana	Herb, succulent	1	11%
PORTULACACEAE	Avonia albissima	Herb, succulent	3	33%
PORTULACACEAE	Avonia herreana	Herb, succulent	1	11%
PORTULACACEAE	Avonia papyracea	Herb, succulent	2	22%
PORTULACACEAE	Avonia quinaria	Herb, succulent	2	22%
PORTULACACEAE	Avonia recurvata	Herb, succulent	2	22%
PORTULACACEAE	Avonia ruschii	Herb, succulent	1	11%
PORTULACACEAE	Ceraria namaquensis	Shrub, succulent, tree	1	11%
PORTULACACEAE	Portulaca kermesina	Herb, succulent	1	11%

Family	Species	Growth forms	No of species per grid	% Frequency (100% = 9 grids)
POTTIACEAE	Tortula atrovirens	Bryophyte	2	22%
POTTIACEAE	Trichostomum brachydontium	Bryophyte	1	11%
RESEDACEAE	Oligomeris dipetala	Dwarf shrub	1	11%
RHAMNACEAE	Ziziphus mucronata	Shrub, tree	1	11%
RICCIACEAE	Riccia cavernosa	Bryophyte	2	22%
RUBIACEAE	Kohautia caespitosa	Herb	2	22%
RUBIACEAE	Kohautia cynanchica	Herb	2	22%
SANTALACEAE	Thesium lineatum	Dwarf shrub, parasite, shrub	2	22%
SAPINDACEAE	Pappea capensis	Shrub, tree	3	33%
SCROPHULARIACEAE	Anticharis juncea	Dwarf shrub	1	11%
SCROPHULARIACEAE	Aptosimum albomarginatum	Dwarf shrub	2	22%
SCROPHULARIACEAE	Aptosimum junceum	Dwarf shrub, shrub	2	22%
SCROPHULARIACEAE	Aptosimum procumbens	Herb	2	22%
SCROPHULARIACEAE	Aptosimum spinescens	Dwarf shrub	3	33%
SCROPHULARIACEAE	Diascia engleri	Herb	4	44%
SCROPHULARIACEAE	Diascia runcinata	Herb	1	11%
SCROPHULARIACEAE	Hebenstretia parviflora	Herb	1	11%
SCROPHULARIACEAE	Jamesbrittenia aridicola	Herb	4	44%
SCROPHULARIACEAE	Jamesbrittenia integerrima	Dwarf shrub, herb	1	11%
SCROPHULARIACEAE	Jamesbrittenia maxii	Dwarf shrub, shrub	1	11%
SCROPHULARIACEAE	Jamesbrittenia ramosissima	Dwarf shrub, shrub	4	44%
SCROPHULARIACEAE	Lyperia tristis	Herb	1	11%
SCROPHULARIACEAE	Manulea burchellii	Herb	1	11%
SCROPHULARIACEAE	Manulea gariepina	Herb	1	11%
SCROPHULARIACEAE	Manulea nervosa	Herb	1	11%
SCROPHULARIACEAE	Manulea schaeferi	Herb	2	22%
SCROPHULARIACEAE	Nemesia anisocarpa	Herb	1	11%

Family	Species	Growth forms	No of species per grid	% Frequency (100% = 9 grids)
SCROPHULARIACEAE	Nemesia ligulata	Herb	1	11%
SCROPHULARIACEAE	Peliostomum leucorrhizum	Dwarf shrub	3	33%
SCROPHULARIACEAE	Phyllopodium maxii	Herb	1	11%
SCROPHULARIACEAE	Selago dinteri	Herb	1	11%
SCROPHULARIACEAE	Selago divaricata	Dwarf shrub	1	11%
SCROPHULARIACEAE	Veronica anagallis-aquatica	Herb, hydrophyte	1	11%
SCROPHULARIACEAE	Zaluzianskya benthamiana	Herb	1	11%
SCROPHULARIACEAE	Zaluzianskya diandra	Herb	2	22%
SINOPTERIDACEAE	Cheilanthes kunzei	Geophyte, herb, lithophyte	1	11%
SOLANACEAE	Datura stramonium	Herb, shrub	1	11%
SOLANACEAE	Lycium bosciifolium	Shrub, tree	2	22%
SOLANACEAE	Lycium oxycarpum	Shrub, tree	1	11%
SOLANACEAE	Lycium pumilum	Shrub	2	22%
SOLANACEAE	Nicotiana glauca	Shrub, tree	1	11%
SOLANACEAE	Nicotiana longiflora	Herb	1	11%
SOLANACEAE	Solanum rigescentoides	Shrub	1	11%
TAMARICACEAE	Tamarix usneoides	Shrub, tree	2	22%
TECOPHILAEACEAE	Cyanella lutea	Geophyte	2	22%
URTICACEAE	Forsskaolea candida	Herb	2	22%
VERBENACEAE	Chascanum garipense	Herb	2	22%
VERBENACEAE	Chascanum pumilum	Herb	1	11%
VISCACEAE	Viscum capense	Parasite, shrub, succulent	1	11%
VISCACEAE	Viscum rotundifolium	Parasite, shrub, succulent	1	11%
ZYGOPHYLLACEAE	Augea capensis	Dwarf shrub, succulent	1	11%
ZYGOPHYLLACEAE	Sisyndite spartea	Shrub	4	44%
ZYGOPHYLLACEAE	Tribulus terrestris	Herb	1	11%
ZYGOPHYLLACEAE	Zygophyllum dregeanum	Dwarf shrub, shrub, succulent	1	11%

Family	Species	Growth forms	No of species per grid	% Frequency (100% = 9 grids)
ZYGOPHYLLACEAE	Zygophyllum microcarpum	Dwarf shrub, shrub, succulent	2	22%
ZYGOPHYLLACEAE	Zygophyllum prismatocarpum	Dwarf shrub, shrub, succulent	1	11%
ZYGOPHYLLACEAE	Zygophyllum retrofractum	Shrub, succulent	2	22%
ZYGOPHYLLACEAE	Zygophyllum rigidum	Shrub, succulent	1	11%
ZYGOPHYLLACEAE	Zygophyllum simplex	Herb, succulent	3	33%

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11 APPENDIX D – SIMON TODD CONSULTING REPORT

APPENDIX 7.3: VISUAL IMPACT ASSESSMENT REPORT

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Visual Impact Assessment

Of Proposed Photovoltaic Development by Biotherm Energy

J A Geldenhuys

ABSTRACT

Visual assessment report for the proposed expansion of a photovoltaic installation on the farm Konkoonsies in the Northern Cape Province, RSA

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1 Introduction

An environmental impact assessment for the installation of a photovoltaic development by Biotherm Energy in the Northern Cape Province has been executed in 2011 in terms of the GN 543 Environmental Impact Assessment regulations promulgated in terms of regulation 54 of the National Environmental Management Act (Act No. 107 of 1998).

A 100 Ha site on the farm of Konkoonsies (30 km North-northeast of Pofadder) was identified as suited for the development of a 19,5Ha photovoltaic installation. J A Geldenhuys executed the visual study, comprising three study areas, which was completed in February 2011 and found to be suitable for development. It has been Approved by the Department of Energy.

An additional area of 140Ha directly adjacent to the previous study areas is now proposed for development. Escience Associates (Pty) Ltd has again contracted the services of J A Geldenhuys for the execution of the visual study of the extended development.

Scoping revealed that the proposed project would include several activities identified in terms of the NEMA 2010 Environmental Impact Assessment (EIA) Amendment Regulations of 18 June 2010, including the transformation of land greater than 20 Ha, the generation of Electricity and the transmission and distribution of electricity. Preliminary scoping also indicated the necessity for the execution of an extension of the visual impact assessment already executed, as a result of the pristine nature of the environment.

2 Project Background

Drawing from *Guideline for involving visual & aesthetic specialists in EIA processes: Edition 1*, by Bernard Oberholzer (2005), the Visual Specialist has taken the following principles and concepts underpinning Visual Input into account during the assessment of the proposed development's background:

- An awareness that 'visual' implies the full range of visual, aesthetic, cultural and spiritual aspects of the environment that contribute to the area's sense of place;
- The consideration of both the natural and the cultural landscape;
- The identification of all scenic resources, protected areas and sites of special interest;
- The nature and location of any cultural heritage sites, and areas of special or historical interest;
- An understanding of the landscape processes, including geological, vegetation and settlement patterns;
- Inclusion of both quantitative criteria, such as 'visibility', and qualitative criteria, such as landscape 'character'.

2.1 Legislative Context of the Area

The relevant provincial and local authorities have been referred to in order to determine whether any restrictions through legislation, by-laws or policies were applicable and which would subsequently prevent or limit development with regards to the protection of any scenic or cultural resources in the direct area, or in proximity to the development. No such reasons had been found.

Research had also been conducted insofar as the following possible flaws are concerned:

- A listed/proclaimed site, in specific Augrabies National Park, is found in relative proximity to the development. The Southern boundary of the park is however 56km northeast of the development;

- Konkoonsies, at its closest, is situated 3,6 km south of the Augrabies National Park's 'Priority Natural Area' southern boundary, as provided for by the National Heritage Resources Act. It therefore falls outside of this area and is deemed suitable for development;
- With the site deviating substantially from the N14 highway that links areas in the East to the West coast of South Africa, no scenic routes, special areas or proclaimed heritage sites are within proximity to the proposed development;
- The previous visual study's view simulation results have yielded that the development would not result in high significance, possibly to be found unacceptable by stakeholders and decision-makers.

Figure 1: The Northern Cape Province's positioning in South Africa

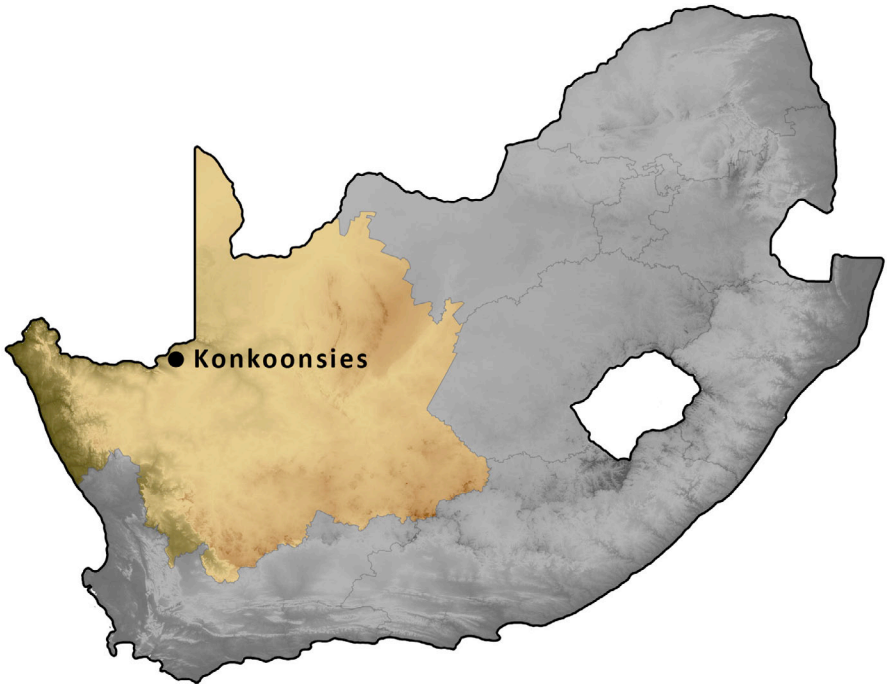

Figure 2: Locality – Konkoonsies

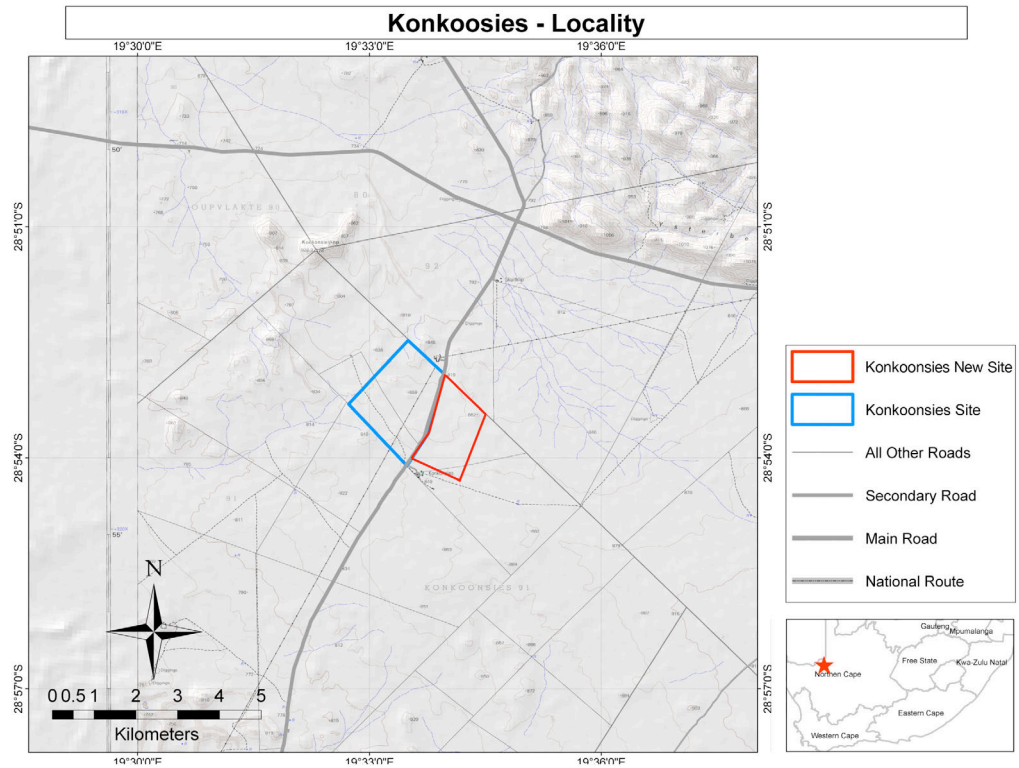

Figure 3: Conservation Areas - Konkoonsies

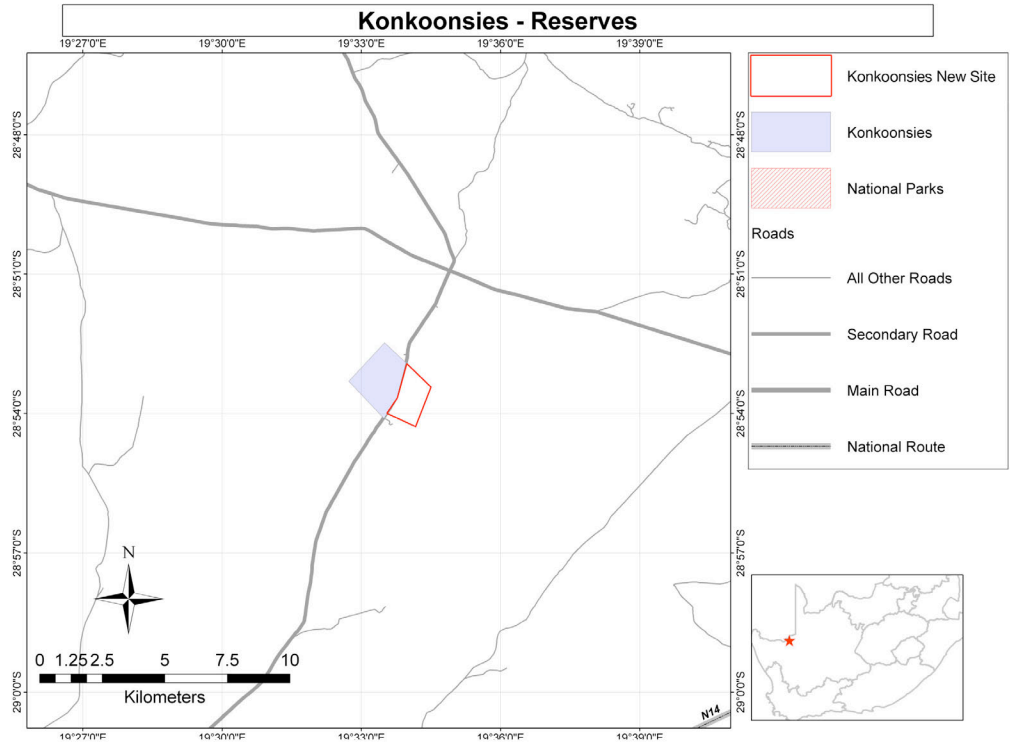

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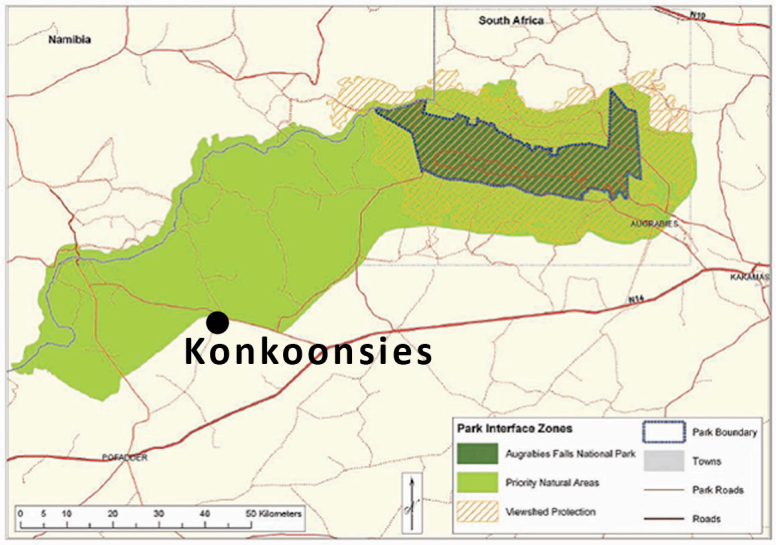
Figure 4: Augrabies National Park's Proclaimed Viewshed Protection Area



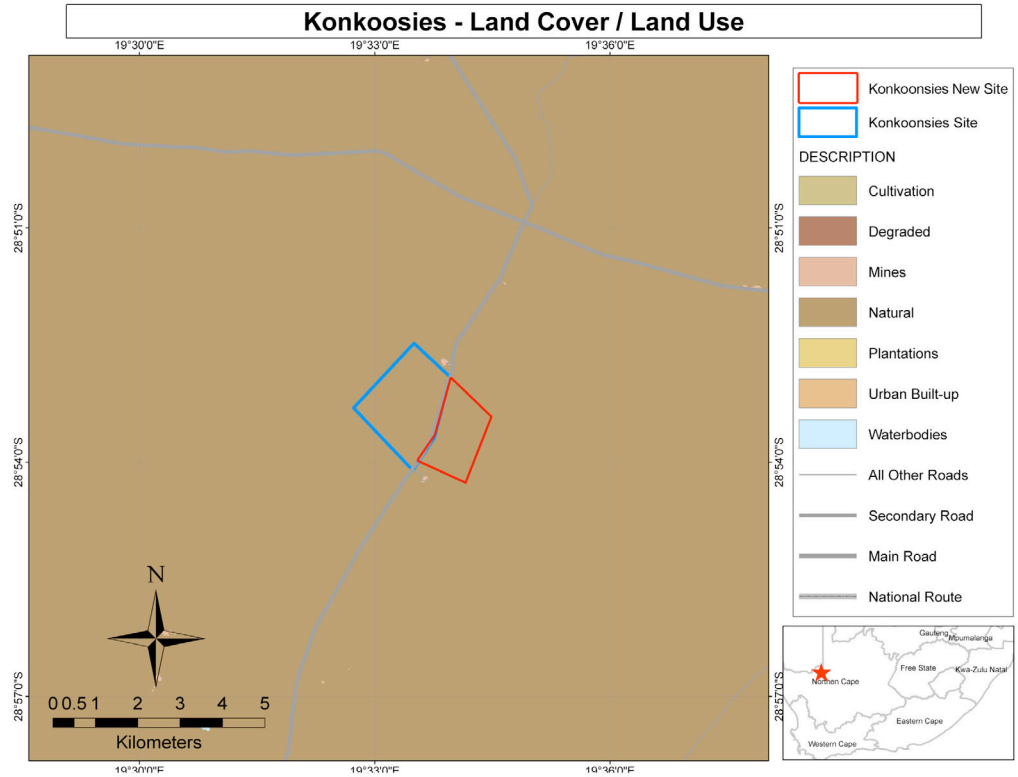
2.2 Environmental Context of the Area

The nature of the environment, with specific regard to its biophysical, social and economic background, was taken into account. As can be seen in figure 3, there are no conservation areas within the development site's viewshed. Konkoonsies is however situated directly adjacent to the Augrabies National Park's proclaimed Priority Natural Area (Figure 4).

With regard to land cover and land use, as can be seen in figure 5, the area is dominated by largely unspoilt natural Nama-Karoo vegetation on relatively flat ground, with occasional occurrences of Granite Gneiss outcrops. While the area is appropriated for grazing, most of the surrounding area had been left intact, with a sense of unspoilt natural beauty.

The area's 'sense of place' is that of a particular kind of openness – of outstretched plains of saturated light-brown Nama Karoo flats, framed by the mostly cloudless deep blue hues of sky. The clean lines of earth and sky at Konkoonsies are broken by the Granite Gneiss koppies and the occasional imposing figure of a quiver tree, sometimes with birds' cluster nests entangled in its branches.

Figure 5: Land Cover – Konkoonsies



Figures 6 - 10: Sense of Place – Konkoonsies

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3 Visual Impact Assessment Planning

3.1 Existing Visual Quality of the Area

Drawing from the United States of America's Bureau of Land Management's Visual Resource Management Manual on "Scenic Quality Rating" (U.S. Department of the Interior), visual quality is quantified by such criteria as the physical qualities of the landscape, as well as the types of viewers exposed to it. Distinction is made between the following seven physical qualities of the landscape:

i.) Landform:

The higher the degree of contrast between portions of land in an area, the more interesting the topography becomes. Heights in relation to flat ground or depressions, such as valleys or canyons, or vice versa, constituting high contrast ratios, will be seen to be more significant since focal areas are created in the compositions. The principles of Gestalt determine that inclines, introducing diagonal and vertical lines into scenes' compositions, will render a scene more interesting.

Perceptions of depth, similarly, contribute to heightened perception of scenic quality. High mountains, observed from low-lying areas, and valleys observed from ridges will serve to emphasise an area's perceived depth.

Outstanding landforms with interesting shapes, such as pinnacles, arches and other extraordinary formations may be seen as having high scenic value.

The area in question consists of flat, outstretched plains. While the site is topographically rather flat, the landscape of Konkoonsies is dotted with almost pyramid-shaped Granite koppies, introducing a very subtle but unexpected topographic variation. The site also displays a substantial degree of depth perception.

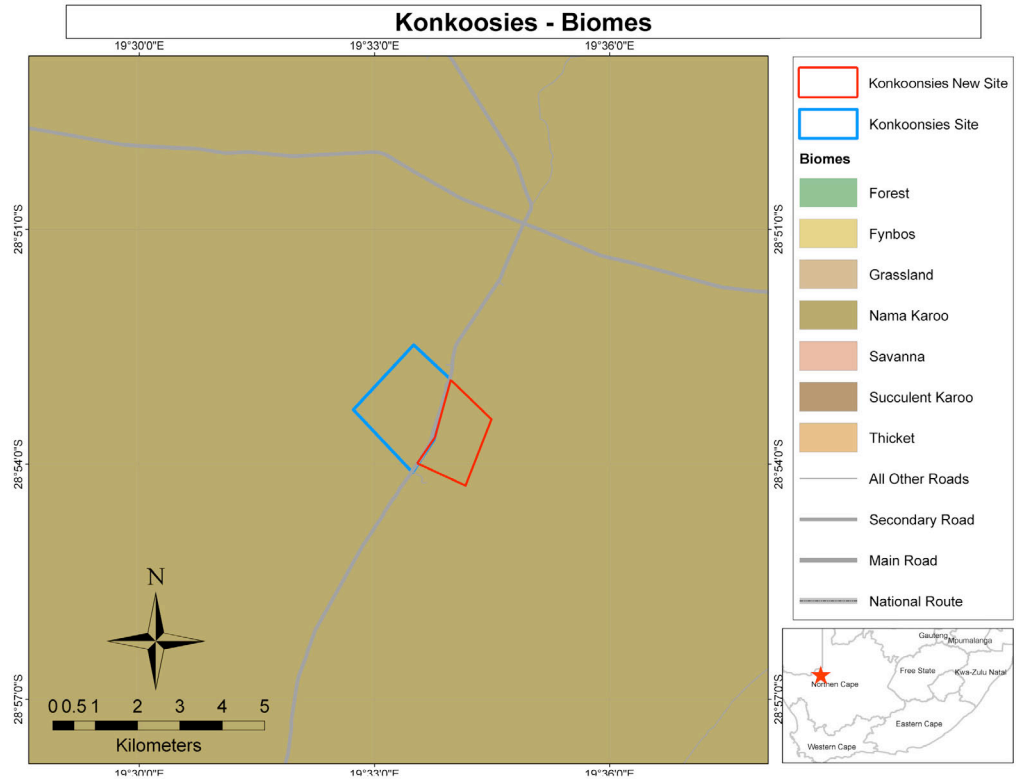
ii.) Vegetation:

From the point of view of survival, sensory input has to serve a purpose – specifically like smell and taste – either to attract us to an object, place or concept or to repel us from it. Our perception of the qualities of a landscape, whether accurate or not, lead us to make decisions about whether we want to associate with it or not – whether it will be good or bad for our survival. There are, in other words, hard-coded responses to visual input in humans, that have very little to do with aesthetics or gestalt. We are, for instance, generally designed to attune to scenes containing lush vegetation, usually indicative of an abundance of water, usually indicating areas that might be fertile and therefore potentially rich in food, or suited to cultivation.

Variety in types of vegetation, introducing variety in pattern, form and texture created by plant life contribute to a scene's perceived visual quality. Occurrences of vegetation, foliage or flowers, whether short-lived or seasonal can also contribute perceived quality, as will interesting or rare vegetation features, such as gnarled or wind-beaten trees.

As mentioned in the discussion regarding 'sense of place', the area is dominated by largely intact natural Nama-Karoo vegetation, showing signs of light grazing. Distribution of vegetation is sparse, but this does not seem to detract from instilling a sense of serenity. There are very few trees, apart from the occasional quiver tree.

Figure 11: Biomes – Konkoonsies



iii.) Water:

We are designed to attune to scenes containing an abundance of water, usually indicating areas that might be fertile. Similarly, on a contextual level, water may introduce serenity to a scene.

Water also introduces movement into a composition, making it more dynamic, allowing the eye to move around in it. It often also introduces repetition and symmetry, other features of compositional gestalt, in its ability to reflect what is around it. Repetition and symmetry contribute to humans' ability for pattern recognition establishing a sense of compositional order.

The degree to which water dominates the scene is the primary consideration in selecting the rating score, providing that compositional balance is retained (large bodies of water alternated by land may be more appealing than being on an island or boat, surrounded by water, with no land in sight).

Apart from the Orange River, which plays a very big part in the physical and cultural landscape of this area, there are no bodies of water in proximity.

iv.) Colour:

We are drawn to colourful objects as opposed to bland objects (green signifies fertility and colourful fruit signify a greater degree of ripeness).

The overall colours of the basic components of the landscape (e.g., soil, rock, vegetation, etc), should be taken into account. Key factors to consider when rating colour are:

- *The variety of colours: Note that not only a big variety of colour is attractive. Often, no or little variety can contribute very positively to scenic value (the arid plains of the Namaqualand in the dry season, for instance, can be as attractive as when in bloom after the spring rains);*

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- *Contrast and harmony: Complimentary colours will add to colour contrast, as will be found in the combination of red or orange flowers, juxtaposed against green foliage, or blue sky combined with the yellow hues of a desert or salt pan.*

Colours are to be considered mostly as they would appear during seasons or periods of high traffic.

The colours found in the vegetation of the area are not conventionally beautiful. The area is very arid, and doesn't lean itself to instilling conventional perceptions of fertility. There are, however, very strong complementary colour pairs to be found in the combination of the saturated brown hues of soil combined with the blue hues of sky. In combination with the flat landscape, it is as if a viewer's vista is divided into two halves of complementary colour. The absence of any dominating topographic features, and thus the absence of diagonal lines, however, does not exclude a sense of dynamicity to the scenic value created by a very defined horizontal shape distinction between land and sky.

v.) Adjacent scenery:

The degree to which scenery outside the scenery unit are rated enhances the overall impression of the scenery within the rating unit. The distance which adjacent scenery will influence scenery within the rating unit will normally range from 0 - 8 kilometres, depending on the characteristics of the topography, the vegetative cover, and other factors.

This factor is generally applied to units that would normally rate very low in score, but the influence of the adjacent unit would enhance the visual quality and raise the score.

The area adjacent to the proposed development is entirely similar to that of the site itself.

vi.) Scarcity:

This factor provides an opportunity to give added importance to one or all of the scenic features that appear to be relatively unique or rare within one physiographic region. There may also be cases where a separate evaluation of each of the key factors does not give a true picture of the overall scenic quality of an area. Often it is a number of not so spectacular elements in the proper combination that produces the most pleasing and memorable scenery - the scarcity factor can be used to recognize this type of area and give it the added emphasis it needs.

While the Nama Karoo spans a very large area and the landscape qualities are thus not as scarce, the combination of elements do contribute to a very unique and beautiful landscape.

vii.) Cultural modifications:

Cultural modifications in the landform/water, vegetation, and addition of structures should be considered and may detract from the scenery in the form of a negative intrusion. Also, man-made features that compliment the natural landscape may enhance the scenic value.

The site is located directly adjacent to an already existing Paulputs substation, accompanied by the obligatory existing roads, servitudes and power lines associated with it.

Figures 12 & 13: Cultural Modifications & Adjacent Scenery – Konkoonsies

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The following table can be employed to make an assessment of the existing scenic quality of the area:

Table 1: Scenic Quality Inventory and Evaluation Chart

Key factors	*Rating Criteria and Score*		
Landform	High vertical relief as expressed in prominent cliffs, spires, or massive rock outcrops, or severe surface variation or highly eroded formations including major badlands or dune systems; or detail features dominant and exceptionally striking and intriguing such as glaciers. 5	Steep canyons, mesas, buttes, cinder cones, and drumlins; or interesting erosion patterns or variety in size and shape of landforms; or detail features which are interesting though not dominant or exceptional. 3	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. **1**
Vegetation	A variety of vegetative types as expressed in interesting forms, textures, and patterns. 5	Some variety of vegetation, but only one or two major types. **3**	Little or no variety or contrast in vegetation. 1
Water	Clear and clean appearing, still, or cascading white water, any of which are a dominant factor in the landscape. 5	Flowing, or still, but not dominant in the landscape. 3	Absent, or present, but not noticeable. **0**
Colour	Rich colour combinations, variety or vivid colour; or pleasing contrasts in the soil, rock, vegetation, water or snow fields. 5	Some intensity or variety in colours and contrast of the soil, rock and vegetation, but not a dominant scenic element. **3**	Subtle colour variations, contrast, or interest; generally mute tones. 1
Influence of adjacent scenery	Adjacent scenery greatly enhances visual quality. 5	Adjacent scenery moderately enhances overall visual quality. **3**	Adjacent scenery has little or no influence on overall visual quality. 0
Scarcity	One of a kind; or unusually memorable, or very rare within region. Consistent chance for exceptional wildlife or wildflower viewing, etc. * 5+	Distinctive, though somewhat similar to others within the region. **3**	Interesting within its setting, but fairly common within the region. 1

Cultural modifications	Modifications add favourably to visual variety while promoting visual harmony. **2**	Modifications add little or no visual variety to the area, and introduce no discordant elements. **0**	Modifications add variety but are very discordant and promote strong disharmony. **-4**

Scenic Quality Rating:

A = 19 or more – High scenic quality
B = 12-18 – Moderate scenic quality
C = 11 or less – Low scenic quality.

The scenic quality rating has scored 13, which indicates **moderate scenic quality.**

3.2 Types of Viewers Exposed to the Development

i.) Viewer Types

Visual sensitivity will vary with the type of users. Recreational sightseers may be highly sensitive to any changes in visual quality, but since the sensitive receptors of the development are centered around gravel roads and the entrances to the Eskom sub-stations, it is inferred that the predominant type of viewers will be workers in the area and local commuters travelling between rural settlements. These viewer types, in general, would perceive changes to the landscape as neutral.

ii.) Frequency of Use

The site is extremely remote. The frequency of viewers subjected to the installations is expected to be very low.

iii.) Public Interest

There was no public controversy about the previous approved development proposal, and there is no awareness of public controversy in response to proposed additions.

3.3 The Nature of the Development

In addition to the plans of the development itself, the following information describing the development was acquired:

- The location and elevation of the project (including coordinates);
- The orientation of the development within the site;
- The surface area and measurements of the respective placement options;
- Indication of finishes and use of colour.

The following list of contextual information was also gathered, not only to inform the visual assessment, but also to present to decision-makers:

- Map indicating the site and surrounding area;
- Topographic information, in the form of high resolution 3D (CAD) files, for the creation of a digital elevation model (DEM) and incorporation into the 3D software employed in the preparation of view simulations.

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A standard photovoltaic (PV) development has been proposed and is being investigated. Measuring an approximate height of 3m, the type of development was identified as a Category 3 Development, which includes Low density resort / residential type development, golf or polo estates, low to **medium-scale infrastructure**.

* **Explanation of term used:**
Low-density development - generally single or double-storey domestic structures, usually with more than 50% of the area retained as natural (undisturbed) open space.

Figure 14: A Single SPV Unit

Three realistic, worst-case study areas had been investigated for the initial application (as outlined in figure 14). The proponents are currently investigating the development of an additional 140Ha area directly adjacent and toward the east of the already approved development (Figure 15):

Figure 15: Previous Study Areas Investigated

Figure 16: Current Study Area Investigated

3.4 Determine the expected level of impact

The following table served as a guideline for the type of Visual Impact Assessment by which the previous study areas could be addressed:

Type of Environment	Type of development (Low to high intensity)				
	Category 1	Category 2	**Category 3**	Category 4	Category 5
Protected/wild areas of international, national, or regional significance	Moderate visual impact expected	High visual impact expected	High visual impact expected	Very high visual impact expected	Very high visual impact expected
Areas or routes of high scenic, cultural, historical significance	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected	High visual impact expected	Very high visual impact expected
Areas or routes of medium scenic, cultural or historical significance	Little or no visual impact expected	Minimal visual impact expected	**Moderate visual impact expected**	High visual impact expected	High visual impact expected
Areas or routes of low scenic, cultural, historical significance / disturbed	Little or no visual impact expected - possible benefits	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected
Disturbed or degraded sites / run-down urban areas / wasteland	Little or no visual impact expected - Possible benefits	Little or no visual impact expected - Possible benefits	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected

Previous view simulations have however shown that, due to the low height of the installation, as well as its distance from the road, the expected level of impact can be reduced from 'moderate' to 'minimal'. The remoteness of the site must also be noted. Despite Konkoonsies's proximity to the Augrabies National Park's natural priority area boundary (3,6 km), the roads from which the vantage points had been determined display extremely low viewer frequency. This will serve to diminish the expected visual impact. It is therefore expected that the degree of visual intrusion will be diminished to an expected 'minimal' visual impact.

Minimal visual impact expected:
Potentially low level of intrusion on landscapes or scenic resources;
Limited change in the visual character of the area;
Low-key development, similar in nature to existing development.

3.5 Data Obtained, Produced By Other Specialists

Data outlining vegetation, morphology, conservation areas, land use, land cover and general sensitivity had been obtained from Escience Associates (Pty) Ltd.

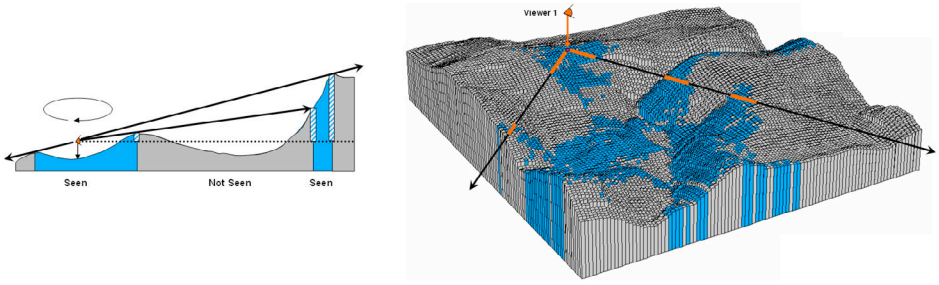
4 Execution of Visual Impact Assessment deliverables

4.1 Viewshed Analysis

A viewshed is an area, dispersed over the area's topography, from which the proposed development area or project activities may be visible. Identifying and mapping the proposed development's viewshed is a key component in developing its visual setting. In this step, the specialist used computer-aided line-of-sight analysis to determine which parts of the landscape will be visually exposed to the project. In combination, he also visits the development site itself to perform an 'inter-visibility'-study, achieved by a 360 degree panoramic photographic audit, based on the principle that the installation site will be visible from any vantage point that is visible from the site. The specialist then drives through the surrounding area, visiting possible vantage points earmarked by both the viewshed- and inter-visibility studies, in order to verify from where the site can be seen.

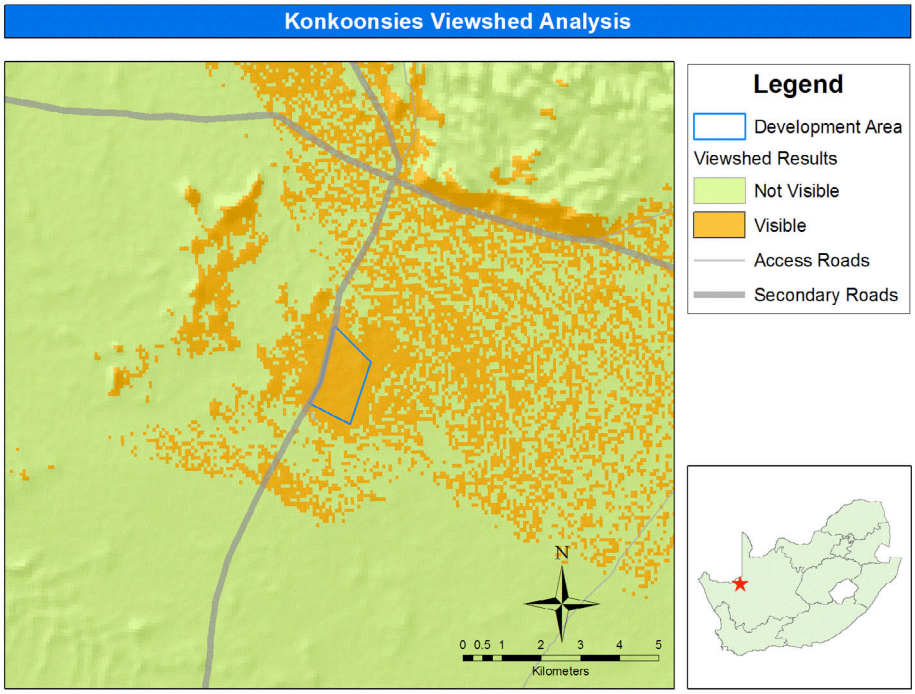
A viewshed can be understood from the analogy of rays of oblique light illuminating a textured object, such as desert dunes during sunrise, or the lunar surface illuminated obliquely by the sun.

Figure 17: Examples of Viewshed Analysis



A viewshed map has been rendered of the new study area from a level of 3 m in height.

Figure 18: Viewshed Analysis of the Proposed Development



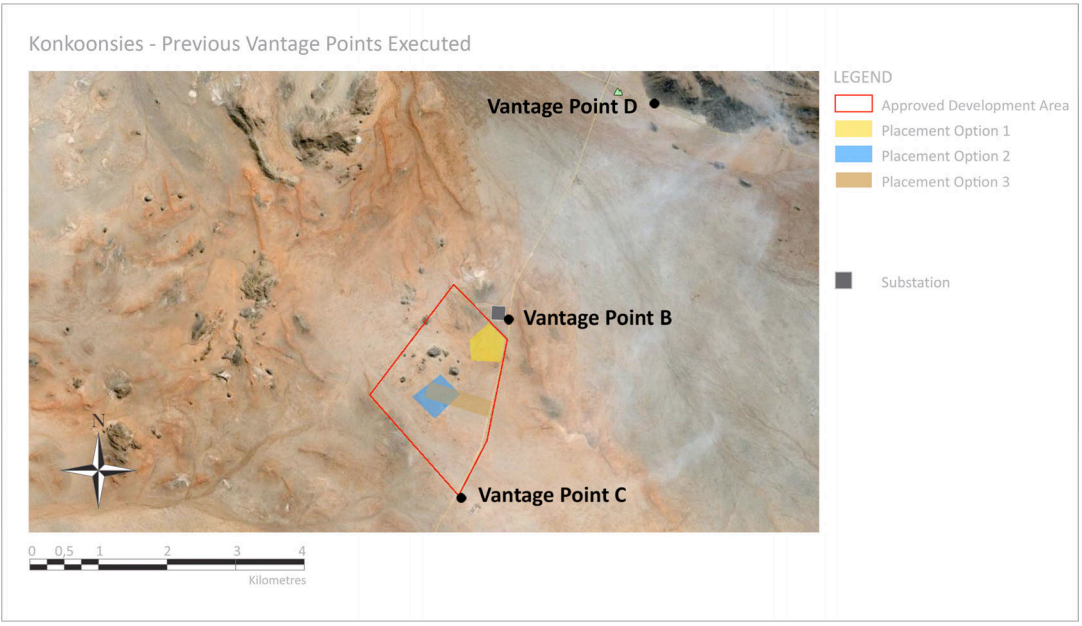
4.2 Identification of Sensitive Receptors Located Within the Project Viewshed

A photographic audit was executed from these vantage points, which include:

i.) 50 mm photographs (simulating the human eye view angle) in the direction of the installation, to be presented to relevant authorities as depictions of the unaltered landscape, as well as to be incorporated into view simulations of the completed development;
ii.) Incremental enlargement photographs of the development site, for incorporation into view simulations, in order to achieve higher definition;
iii.) Site audit photographs that will aid in the gathering of botanical, geological and topographic data, to be used as reference material for, or incorporated into view simulations;
iv.) Other photographs, for the purpose of recording the area's particular "sense of place".

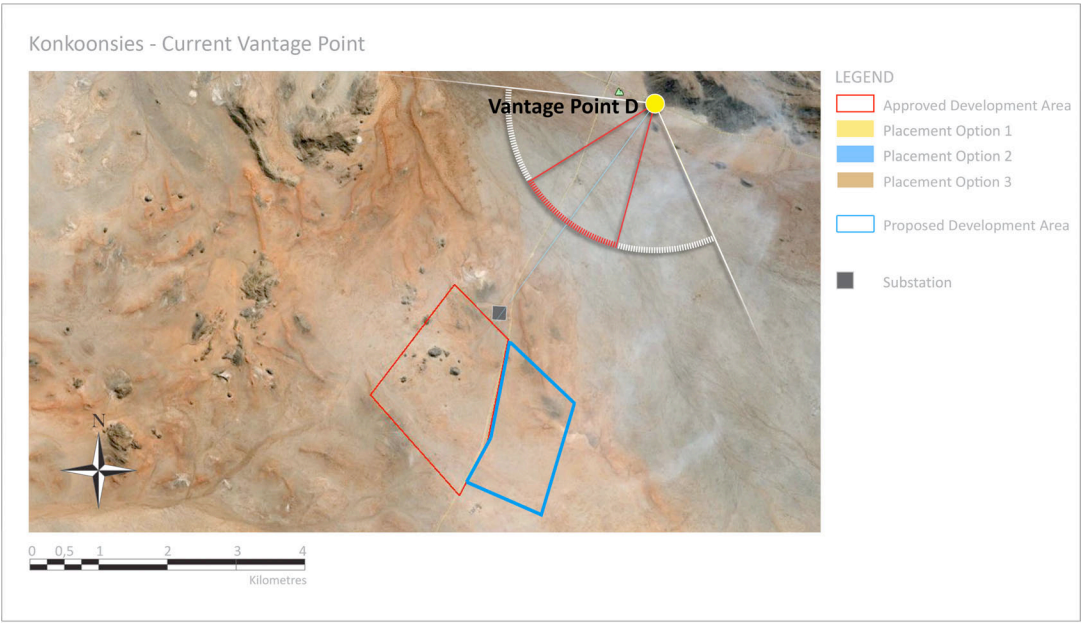
For the purpose of the previous visual study, areas with the highest degree of viewer traffic, such as gravel roads and intersections, were identified. The vantage points are indicated in Figure 19 as A, B and C.

Figure 19: Previous Vantage Points



Since three worst-case scenario study areas have already been empirically modelled in CAD and view simulations have been produced of the various placement options at different distances from the development, the new study area has been modelled from Vantage Point D (Onseepkans Road, 200 m East of the turn-off to the Paulputs sub-station) by means of photomontage.

Figure 20: Current Vantage Point



4.3 View Simulations of the Visual Changes that the Development will Introduce

Please refer to *Appendix A: Previous View Simulations* for daytime view simulations from each of three vantage points, studying the degree of visual intrusion of the three aforementioned study areas. Included below are view simulations of the new development area:

Figure 21: Konkoonsies Vantage point D, Before Development

Figure 22: Konkoonsies Vantage Point D, After Development

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5 Assessment of Visual Impact findings

5.1 Defining visual impact assessment criteria

5.1.1 Visual Exposure

Visual exposure constitutes the visual range of the development, or the geographic area from which the project will be visible.

- ***High visual exposure** – covers a large area (e.g. several square kilometres);*
- ***Moderate visual exposure** – covers an intermediate area (e.g. several hectares);*
- ***Low visual exposure** – covers a small area around the project site.*

The new development area comprises an area of 140Ha, or 1,4km^2. As can be seen in view simulations and viewshed analysis executed in chapter 4, the development is expected to enjoy moderate visual exposure.

5.1.2 Relative visibility of the proposed development

Proximity, as well as the physical size of the development will play a role in its perceivable size from sensitive receptors. The relative perceivable size of the development can be determined by the percentage it will constitute in human field of vision during a static gaze. Using an SLR camera, it can be simulated at a lens angle of between 50 mm and 60 mm, not including peripheral view.

According to Berry and Martin (2003), a development's perceivable size is considered to be minimal if the percentage in constitutes is less than 5%.

The new development area's horizontal width as viewed from Vantage Point D is 1,2km, and Vantage Point D is situated 4,2km away from the development's closest point. The angular size of the development is thus calculated at 16,26° and will thus comprise about 36% of human central vision (44°) or 13% of human central and peripheral vision combined (120°), should the area's topography allow the 3m high development to be seen cropped out of the landscape.

Landscapes are subdivided into 3-distanced zones based on relative visibility from sensitive vantage points. The three zones are:

i.) ***Foreground-middle ground:***
This zone includes areas that are less than 5 to 8 kilometres away, where activities might be viewed in detail. The outer boundary of this distance zone is defined as the point where the texture and form of individual plants are no longer apparent in the landscape. In some areas, atmospheric conditions can reduce visibility and shorten this distance.

ii.) ***Background:***
Areas beyond the foreground-middle ground zone, but usually less than 24 kilometres away are in the background zone.

iii.) ***Seldom-Seen:***
Areas beyond the reach of the foreground-middle ground- and background zones fall within the seldom-seen zone.

Oberholzer's Guidelines (2005) distinguishes between three distance zones within the foreground:

- 2 km and more: Marginally visible (not particularly noticeable)
- 0 km to 1 km: Highly visible (dominant)
- 1 km to 2 km: Moderately visible.

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The development is therefore expected to be **Marginally Visible,** or not particularly noticeable.

5.1.3 The development's compatibility or contrast with the environment

The contrast ratio of the development in relation to its environment can be calculated by means of the following parameters employed in determining compositional Gestalt:

i.) What is the development's height in relation with its environment?
(While the development's horizontal size in relation to the viewer's field of vision is covered by 4.2.1, the height of the installation in relation to the landform of the environment acts upon its contrast ratio).

Higher than landform/vegetation (3) **Medium height (2)** **Low (1)**

ii.) What are the predominant shapes involved in the development:
(It is assumed that the more geometric the shapes, the more man-made the development will appear).

Geometric shapes (3) **Combination of shapes (2)** **Organic shapes (1)**

iii.) Colour:
(A colour wheel can be employed to determine the degree to which the use of colour is complementary or supplementary to the colour of the environment).

Complementary Colours (3) **Supplementary Colours (2)** **Neutral Colours (1)**

iv.) Texture:
(Depending on the textures in the environment, either abundance or absence of texture could be incompatible with the environment).

Low compatibility (3) **Medium compatibility (2)** **Low compatibility (1)**

*** Instructions:**
The total score will indicate the general level of compatibility of the development with the landscape:

Score 0 - 4 – *High compatibility* – blends in well with the surroundings;

Score 5 - 8 – *Medium compatibility* – partially fits into the surroundings, but clearly noticeable;

Score 9 - 12 – *Low compatibility* – visually intrudes, or is discordant with the surroundings.

The Score is 8 – A **medium contrast ratio is expected.**

5.1.4 Visual Absorption Capacity and 'Back-clothing'

With a general absence of vegetation, and in particular trees or shrubs over 1 m in height in the Nama Karoo biome, the degree to which vegetation is able to absorb the development into the landscape by means of Visual Absorption Capacity (VAC) is negligible.

There are also no hills, mountains or high ground to absorb the installation by means of 'back-clothing'.

5.2 Level of change to the environment

Each of the ten questions below has been considered and responses that most closely applied to the project in question had been selected. Each response has a corresponding point value. The total score will represent the visual impact of the development.

5.2.1 Change to the Visual Environment

i.) Will the project result in a noticeable change in the physical characteristics of the existing environment?

(Considering all project components and construction impacts - both permanent and temporary, including landform changes, structures, noise barriers, vegetation removal, railing, signage, and contractor activities).

High level of change (3) **Moderate level of change (2)** **Low level of change (1)**

ii.) Will the project complement or contrast with the visual character desired by the community?

(Evaluating the scale and extent of the project features compared to the surrounding scale of the community. Is the project likely to give an urban appearance to an existing rural or suburban community? Is the change viewed as positive or negative? Research planning documents, or talk with local planners and community representatives to get a rough idea of what type of visual environment local residents envision for their community).

Highly incompatible (3) **Somewhat incompatible (2)** **Somewhat compatible (1)**

iii.) What types of project features and construction impacts are proposed? Are bridge structures, large excavations, sound barriers, or median planting removal proposed?

(Certain project improvements can be of special local interest, causing a heightened level of public concern, and requiring a more focused visual analysis.)

High concern (3) **Moderate concern (2)** **Low concern (1)**

iv.) Will the project changes likely be mitigated by normal means such as landscaping and architectural enhancement or will avoidance measures be necessary to minimize adverse change?

(Consider the type of changes caused by the project, i.e., can undesirable views be screened or will desirable views be permanently obscured)?

Project alternative may be needed (3) **Extensive mitigation likely (2)** **Normal mitigation (1)**

v.) Will this project, when seen collectively with other projects, result in an aggregate adverse change in overall visual quality or character?

(Identification of contributing projects should include any projects (both departmental and local) in the area that have been constructed within the last couple of years and those currently envisioned or planned for future construction. The window of time and the extent of area applicable to possible cumulative impacts should be based on a reasonable anticipation of the viewing public's perception).

Impacts likely in 0-5 years (3) **Impacts likely in 6-10 years (2)** **Cumulative Impacts unlikely (1)**

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5.2.2 Viewer Sensitivity

i.) What is the potential that the project proposal may be controversial within the community, or opposed by any organized group?
(This was researched initially by talking with Departmental and local agency management and staff familiar with the affected community's sentiments as evidenced by past projects and/or current information).

High Potential (3) **Moderate Potential (2)** **Low Potential (1)**

ii.) How sensitive are potential viewer-groups likely to be regarding visible changes proposed by the project?
(Considering among other factors the number of viewers within the group, probable viewer expectations, activities, viewing duration, and orientation. The expected viewer sensitivity level was scoped by applying professional judgment, and by soliciting information from local agencies and community representatives familiar with the affected community's sentiments and demonstrated concerns).

High Sensitivity (3) **Moderate Sensitivity (2)** **Low Sensitivity (1)**

iii.) To which degree does the project appear to be consistent with applicable laws, ordinances, regulations, policies or standards?
(These documents are critical in understanding the importance the local communities place on aesthetic issues).

Incompatible (3) **Moderately compatible (2)** **Largely compatible (1)**

iv.) Are any permits going to be required by outside regulatory agencies (national, provincial or municipal) that will necessitate a particular level of Visual Impact Assessment?
(Anticipated permits, as well as specific permit requirements - which are defined by the permitter, were determined by talking with the project Environmental Planner and Project Engineer).

Yes (3) **Maybe (2)** **No (1)**

v.) Will the Project Development Team or public benefit from a more detailed visual analysis in order to help reach consensus on a course of action?
(Considering the proposed project features possible environmental impacts, and probable mitigation recommendations).

Yes (3) **Maybe (2)** **No (1)**

Score 25-30 – Very high visual change rating

Score 20-24 – High visual change rating

Score 15-19 – Moderate visual change rating

Score 10-14 – Low visual change rating

The Score is 13 – The proposed development poses a preliminary **low visual change rating.**

5.3 Visual Impact Assessment criteria

The assessment of impacts is based on a synthesis of the visual change rating and the following assessment criteria (Oberholzer, 2005):

i.) **Extent** – the spatial or geographic area of influence of the visual impact, i.e.:

- *site-related:* extending only as far as the activity (1)
- ***local:* limited to the immediate surroundings (2)**
- *regional:* affecting a larger metropolitan or regional area (3)
- *national:* affecting large parts of the country (4)
- *international:* affecting areas across international boundaries (5)

ii.) **Duration** – the predicted life-span of the visual impact:

- *short term,* (e.g. duration of the construction phase) (1)
- *medium term,* (e.g. duration for screening vegetation to mature) (2)
- ***long term,* (e.g. lifespan of the project) (3)**
- *permanent,* where time will not mitigate the visual impact. (5)

iii.) **Intensity** – the magnitude of the impact on views, scenic or cultural resources.

- ***low,* where visual and scenic resources are not affected (1)**
- *medium,* where visual and scenic resources are affected to a limited extent (3)
- *high,* where scenic and cultural resources are significantly affected. (5)

iv.) **Probability** – the degree of possibility of the visual impact occurring:

- ***improbable,* where the possibility of the impact occurring is very low (1)**
- *probable,* where there is a distinct possibility that the impact will occur (2)
- *highly probable,* where it is most likely that the impact will occur (3)
- *definite,* where the impact will occur regardless of any prevention measures. (5)

v.) **Significance** – The significance of impacts can be determined through a synthesis of the aspects produced in terms of their nature, duration, intensity, extent and probability, and be described as:

- ***low,* where it will not have an influence on the decision (1)**
- *medium,* where it should have an influence on the decision unless it is mitigated (3)
- *high,* where it would influence the decision regardless of any possible mitigation (5)

Score 20 - 25 – Very high visual change rating

Score 15 - 19 – High visual change rating

Score 9 - 14 – Moderate visual change rating

Score 0 - 8 – Low visual change rating

The Score is 8 – The proposed development poses a preliminary **low visual impact rating.**

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5.4 Management Actions

It is suggested that the auxiliary surface structures are painted with non-reflective paint, in the same hue as the colour of the soil. Other recommendations, specifically in terms of painting the installation in muted colours, is not recommended, since the installation's flat surfaces will serve to blend it into the landscape through reflecting the ambient sky colour.

5.5 Conclusion

- The existing scenic quality of the area scores 13/32, constituting an existing scenic value of **40,6%**. This indicates **moderate scenic quality**;
- The level of contrast the development will have in relation to its environment scores 8/12, constituting a contrast value of **66,6%**. This indicates a **medium contrast ratio**, with anticipated **medium compatibility** with surrounding scenery;
- The development's Visual Change Rating is calculated at 13/30, where viewer sensitivity is not considered high. This constitutes a percentage of **43,3%**.
- Due to its distance from vantage point D (4,2km) it is anticipated to be **minimally visible**, or not visible at all.

5.6 Recommendations

It is recommended that this project can be developed without causing any significant degree of visual impact in the area. With the entire feasibility area being proposed for development, it is expected to pose a minimal impact toward the identified sensitive receptors along the Onseepkans road.

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Appendix A: View Simulations of Previous Visual Study

Figure 1: Konkoonsies Vantage point A, Before Development

Figure 2: Konkoonsies Vantage Point A, Option 1

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Figure 3: Konkoonsies Vantage Point A, Option 2

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Figure 4: Konkoonsies Vantage Point A, Option 3

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Figure 5: Konkoonsies Vantage Point B1, Before Development

Figure 6: Konkoonsies Vantage Point B1, Option 1

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Figure 7: Konkoonsies Vantage Point B1, Option 2

Figure 8: Konkoonsies Vantage Point B1, Option 3

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Figure 9: Konkoonsies Vantage Point B2, Before Development

Figure 10: Konkoonsies Vantage Point B2, Option 1

Figure 11: Konkoonsies Vantage Point B2, Option 2

Figure 12: Konkoonsies Vantage Point B2, Option 3

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Figure 13: Konkoonsies Vantage Point C, Before Development

Figure 14: Konkoonsies Vantage Point C, Option 1

Figure 15: Konkoonsies Vantage Point C, Option 2

Figure 16: Konkoonsies Vantage Point C, Option 3

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APPENDIX 7.4: HERITAGE IMPACT ASSESSMENT

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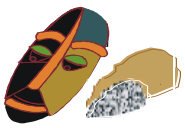

Archaetnos Culture & Cultural
Resource Consultants
BK 98 09854/23

A REPORT ON A HERITAGE IMPACT ASSESSMENT (HIA) FOR THE PROPOSED PHOTO-VOLTAIC SOLAR POWER GENERATION PLANT ON KONKOONSIES 91, POFADDER DISTRICT, NORTHERN CAPE

For:

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REPORT: **AE01222P**

by:

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Accredited member of ASAPA
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DISCLAIMER:

Although all possible care is taken to identify all sites of cultural importance during the survey of study areas, the nature of archaeological and historical sites are as such that it always is possible that hidden or subterranean sites could be overlooked during the study. Archaetnos and its personnel will not be held liable for such oversights or for costs incurred as a result thereof.

The South African Heritage Resources Agency (SAHRA) or one of its subsidiary bodies needs to comment on this report and clients are advised not to proceed with any action before receiving these.

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SUMMARY

Archaetnos cc was appointed by EScience & Associates, on behalf of Biotherm Energy and Aurora Power Solutions (APS), to conduct a Heritage Impact Assessment for the proposed Photo-Voltaic Solar Power Generation Plant on the farm Konkoonsies 91, in the Pofadder District of the Northern Cape Province. A similar study was done on the farm for Biotherm and APS during January 2011, during which a number of archaeological sites were recorded. Based on the results of the earlier work Aurora has positioned their plant in order not to impact negatively on these sites. The 2012 assessment was necessitated by the fact that a second area on Konkoonsies, for the expansion of the Solar Plant, has been selected for development.

A number of archaeological sites, features and objects of some significance were identified during the assessment, some falling outside the study area. All the sites and finds date to the Stone Age. The report gives a discussion of the finds and observations made during the fieldwork and also gives an indication of the methodology followed. It also indicates how to deal with any archaeological material that may be unearthed or disturbed during the development activities.

Mitigation measures to minimize the impact of the development on the sites that were located during the assessment are put forward at the end of this report. Once these have been implemented the development, from a Cultural Heritage perspective, can continue.

CONTENTS

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1. INTRODUCTION

Archaetnos cc was appointed by EScience & Associates, on behalf of Biotherm Energy and Aurora Power Solutions, to conduct a Heritage Impact Assessment for the proposed Photo-Voltaic Solar Power Generation Plant on the farm Konkoonsies 91, in the Pofadder District of the Northern Cape Province. A similar study was done on the farm for Biotherm and APS during January 2011, during which a number of archaeological sites were recorded. Based on the results of the earlier work Aurora has positioned their plant in order not to impact negatively on these sites. The 2012 assessment was necessitated by the fact that a second area on Konkoonsies, for the expansion of the Solar Plant, has been selected for development.

A number of archaeological sites, features and objects of some significance were identified during the assessment, some falling just outside the study area. All the sites and finds date to the Stone Age.

The client indicated the boundaries of the portion to be surveyed and the work was confined to this area.

2. TERMS OF REFERENCE

The Terms of Reference for the survey were to:

1. Identify all objects, sites, occurrences and structures of an archaeological or historical nature (cultural heritage sites) located in the area of the proposed development (**see Appendix A**).

2. Assess the significance of the cultural resources in terms of their archaeological, historical, scientific, social, religious, aesthetic and tourism value (**see Appendix B**).

3. Describe the possible impact of the proposed development on these cultural remains, according to a standard set of conventions.

4. Propose suitable mitigation measures to minimize possible negative impacts on the cultural resources, should this be applicable.

5. Review applicable legislative requirements.

3. CONDITIONS & ASSUMPTIONS

The following conditions and assumptions have a direct bearing on the survey and the resulting report:

1. Cultural Resources are all non-physical and physical man-made occurrences, as well as natural occurrences associated with human activity. These include all sites, structure and artifacts of importance, either individually or in groups, in the history, architecture and archaeology of human (cultural) development. Graves and cemeteries are included in this.

2. The significance of the sites, structures and artifacts is determined by means of their historical, social, aesthetic, technological and scientific value in relation to their uniqueness, condition of preservation and research potential. The various aspects are not mutually exclusive, and the evaluation of any site is done with reference to any number of these aspects.

3. Cultural significance is site-specific and relates to the content and context of the site. Sites regarded as having low cultural significance have already been recorded in full and require no further mitigation. Sites with medium cultural significance may or may not require mitigation depending on other factors such as the significance of impact on the site. Sites with a high cultural significance require further mitigation (see Appendix C).

4. The latitude and longitude of any archaeological or historical site or feature, is to be treated as sensitive information by the developer and should not be disclosed to members of the public.

5. All recommendations are made with full cognizance of the relevant legislation.

6. It has to be mentioned that it is almost impossible to locate all the cultural resources in a given area, as it will be very time consuming. Developers should however note that the report should make it clear how to handle any other finds that might be found.

4. LEGISLATIVE REQUIREMENTS

Aspects concerning the conservation of cultural resources are dealt with mainly in two acts. These are the National Heritage Resources Act (Act 25 of 1999) and the National Environmental Management Act (Act 107 of 1998).

4.1 The National Heritage Resources Act

According to the above-mentioned act the following is protected as cultural heritage resources:

a. Archaeological artifacts, structures and sites older than 100 years
b. Ethnographic art objects (e.g. prehistoric rock art) and ethnography
c. Objects of decorative and visual arts
d. Military objects, structures and sites older than 75 years
e. Historical objects, structures and sites older than 60 years
f. Proclaimed heritage sites
g. Grave yards and graves older than 60 years
h. Meteorites and fossils
i. Objects, structures and sites or scientific or technological value.

The national estate (**see Appendix C**) includes the following:

a. Places, buildings, structures and equipment of cultural significance
b. Places to which oral traditions are attached or which are associated with living heritage

c. Historical settlements and townscapes
d. Landscapes and features of cultural significance
e. Geological sites of scientific or cultural importance
f. Sites of Archaeological and palaeontological importance
g. Graves and burial grounds
h. Sites of significance relating to the history of slavery
i. Movable objects (e.g. archaeological, palaeontological, meteorites, geological specimens, military, ethnographic, books etc.)

A Heritage Impact Assessment (HIA) is the process to be followed in order to determine whether any heritage resources are located within the area to be developed as well as the possible impact of the proposed development thereon. An Archaeological Impact Assessment (AIA) only looks at archaeological resources. An HIA must be done under the following circumstances:

a. The construction of a linear development (road, wall, power line, canal etc.) exceeding 300m in length
b. The construction of a bridge or similar structure exceeding 50m in length
c. Any development or other activity that will change the character of a site and exceed 5 000m^2 or involve three or more existing erven or subdivisions thereof
d. Re-zoning of a site exceeding 10 000 m^2
e. Any other category provided for in the regulations of SAHRA or a provincial heritage authority

Structures

Section 34 (1) of the mentioned act states that no person may demolish any structure or part thereof which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.

A structure means any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith.

Alter means any action affecting the structure, appearance or physical properties of a place or object, whether by way of structural or other works, by painting, plastering or the decoration or any other means.

Archaeology, palaeontology and meteorites

Section 35(4) of this act deals with archaeology, palaeontology and meteorites. The act states that no person may, without a permit issued by the responsible heritage resources authority (national or provincial):

a. destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
b. **destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite**;

c. trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or
d. bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment that assists in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.
e. alter or demolish any structure or part of a structure which is older than 60 years as protected.

The above mentioned may only be disturbed or moved by an archaeologist, after receiving a permit from the South African Heritage Resources Agency (SAHRA). In order to demolish such a site or structure, a destruction permit from SAHRA will also be needed.

Human remains

Graves and burial grounds are divided into the following:

a. ancestral graves
b. royal graves and graves of traditional leaders
c. graves of victims of conflict
d. graves designated by the Minister
e. historical graves and cemeteries
f. human remains

In terms of Section 36(3) of the National Heritage Resources Act, no person may, without a permit issued by the relevant heritage resources authority:

a. destroy, damage, alter, exhume or remove from its original position of otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;
b. destroy, damage, alter, exhume or remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
c. bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation, or any equipment which assists in the detection or recovery of metals.

Human remains that are less than 60 years old are subject to provisions of the Human Tissue Act (Act 65 of 1983) and to local regulations. Exhumation of graves must conform to the standards set out in the **Ordinance on Excavations** (**Ordinance no. 12 of 1980**) (replacing the old Transvaal Ordinance no. 7 of 1925).

Permission must also be gained from the descendants (where known), the National Department of Health, Provincial Department of Health, Premier of the Province and local police. Furthermore, permission must also be gained from the various landowners (i.e. where the graves are located and where they are to be relocated) before exhumation can take place.

Human remains can only be handled by a registered undertaker or an institution declared under the **Human Tissues Act** (**Act 65 of 1983 as amended**).

Unidentified/unknown graves are also handled as older than 60 until proven otherwise.

4.2 The National Environmental Management Act

This act states that a survey and evaluation of cultural resources must be done in areas where development projects, that will change the face of the environment, will be undertaken. The impact of the development on these resources should be determined and proposals for the mitigation thereof are made.

Environmental management should also take the cultural and social needs of people into account. Any disturbance of landscapes and sites that constitute the nation's cultural heritage should be avoided as far as possible and where this is not possible the disturbance should be minimized and remedied.

5. METHODOLOGY

5.1 Survey of literature

A survey of literature was undertaken in order to obtain background information regarding the archaeology of the area. Sources consulted in this regard are indicated in the bibliography.

5.2 Field survey

The survey was conducted according to generally accepted HIA/AIA practices and was aimed at locating all possible objects, sites and features of cultural (archaeological and historical) significance in the area of proposed development. If required, the location/position of any site is determined by means of a Global Positioning System (GPS), while photographs are also taken where needed.

The survey was undertaken mainly on foot

5.3 Oral histories

People from local communities are sometimes interviewed in order to obtain information relating to the surveyed area. It needs to be stated that this is not applicable under all circumstances. When applicable, the information is included in the text and referred to in the bibliography.

5.4 Documentation

All sites, objects, features and structures identified are documented according to the general minimum standards accepted by the archaeological profession. Co-ordinates of individual localities are determined by means of the Global Positioning System (GPS).The information is added to the description in order to facilitate the identification of each locality.

6. DESCRIPTION OF THE AREA

The project area is located on the farm Konkoonsies 91, in the Pofadder District of the Northern Cape Province. It is situated close to ESKOM's Paulputs Substation.

The area is fairly flat with open sandy areas, with patches of grass and shrubs. A number of low hills and rocky outcrops are located in area that was assessed in 2011. The area assessed in 2012 contains some low outcrops, as well as some red dunes (Aeolian sands) covering parts of these outcrops. The open nature of the landscape made archaeological visibility relatively easy. As a result of the 2011 survey, when many archaeological sites were recorded close to the hills and outcrops, the original location of the solar plant was moved away in order not to impact on any of these and to stay away from the hills and outcrops. The 2012 assessment was necessitated by the identification of an additional area by the developers for the establishment of their solar plant.

Figure 1: Aerial location of development (courtesy Client and Google Earth 2011). The no's 1-5 indicate the sites located in 2011, while the red square is the footprint of the original solar plant. The yellow block is the area that had to be assessed in 2012.

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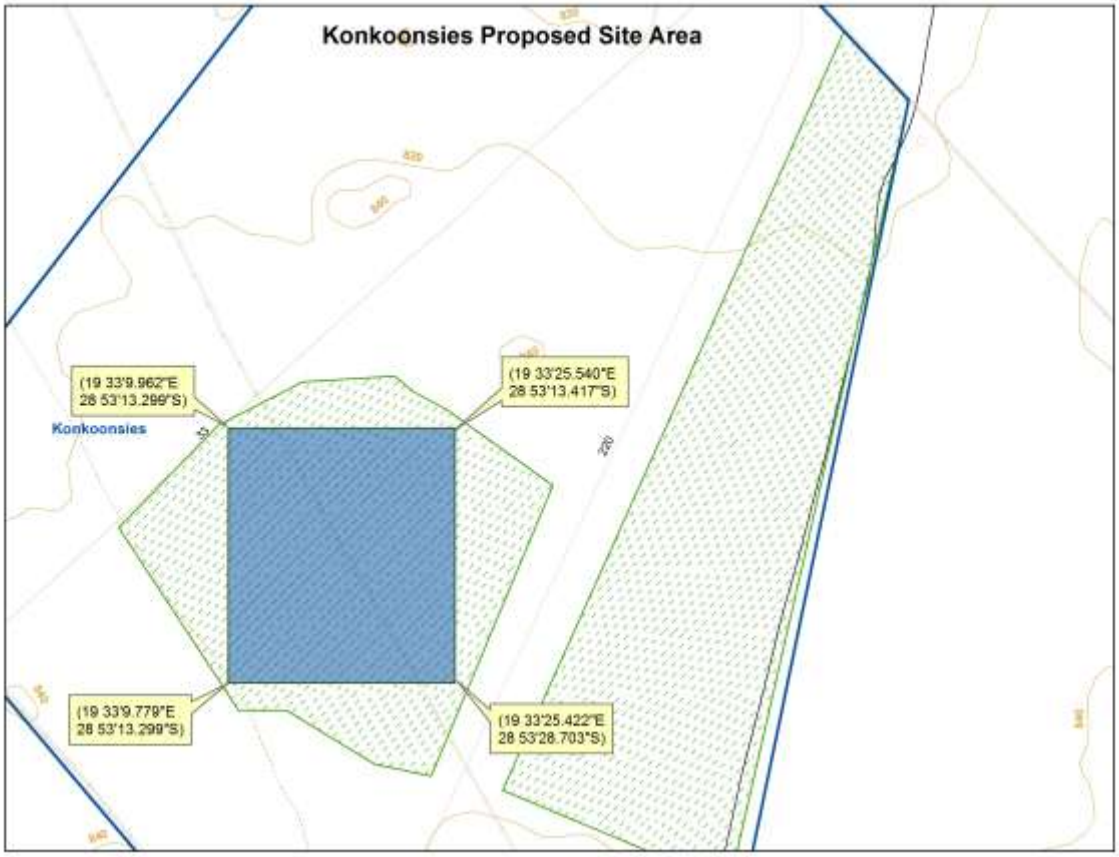

Figure 2: Layout of solar plant (blue block) and new area that had to be assessed in 2012 (provided by Aurora Power Solutions).

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Figure 3: Topographic location of development (Map Source 2010).

Figure 4: General view of the area. The hills in the distance is where the 2011 assessment was done.

Figure 4: View of ESKOM's Paulputs Substation from the assessment area.

Figure 5: Another view of the area, showing low outcrops on the edge of the assessment area.

Figure 6: A view of the area from one of the low ridges covered by red dune (aeolian) sand. The solar plant will be placed in the flat area between these ridges and the hills in the distance.

7. DISCUSSION

During the 2011 assessment a number of sites, features and objects of archaeological nature were located in the area, situated mainly close to and around the outcrops and hills that occur in the area. The 2012 assessment also identified some sites located in similar areas. Very little archaeological material is found in the flat areas away from the ridges and outcrops. In order to enable the reader to understand archaeological objects, features and sites that could possibly be unearthed and disturbed during development, it is necessary to give a background regarding the different phases of human history and the history and archaeology of the area in general.

7.1 Stone Age

The Stone Age is the period in human history when lithic (stone) material was mainly used to produce tools (Coertze & Coertze 1996: 293). In South Africa the Stone Age can be divided in three periods. **It is however important to note that dates are relative and only provide a broad framework for interpretation**. The division for the Stone Age according to Korsman & Meyer (1999: 93-94) is as follows:

Early Stone Age (ESA) 2 million – 150 000 years ago
Middle Stone Age (MSA) 150 000 – 30 000 years ago
Late Stone Age (LSA) 40 000 years ago – 1850 - A.D.

According to David Morris of the McGregor Museum in Kimberley the archaeology of the Northern Cape is rich and varied, covering long spans of human history. The Karoo is particularly bountiful. Some areas are richer than others, and not all sites are equally significant. The significance of sites encountered in the study area may be assessed against

previous research in the region and subcontinent. The region's remoteness from research institutions accounts for a relative lack of archaeological research in the area. The area has probably been relatively marginal to human settlement for most of its history, yet it is in fact exceptionally rich in terms of Stone Age sites and rock art, as a relatively few but important studies have shown (Morris 2006).

Some information on the Stone Age of the large geographical area could be found in a report on a HIA conducted by Morris for the Black Mountain Concentrated Solar Power Facility development at Aggeneys in the Northern Cape. No substantial MSA (or ESA) sites have been found previously in the survey area. Only very sparse localized scatters of stone tools have been seen in places, with limited traces in the hills (e.g. an MSA site at the top of Gamsberg) or at the bases of hills (Morris 2011: 10).

Late Holocene Later Stone Age (LSA) sites dominate the archaeological trace noted in past surveys in the Aggeneys-Pofadder region. Researchers such as Beaumont and Morris have shown that virtually all the Bushmanland sites so far located appear to be ephemeral occupations by small groups in the hinterland on both sides of the Orange River. The appearance of herders in the Orange River Basin, Beaumont et al. argue, led to competition over resources and ultimately to marginalization of hunter-gatherers, some of whom then occupied Bushmanland, probably mainly in the last millennium, and focused their hunting and gathering activities around the limited number of water sources in the region. Surveys have located signs of human occupation mainly in the shelter of granite inselbergs, on red dunes which provided clean sand for sleeping, or around the seasonal pans. Possibly following good rains, herders moved into the Orange River hinterland, as attested archaeologically at sites with ample pottery near Aggeneys and, east of Pofadder, at Schuitdrift South. However, Thompson (1824) refers to herder groups settled at the stronger springs such as Pella dispersing during periods of drought to smaller springs in the region, which could equally well account for the traces referred to here. At such times competition between groups over resources and stress within an already marginalized hunter-gatherer society, must have intensified (Morris 2011: 9-10).

All the sites, features or objects identified during the assessment date to the Stone Age and more than likely to the LSA. The finds will be discussed in more detail further on in the report.

7.2 Iron Age

The Iron Age is the name given to the period of human history when metal was mainly used to produce artifacts (Coertze & Coertze 1996: 346). In South Africa it can be divided in two separate phases according to Van der Ryst & Meyer (1999: 96-98), namely:

Early Iron Age (EIA) 200 – 1000 A.D.
Late Iron Age (LIA) 1000 – 1850 A.D.

Huffman (2007: xiii) however indicates that a Middle Iron Age should be included. His dates, which now seem to be widely accepted in archaeological circles, are:

Early Iron Age (EIA) 250 – 900 A.D.
Middle Iron Age (MIA) 900 – 1300 A.D.

Late Iron Age (LIA) 1300 – 1840 A.D.

The expansion of early farmers, who, among other things, cultivated crops, raised livestock, made ceramic containers (pots), mined ore and smelted metals, occurred in this area between AD 400 and AD 1100 and brought the Early Iron Age (EIA) to South Africa. They settled in semi-permanent villages (De Jong 2010: 35).

While there is some evidence that the EIA continued into the 15th century in the South African Lowveld, on the escarpment it had ended by AD1100. The Highveld became active again from the 15th century onwards due to a gradually warmer and wetter climate. From here communities spread to other parts of the interior. This later phase, termed the Late Iron Age (LIA), was accompanied by extensive stonewalled settlements, such as the Thlaping capital Dithakong, 40 km north of Kuruman (De Jong 2010: 35-36).

Sotho-Tswana and Nguni societies, the descendants of the LIA mixed farming communities, found the region already sparsely inhabited by the Late Stone Age (LSA) Khoisan groups, the so-called 'first people'. Most of them were eventually assimilated by LIA communities and only a few managed to survive, such as the Korana and Griqua. This period of contact is sometimes known as the Ceramic Late Stone Age and is represented by sites such as the Blinkklipkop specularite mine near Postmasburg and finds at the Kathu Pan (De Jong 2010: 36).

No known Iron Age archaeological sites are located in the area.

7.3 Historical Age

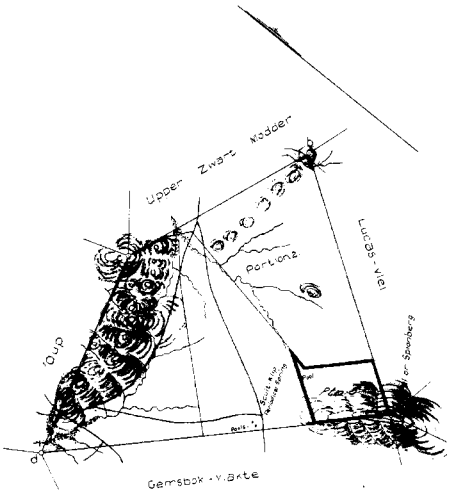
Factors such as population expansion, increasing pressure on natural resources, the emergence of power blocs, attempts to control trade and penetration by Griquas, Korana and white communities from the south-west resulted in a period of instability in Southern Africa that began in the late 18th century and effectively ended with the settlement of white farmers in the interior. This period, known as the *difaqane* or *Mfecane*, also affected the Northern Cape Province, although at a relatively late stage compared to the rest of Southern Africa. Here, the period of instability, beginning in the mid-1820s, was triggered by the incursion of displaced refugees associated with the Tlokwa, Fokeng, Hlakwana and Phuting tribal groups.

The *difaqane* coincided with the penetration of the interior of South Africa by white traders, hunters, explorers and missionaries. The first was PJ Truter's and William Somerville's journey of 1801, which reached Dithakong at Kuruman. They were followed by Cowan, Donovan, Burchell and Campbell and resulted in the establishment of a London Mission Society station near Kuruman in 1817 by James Read.

The Great Trek of the Boers from the Cape in 1836 brought large numbers of Voortrekkers up to the borders of large regions known as Bechuanaland and Griqualand West, thereby coming into conflict with many Tswana groups and also the missionaries of the London Mission Society. The conflict between Boer and Tswana communities escalated in the 1860s and 1870s when the Korana and Griqua communities became involved and later also the British government. The conflict mainly centered on land claims by various communities. For decades the western border of the Transvaal Boer republic was not fixed. Only through arbitration (the Keate Arbitration), triggered by the discovery of gold at Tati (1866) and

diamonds at Hopetown (1867) was part of the western border finally determined in 1871. Ten years later, the Pretoria Convention fixed the entire western border, thereby finally excluding Bechuanaland and Griqualand West from Boer domination (De Jong 2010: 36).

The database of the Chief Surveyor General (www.csg.dla.gov.za) indicates that the farm Konkoonsies was already in existence by at least 1893 and probably earlier. A map for Schuitklip 92 (a bordering farm) shows that it was surveyed in 1877 (CSG document 100W2001), while Oup Vlakte 90 was surveyed in 1893 (100WGP01). Portion 1 of Konkoonsies 91 was surveyed in 1943 (100WGZ01).



NO. B. 855/1877.

The numerical data of this diagram are sufficiently consistent.
(Sgd.) L. Marquard.
Examiner.

SIDES		ANGLES	
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b c	3234.90	b	78.30.20
c d	3373.04	c	142.10.50
d a	5458.87	d	60.35.40

Scale:- Cape Roods.

The diagram a. b. c. d. represents the Farm Scuit-Klip containing 24577 Morgen and 409 Square Roods, situated in the Field-cornetcy of Zeekoe Division of Kenhardt.

Bounded Northwards by Oup and Upper Zwart Modder
South east by Lucas-vlei
South West by Gemsbok Vlakte

Copied from General Plan framed by Mr. G. Greeff, Government Surveyor.
(Sgd.) A. van Helsdingen.
Asst. Draftsman,
Sur. Genls. Office.
October 1877.

THE FARM Scuit-Klip No 92
KENHARDT

Copied from diagram relating to Title Deed No. Ken. 9. 5-5 dated 28.12.1908
for Surveyor-General
1. 4. 1954
Sheet GI-8
CHECKED
DATA CHECKED
For list of deductions see back of diagram
421/1964
MAW/MF

Figure 7: Map of Schuit-Klip 92 (csg.dla.gov.za).

S. G. Dgm. No. F 938/1893

The numerical data of this diagram are sufficiently consistent.
S.G. Dgm. No. 938/1893. (Sgd) J.J. Bosman.
Examiner.

Sides		Angles	
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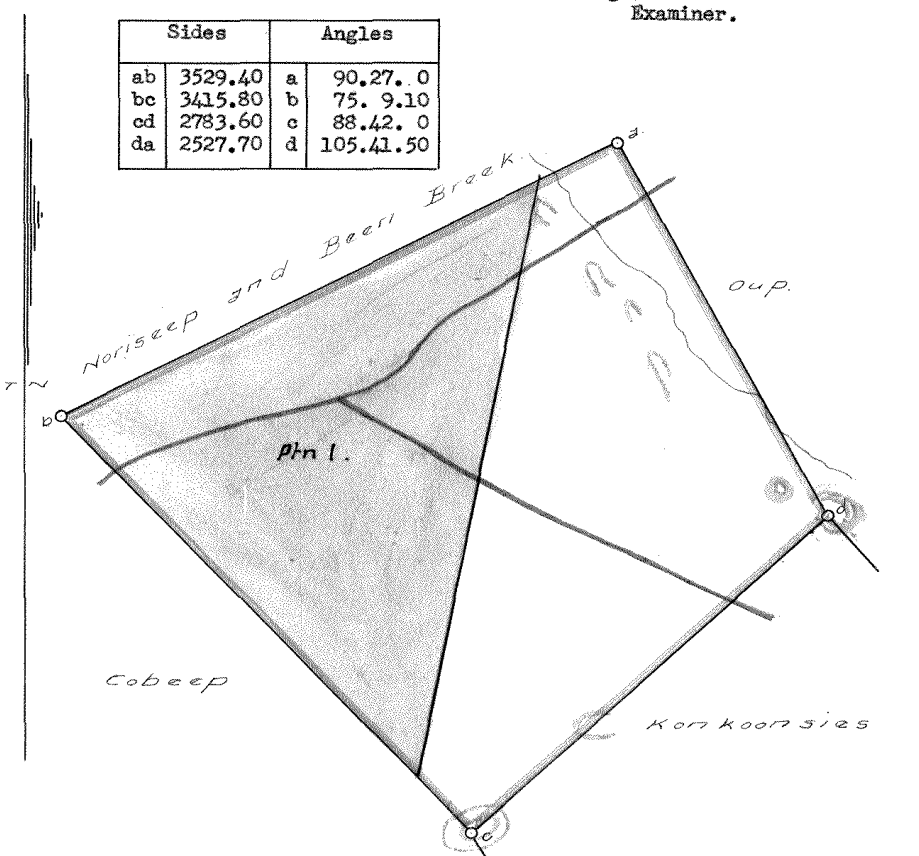
bc	3415.80	b	75. 9.10
cd	2783.60	c	88.42. 0
da	2527.70	d	105.41.50



N.B. The beacons were pointed out to J.W. Merridge F.C.

THE FARM Oupvlakte No. 90
KENHARDT

100 p 500 1000 2000 3000.
Scale of Cape Roods.

The above Diagram, lettered a.b.c.d. represents 15355 Morgen 558 Square Roods of Crown Land, situated in the Division of Kenhart Fieldcornetcy of Zeekoe being the farm called OUPVLAKTE.

Bounded NW by Noriseep and Been Breek
SE " Konkoonsies
NE " Oup
SW " Cobeep.

Surveyed by me, 1893
(Sgd) Garwood Alston.
Government Surveyor.

Copied from the diagram relating to
Quitrent Title Deed No. Ken. Q. 6-5
dated 3rd February 1911. in favour of
Arend Gerrit de Waal.
for SURVEYOR-GENERAL
18 OCT 1955
CAPE TOWN
1504/1955.

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Sheet GI - 7

For list of deductions see back of diagram

C.F.L./I.G.

Figure 8: Oupvlakte 90 (csg.dla.gov.za).

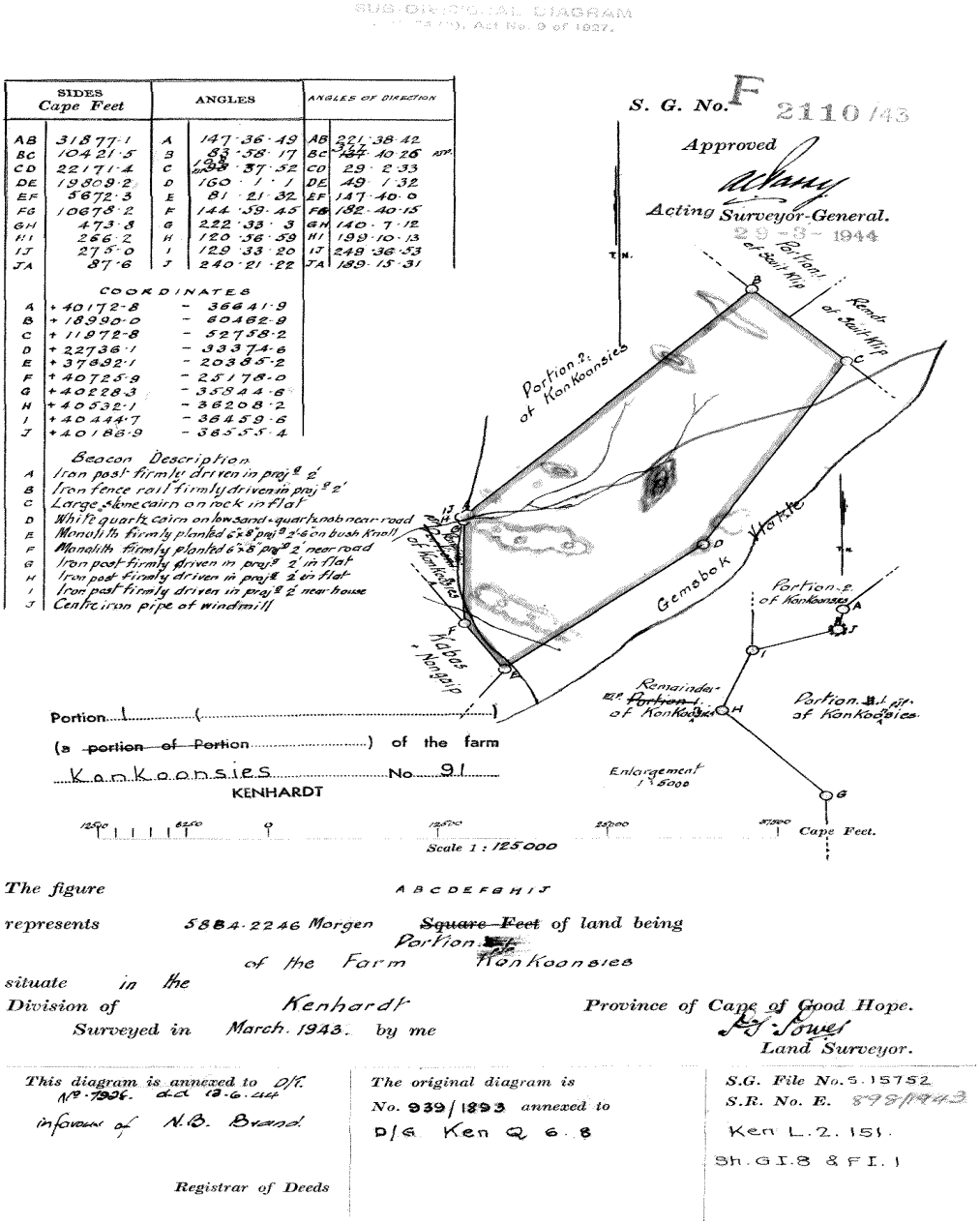

Figure 9: Map of Konkoonsies 91 (csg.dla.gov.za).

Discussion of sites, features or objects found during the assessment

Site 1

This site is represented by a scatter of ostrich eggshell fragments located down slope of a small outcrop. Similar scatters were found during the 2011 survey of the area, while Morris also indicated such finds in his 2011 assessment near Aggeneys. According to him these fragments are the remains of water flasks (Morris 2011: 16).

GPS Location: **S28.88439 E19.56608**
Significance of site: **Low**.
Mitigation: **None required**

Figure 10: OES fragment on Site 1.

Site 2

Site 2 contains a scatter of quartz, some of which seems to be flaked. One point was identified. Other scatters occur throughout the area and similar sites were identified during 2011. Morris also identified quartz flakes and tools near Aggeneys (Morris 2011: 16-17).

GPS Location: **S28.88491 E19.56639**
Significance of site: **Medium**
Mitigation: **Sampling if site is going to be impacted.**

Figure 11: Quartz point and flake found on Site 2.

Site 3

This is another site containing a scatter of ostrich eggshell fragments which probably are the remnants of a water container. No stone tools were identified in the vicinity.

GPS Location: **S28.88260 E19.56710**
Significance of site: **Low**
Mitigation: **None required**

Figure 12: Site 3.

Site 4

The age of this site is unknown, but could also date to the Later Stone Age. It consists of a very ephemeral, low, stone packed wall, just more than 1m in length. It is situated on top of ridge covered by red dune sand and could possibly be evidence of a wind break. No stone tools were found in close proximity, and if any were present they are covered by the red sands.

GPS Location: **S28.88489 E19.56974**
Significance of site: Medium
Mitigation: **None. Development will not impact on site as solar plant will avoid ridges/outcrops**

Figure 13: Low stone wall on Site 4.

Site 5

This is another scatter of ostrich eggshell fragments, located on top of a ridge covered by red dune sands. The sand is being eroded out by wind, exposing the rock base and cultural material covered by the sand. A few possible quartz flakes were also observed in the area on the dunes.

GPS Location: **S28.88168 E19.56881**
Significance of site: **Low**
Mitigation: **None required. The development will avoid ridges/outcrops.**

Figure 14: OES fragments eroding out of the red dune sands Site 5.

The sites recorded during the 2012 assessment of the area consists mainly of scatters of OES fragments (the possible remains of water flasks/containers used by San hunter-gatherers), scatters of quartz (some flaked and some formal tools) and a possible stone-packed windbreak. Most of the sites are located close to or on top of small outcrops/ridges covered by red dune sand and will therefore not be impacted on by the proposed development. The finds are isolated and not very dense in terms of number of artifact and therefore not highly significant. With most of the sites also falling just outside the study area, no mitigation measures will have to be implemented.

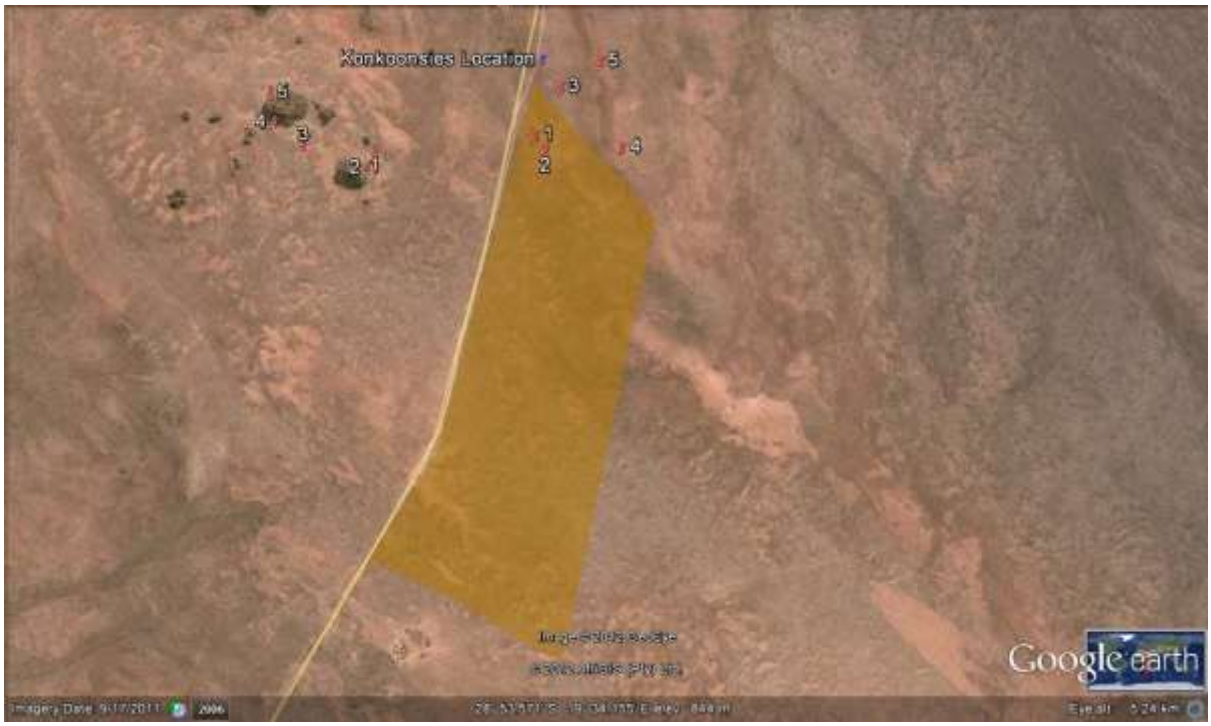

Figure 15: The distribution of the sites discussed in the report.
It is clear that the Stone Age occurrences are concentrated near and around the hills and outcrops

8. CONCLUSIONS AND RECOMMENDATIONS

In conclusion it can be stated that the Impact Assessment for the area was conducted successfully. A number of archaeological sites, features and objects were identified and recorded in the area, **all dating to the Later Stone Age.** Most of the sites are situated near or on low ridges and outcrops covered by red dune sand, represented by scatters of Ostrich Eggshell fragments (OES) and some quartz-made stone tools and flakes. One possible stone wall (wind break) was also recorded. A survey done in 2011 for the original solar plant in the area recorded further sites dating to the Stone Age as well. Very little archaeological material is found in the flat "zones" where the solar panels will be erected.

With the decision to avoid any outcrops or ridges, and drainage systems, where the archaeological sites are more likely to occur, during the development of the plant, it is believed that no archaeological sites will be negatively impacted and therefore no mitigation measures need to be implemented. Also, the area leading up to the existing substation at Konkoonsies, were checked for the existence of any possible site and

scatters of stone tools, and none was recorded. I any finds are to be made here it would more than likely be single, out of context, stone tools similar to the others recorded in the larger area.

From a Heritage perspective the development can therefore continue taking cognizance of the following:

1. It is impossible to locate all possible sites, features or objects of a cultural heritage (archaeological and historical) nature in any given area. Therefore some sites could have been overlooked as a result.

2. Also, the subterranean presence of archaeological and/or historical sites, features or artifacts are always a distinct possibility. Care should therefore be taken during any development activities that if any of these are accidentally discovered, a qualified archaeologist be called in to investigate. In this case unmarked LSA burials are a possibility as well. The red sands are covering possible archaeological traces as well and these might get exposed during construction activities in the area

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Aerial view of development location as well as Site Distribution: Courtesy Google Earth & EScience Associates (Pty) Ltd

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APPENDIX A

DEFINITIONS:

Site: Means a large place with extensive structures and related cultural objects. It can also be a large assemblage of cultural artifacts, found on a single location.

Structure: Means a permanent building found in isolation or which forms a site in conjunction with other structures.

Feature: Means a coincidental find of movable cultural objects.

Object: Means an Artifact (cultural object).

(Also see Knudson 1978: 20).

APPENDIX B

DEFINITIONS/STATEMENTS OF HERITAGE SIGNIFICANCE:

Historic value: Important in the community or pattern of history or has an association with the life or work of a person, group or organization of importance in history.

Aesthetic value: Important in exhibiting particular aesthetic characteristics valued by a community or cultural group.

Scientific value: Potential to yield information that will contribute to an understanding of natural or cultural history or is important in demonstrating a high degree of creative or technical achievement of a particular period

Social value: Have a strong or special association with a particular community or cultural group for social, cultural or spiritual reasons.

Rarity: Does it possess uncommon, rare or endangered aspects of natural or cultural heritage.

Representivity: Important in demonstrating the principal characteristics of a particular class of natural or cultural places or object or a range of landscapes or environments characteristic of its class or of human activities (including way of life, philosophy, custom, process, land-use, function, design or technique) in the environment of the nation, province region or locality.

APPENDIX C

SIGNIFICANCE AND FIELD RATING:

1. Cultural significance:

- Low: A cultural object being found out of context, not being part of a site or without any related feature/structure in its surroundings.

- Medium: Any site, structure or feature being regarded less important due to a number of factors, such as date and frequency. Also any important object found out of context.

- High: Any site, structure or feature regarded as important because of its age or uniqueness. Graves are always categorized as of a high importance. Also any important object found within a specific context.

2. Heritage significance:

- Grade I: Heritage resources with exceptional qualities to the extent that they are of national significance.

- Grade II: Heritage resources with qualities giving it provincial or regional importance although it may form part of the national estate.

- Grade III: Other heritage resources of local importance and therefore worthy of conservation.

3. Field ratings:

• National Grade I significance:	Should be managed as part of the national estate.
• Provincial Grade II significance:	Should be managed as part of the provincial estate.
• Local Grade IIIA:	Should be included in the heritage register and not be mitigated (high significance).
• Local Grade IIIB:	Should be included in the heritage register and may be mitigated (high/ medium significance).
• General protection A (IV A):	Site should be mitigated before destruction (high/ medium significance).
• General protection B (IV B):	Site should be recorded before destruction (medium significance).
• General protection C (IV C):	Phase 1 is seen as a sufficient recording of the existing structure and it may therefore be demolished of (low significance) .

APPENDIX D

PROTECTION OF HERITAGE RESOURCES:

1. Formal protection:

Formal protection is applicable to the following:

- National heritage sites and Provincial heritage sites – grades I and II
- Protected areas – which is described as an area surrounding a heritage site
- Provisional protection – described as protection for a maximum period of two years
- Heritage registers – listings of grades II and III
- Heritage areas – areas which include more than one heritage site
- Heritage objects – heritage objects include inter alia archaeological, paleontological, meteorites, geological specimens, visual art, military, numismatic and books.

2. General protection:

General protection is applicable to:

- Objects protected by the laws of foreign states
- Structures – older than 60 years
- Archaeology, paleontology and meteorites
- Burial grounds and graves
- Public monuments and memorials

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APPENDIX E

HERITAGE IMPACT ASSESSMENT PHASES

- Phase 1: Pre-assessment or scoping phase – the establishment of the scope of the project and the terms of reference.
- Phase 2: Baseline assessment – the establishment of a broad framework of the potential heritage of an area.
- Phase 3: Assessment of potential impacts – the identification of sites, assessment of their significance, commenting on the potential impact of the proposed development and recommending mitigation measures or the conservation thereof.
- Phase 4: Letter of recommendation for exemption –submitted in the event that no likelihood exists that any sites will be impacted upon.
- Phase 5: Mitigation or rescue – planning the protection of significant sites or sampling through excavation or collection (after receiving a permit) of sites that may be lost.
- Phase 6: Compilation of and implementation of a management plan – in rare cases where sites are regarded as of high importance such that development cannot be permitted unconditionally.

APPENDIX 7.5: DESKTOP PALEONTOLOGICAL REPORT

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Email: bruce.rubidge@wits.ac.za

26 April 2011

Dr Robert De Jong
Cultmatrix
PO Box 12013
Queenswood 0121
Pretoria

E-Mail cultmat@iafrica.com

Dear Robert,

Konkoonsies 91, Pofadder – Palaeontological Impact Assessment

I have undertaken a desk top palaeontological impact analysis for the area which will be affected by the proposed development on the farm Konkoonsies 91 in the Pofadder area.

The entire area is situated on the Namaqua-Natal Metamorphic Province comprising Precambrian igneous and metamorphic rocks of the Naro, Witwater, Hoogoor and Grünau suites which are exposed in places but in turn are covered by Quaternary alluvial deposits.

The granites and gneisses of the Naro, Witwater, Hoogoor and Grünau suites, which are Precambrian in age, are unlikely to contain fossils. There is a slight, but unlikely, possibility of Quaternary fossils being present in the unconsolidated alluvial deposits. It is unlikely that the proposed development will have an impact on palaeontological heritage, but it is essential that if fossils are uncovered in the process of development activities that a professional palaeontologist be bought in to access the situation.

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Yours sincerely

Bruce Rubidge PhD, FGSSA, Pr Sci Nat

APPENDIX 7.6: SOIL IMPACT ASSESSMENT

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LAND USE AND AGRICULTURAL POTENTIAL ASSESSMENT - PROPOSED DEVELOPMENT OF A PHOTO-VOLTAIC SOLAR POWER GENERATION PLANT ON PORTION 6 OF THE FARM KONKOONSIES 91, POFADDER, NORTHERN CAPE

Compiled by:
EScience Associates (Pty) Ltd.
In consultation with
Prof. Andries Claassens

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July 2012

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1. INTRODUCTION

1.1 OBJECTIVES OF THE STUDY

EScience Associates (Pty) Ltd. undertook a desktop soil assessment, in consultation with Prof. Andries Claassens (Soil Science and Plant Nutrition Consultant), in relation to the proposed establishment of PV solar power plant on Ptn. 6 of the farm Konkoonises 91, Pofadder, Northern Cape (Figure 1-1); with the primary objective of the study being to determine the potential impacts of the proposed development on the land capability, land use, soils and agricultural potential of the subject site.

The study details the following:

- Soil form(s) present over the site, as well as the geographic distribution thereof over the development site;
- The size of the affected farm portions encompassing the development site;
- The locality of the development site;
- Potential land use alternatives for the site in question; and
- Impacts of the proposed change in land use on land capability and agricultural potential.

1.2 AGRICULTURAL POTENTIAL / LAND CAPABILITY

To assess the agricultural potential of a soil, one needs to determine the extent to which it complies with the basic growth and survival requirements of plants, so far as concerns the following aspects:

- Water retention/supply: this relate to soil texture, structure and depth;
- Nutrient supply: clay and organic matter content, where nutrients supportive of plant growth are prevalent;
- Oxygen supply: Soil texture and structure will influence air exchange;
- Buffer capacity: Soil must buffer against major changes in chemical properties; and
- Anchor medium: Soil must be able to anchor the plants growing therein, and allow for adequate root penetration in the supporting substrate.

Climatic conditions need to be considered in combination with soil characteristics in order to gauge the agricultural potential of a site. One of the most important aspects influencing agricultural potential is indeed rainfall. Low average annual rainfall can be a severe limiting factor toward i) the commercial production of crops, as well as ii) achievable stocking rates for large- (LSU) and small stock units (SSU) in extensive livestock production systems. The aforementioned factors will be considered in combination to determine the agricultural potential of the soils, and land capability, over the proposed development area.

1.3 DESCRIPTION OF THE STUDY AREA

The site for the proposed facility is located within the jurisdiction of the Namakwa District- and Khai Ma Local Municipalities, approximately 36km North East of the town of Pofadder in the Northern Cape (Figure 1-1). Only the area in close proximity to the Paulputs sub-station, on Ptn. 6 of the farm Konkoonsies, will be investigated in detail as part of this study. Land types for the greater farm 'Konkoonsies' are, however, provided for reference.

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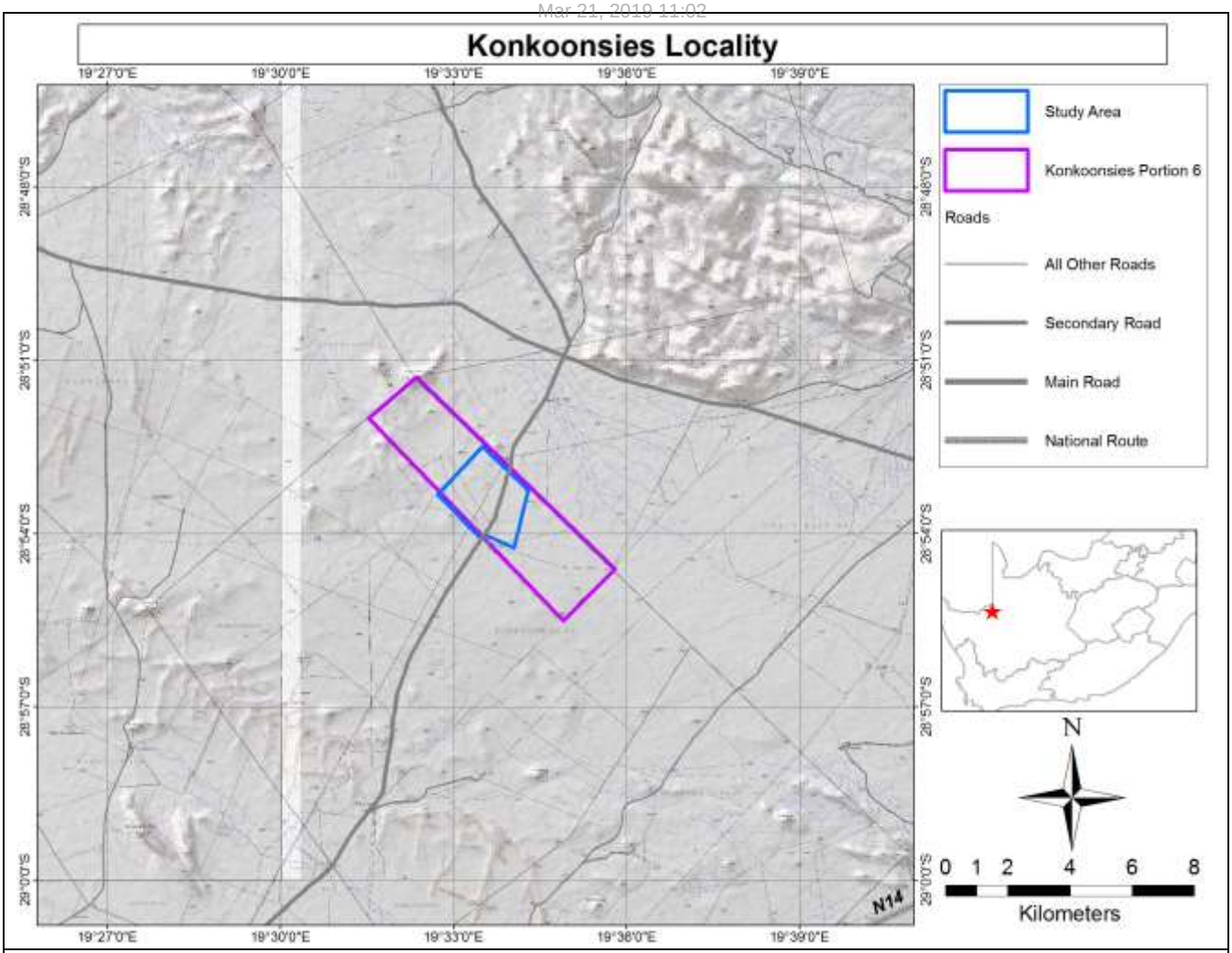

Figure 1-1: Topographical Locality Map of farm Konkoonsies

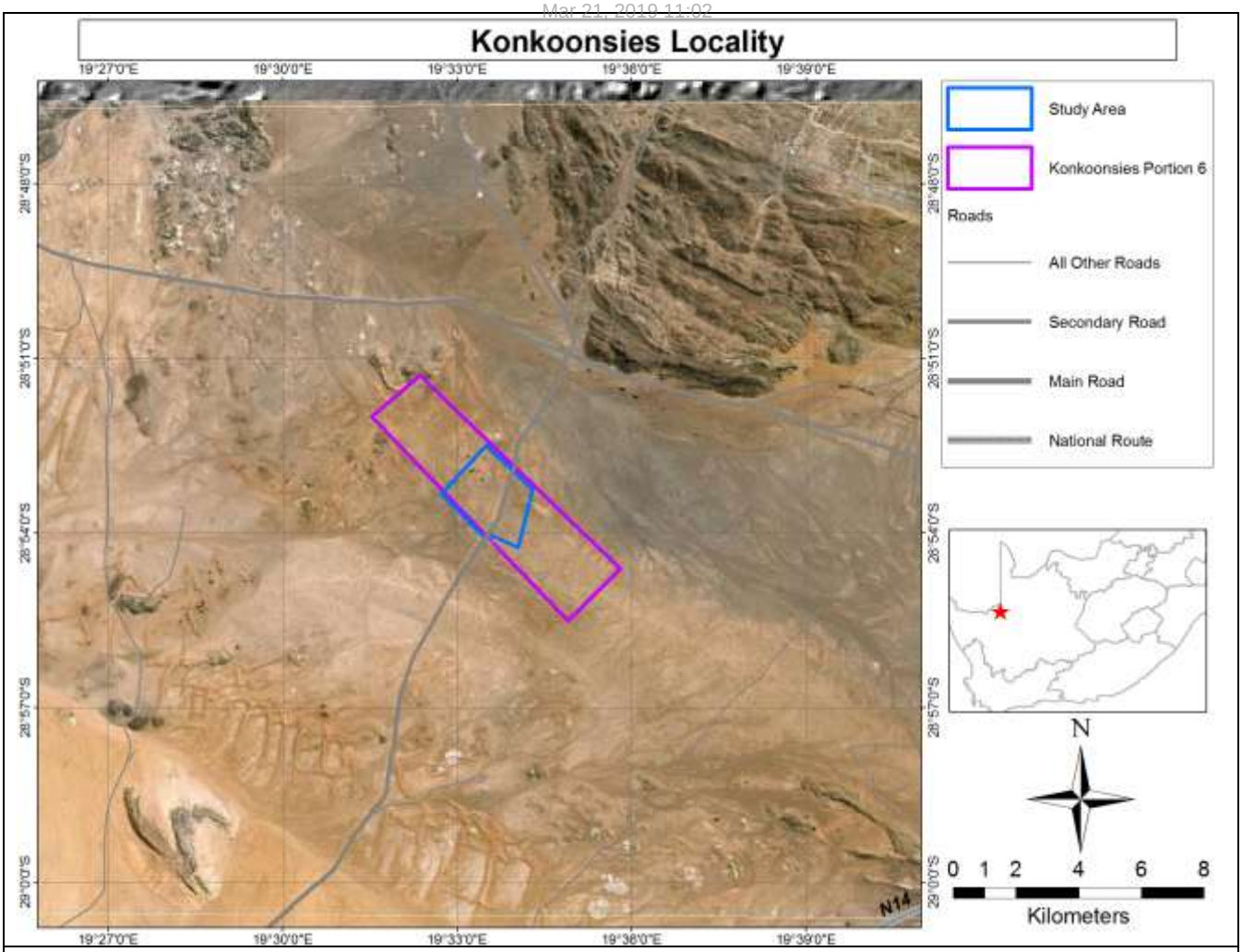

Figure 1-2: Google Earth Locality Map of the farm Konkoonsies

1.4 GEOLOGY

The geology influencing the soil types present in the area are Gneissic granite and other ultra-morphic rocks of the Namaqualand Metamorphic Complex. A smaller part of the farm is underlain by recent sands on pedi sediments, with some gneissic granite and ultra-metamorphic rock outcrops of the Namaqualand Metamorphic complex also present. Figure 1-3 below represents the regional geology of the study area.

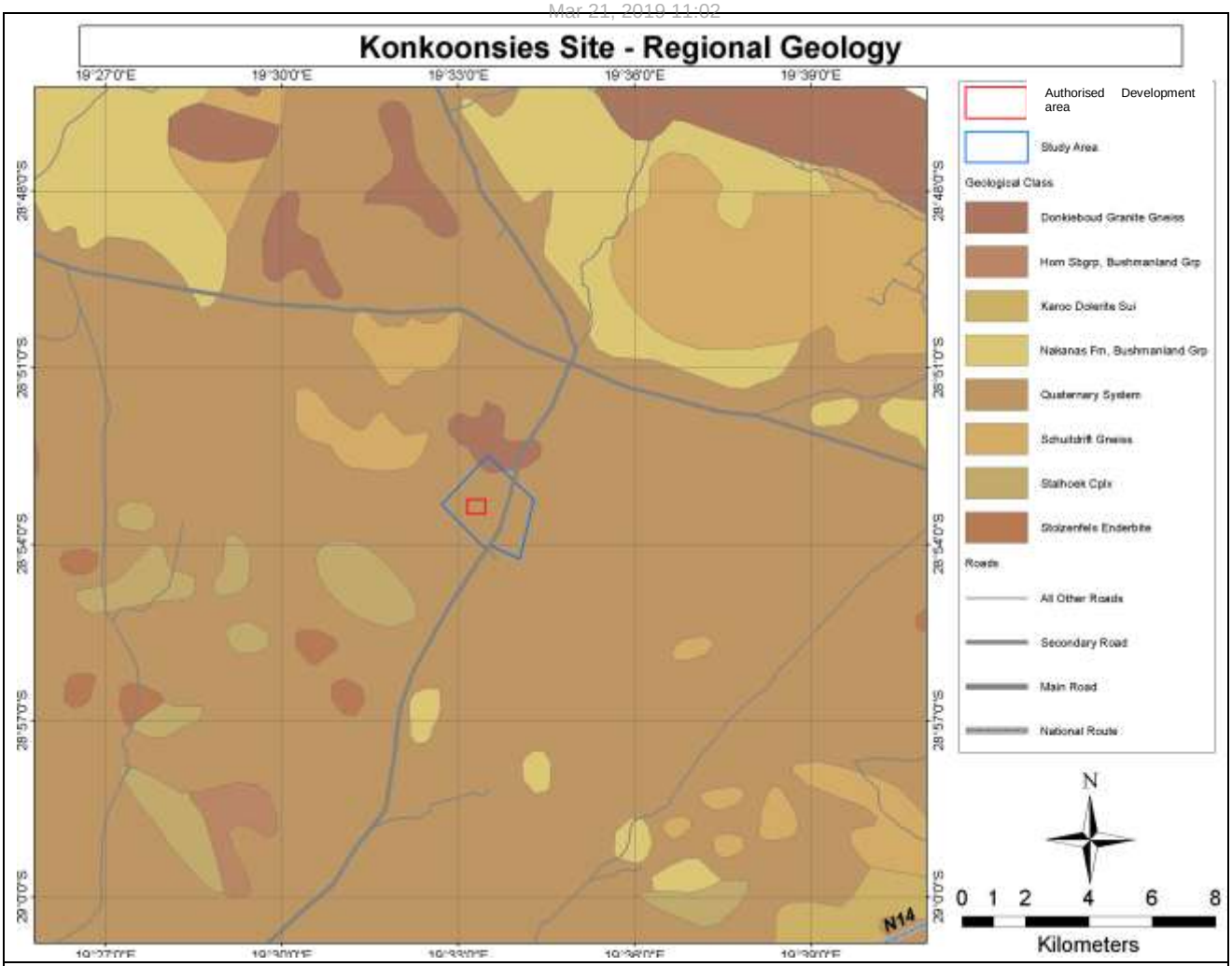

Figure 1-3: Regional geology of the proposed site.

2. LAND CAPABILITY, LAND USE, SOIL AND AGRICULTURAL POTENTIAL

2.1 METHODOLOGY

A 'land type' map of South Africa (Figure 2-1) was used to derive soil data for the broader study area; where i) soil type and distribution patterns, ii) land form and iii) micro-climate are the aspects contributing to the designation of different land types. The study area was overlaid onto the said land type map to identify the soil type(s) present in the study area (Figure 2-1). The relevant memoir was then used to determine the soil, land and terrain type of the relevant section of the farm Konkoonsies.

2.2 RESULT OF THE ASSESSMENT

2.2.1 LAND TYPES AND SOIL FORM(S)

The majority (66%) of the farm Konkoonsies falls within land type Ag37. The remainder of the farm falls within land types Af14 (25 %) and Ae67 (8%) (Figure 2-1). Land type Af14, Ag37 and Ag67 soil forms are present within the area encompassing the greater farm Konkoonsies, however, only Ag37 occurs within

the proposed study area on Ptn. 6 thereof. The soil forms potentially occurring in this land type are as follows, with each different form likely to occur within a different landscape feature:

Land type Ag37:

1. Mispah form on the high lying areas. Soil depth varies from 100 – 200 mm. Soil are very sandy in nature.
2. Hutton soil form lower down the slopes. Soil depth varies from 200 – 300 mm. In certain area these soils are deeper. Soils are sandy to sandy loam
3. Dundee and Oakleaf soil are found in the lover lying areas (valley bottom) which have depths of up to 1000mm. Soils are very sandy
4. The major soil restriction is solid rock.

According to the '*Environmental Potential atlas for the Northern Cape- Generalised Soil Description'* (Figure 2-2), the soils within the study area are considered to be soils with minimal development, usually shallow on hard or weathered rock, with or without intermittent diverse soils. Lime is indicated as being generally present in part, or most, of the landscape. The general soil depth in the area is <450mm, with <15% clay content within the topsoil. (DEA et al., 2000).

2.2.2 LAND CAPABILITY

The Northern Cape region is arid to very arid, and receives an annual average rainfall of between 140 to 170 millimetres per year, with the majority of rain falling in the summer months between October and March. On average the heaviest rains fall in mid- to late summer, with February and March being the wettest months of the year. The area within which the study area falls is considered to be an arid to very arid region of South Africa, predominantly due to areas with less than 400 millimetre of rainfall a year being considered to be arid.

There are no official rainfall stations in close proximity to the study area. It was subsequently necessary to use data from the nearest official rainfall station. The acquired information was retrieved from the following website, www.worldweatheronline.com. The data is for the Augrabies Falls National Park on the Orange River, some 72 Km east northeast of the study area.

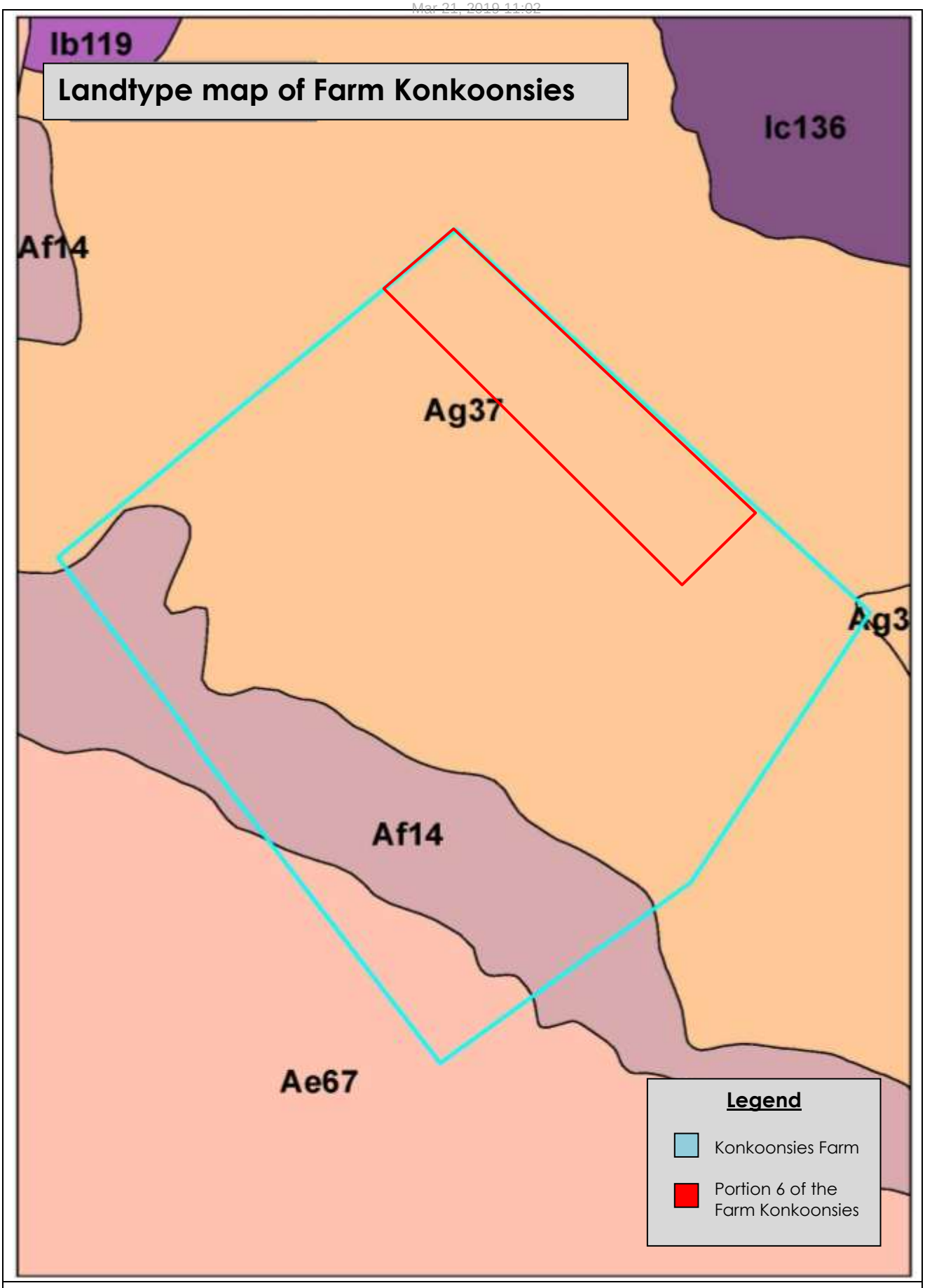

Figure 2-1: Land type map for the farm Konkoonsies

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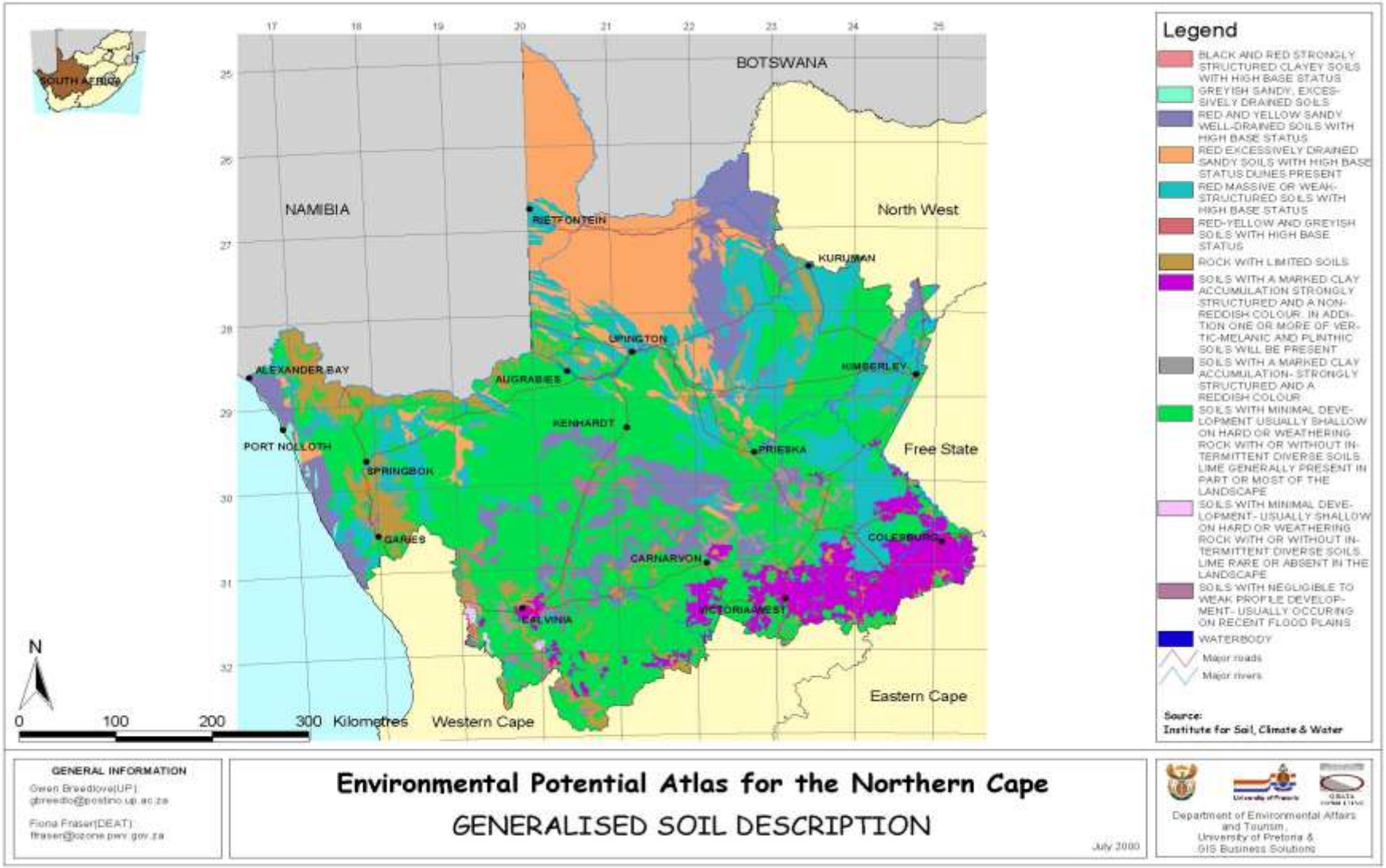
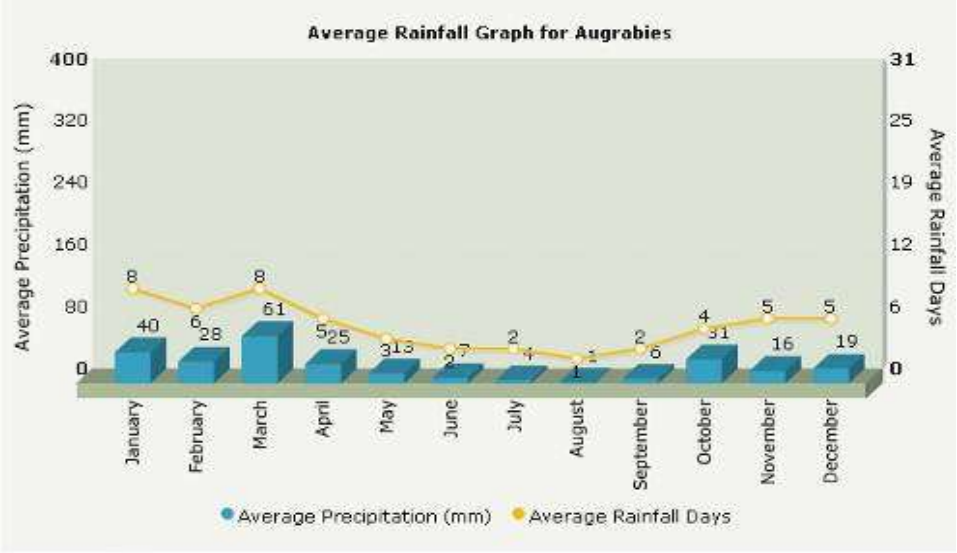


Figure 2-2: General soil description map of the Northern Cape Province (http://www.environment.gov.za)

Table 2-1: The monthly average rainfall for the Augrabies Falls National Park. (Courtesy, www.worldweatheronline.com)



Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
40mm	28mm	61mm	25mm	13mm	7mm	4mm	1mm	6mm	31mm	16mm	19mm
8	6	8	5	3	2	2	1	2	4	5	5

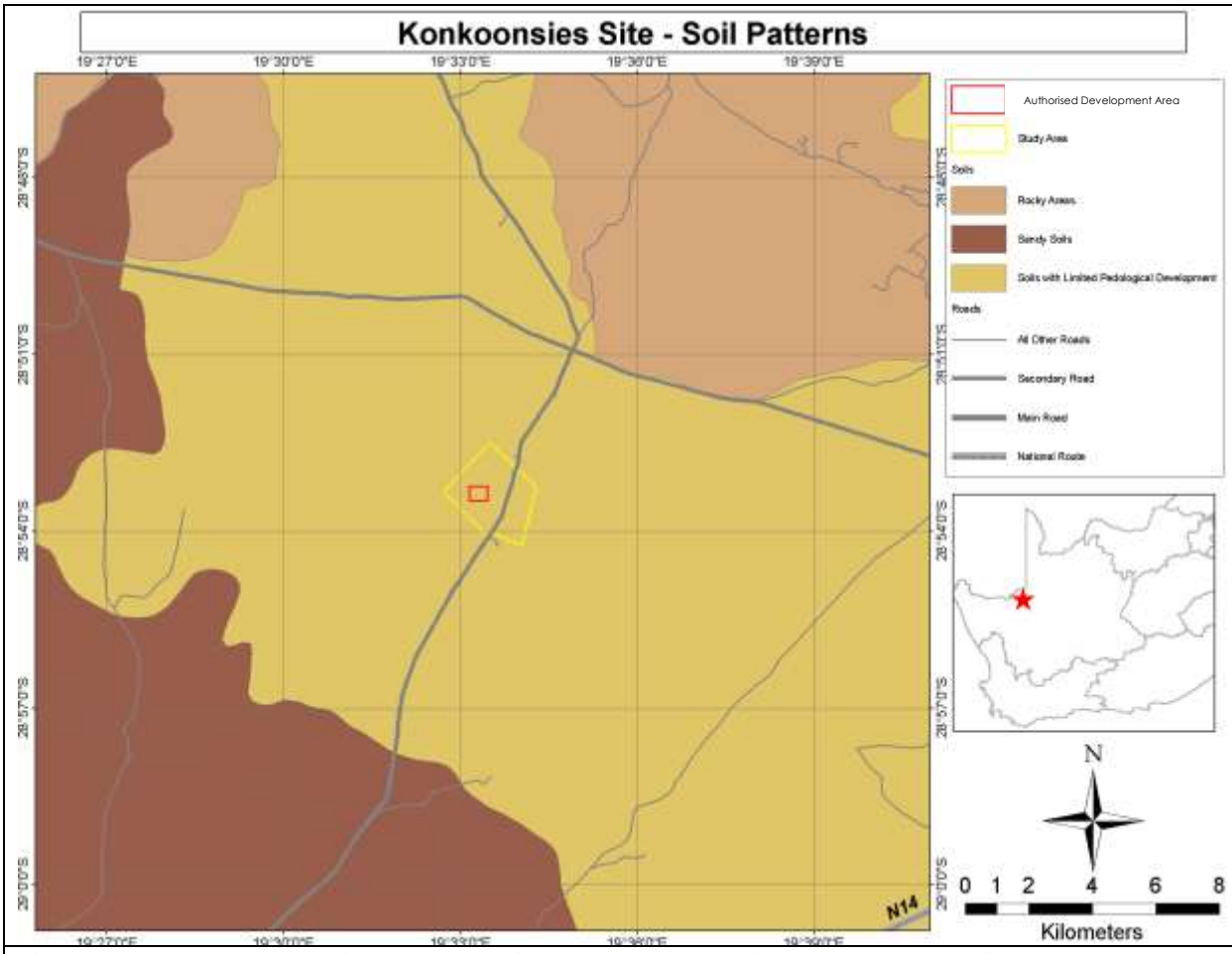


Figure 2-3: Regional soil patterns of the proposed site and surrounding. The delineated study area is falls within the Farm Konkoonsies portion 6.

The nature of the underlying parent material (mainly gneiss and granite), combined with low rainfall in the area, has led to the development of shallow soils (i.e. soils with limited pedological development); with underlying solid rock as the limiting factor to the depth thereof. Deeper soils are, however, found in the lower lying areas.

2.2.3 AGRICULTURAL POTENTIAL

The agricultural potential in the area is considered to be very low due to restrictive climatic conditions (low rainfall) and prevailing shallow, sandy, soil conditions. Although certain low lying areas have deeper soils, crop cultivation cannot be considered due to the low rainfall, and unavailability of water in the area for irrigation.

The subject site is presently used for extensive livestock grazing. There is no evidence to suggest that any crops are cultivated on site or in the surrounding area, except in close proximity to the Orange River, which mostly consists of vineyards (i.e. Grape and raisin production) under heavy irrigation.

3. DISCUSSION

3.1 LAND CAPABILITY AND AGRICULTURAL POTENTIAL

Due to the sandy to loamy soil characteristics of the study area, limited soil depths, as well as prevailing climatic conditions, the agricultural potential of the site is considered to be very low. The inferred cost associated with the preparation of site soils for crop production, as well as to install irrigation systems (i.e. due to low relative rainfall in the area), render a change in land use to crop production as largely impractical. The potential loss of grazing land is not considered to be a significant issue as the area is not supportive of high stocking rates. Stocking rates in the region are typically in the order of approximately 22-25ha/large stock unit (LSU); where, for example, 100ha of land would typically only support four (4) head of cattle on a sustainable basis.

3.2 OVERALL SOIL IMPACTS

The proposed project's impact on site soils is considered to be low, due to the erection of the PV facility. There are, however, some mitigation measures that would need to be implemented to prevent and contain erosion associated with soil disruptions during the construction phase. The impact is considered negligible when comparing it, for example, to coal mining on the Highveld which occurs on high agricultural soils which produce similar quantities of electricity (van der Waals, 2011). Apart from the access road and construction sites where the soil (environment) may be impacted on, the proposed development should not have a major influence on the soils on the rest of the farm. Because of the major areas consist of either Mispah or Glenrosa soil forms, the soil potential is low. The major use of the land type is therefore extensive grazing.

4. IMPACT ASSESSMENT

4.1 IMPACT ASSESSMENT METHODOLOGY

The following criteria and methodology was used to determine the significance of environmental impacts on land capability, agricultural potential and soils.

4.1.1 TYPE OF IMPACTS

Potential environmental impacts may either have a positive or negative effect on the environment, and can in general be categorised as follows:

a) Direct/Primary Impacts
   Primary impacts are caused directly due to the activity and generally occur at the same time and at the place of the activity.
b) Indirect/Secondary Impacts
   Secondary impacts induce changes that may occur as a result of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken.
c) Cumulative Impacts
   Cumulative impacts are those that result from the incremental impact of the proposed activity on common resources when added to the impacts of the other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time, and can include both direct and indirect impacts.

4.1.2 DETERMINING SIGNIFICANCE

The following criteria will be used to determine the significance of an impact. The scores associated with each of the levels within each criterion are indicated in brackets after each description [like this].

Nature

Nature (N) considers whether the impact is:

- positive [- ¼]
- negative [+1].

Extent

Extent (E) considers whether the impact will occur:

on site [1]

- locally: within the vicinity of the site [2]
- regionally: within the local municipality [3]
- provincially: across the province [4]
- nationally or internationally [5].

Duration

Duration (D) considers whether the impact will be:

- very short term: a matter of days or less [1]
- short term: a matter of weeks to months [2]
- medium term: up to a year or two [3]
- long term: up to 10 years [4]
- very long term: 10 years or longer [5].

Intensity

Intensity (I) considers whether the impact will be:

- negligible: there is an impact on the environment, but it is negligible, having no discernable effect [1]
- minor: the impact alters the environment in such a way that the natural processes or functions are hardly affected; the system does however, become more sensitive to other impacts [2]
- moderate: the environment is altered, but function and process continue, albeit in a modified way; the system is stressed but manages to continue, although not with the same strength as before [3]
- major: the disturbance to the environment is enough to disrupt functions or processes, resulting in reduced diversity; the system has been damaged and is no longer what it used to be, but there are still remaining functions; the system will probably decline further without positive intervention [4]
- severe: the disturbance to the environment destroys certain aspects and damages all others; the system is totally out of balance and will collapse without major intervention or rehabilitation [5].

Probability

Probability (P) considers whether the impact will be:

- unlikely: the possibility of the impact occurring is very low, due either to the circumstances, design or experience [1]
- likely: there is a possibility that the impact will occur, to the extent that provisions must be made for it [2]
- very likely: the impact will probably occur, but it is not certain [3]
- definite: the impact will occur regardless of any prevention plans, and only mitigation can be used to manage the impact [4].

Mitigation or Enhancement

Mitigation (M) is about eliminating, minimising or compensating for negative impacts, whereas enhancement (H) magnifies project benefits. This factor considers whether –

A negative impact can be mitigated:

- unmitigated: no mitigation is possible or planned [1]
- slightly mitigated: a small reduction in the impact is likely [2]
- moderately mitigated: the impact can be substantially mitigated, but the residual impact is still noticeable or significant (relative to the original impact) [3]

- well mitigated: the impact can be mostly mitigated and the residual impact is negligible or minor [4]

A positive impact can be enhanced:

- un-enhanced: no enhancement is possible or planned [1]
- slightly enhanced: a small enhancement in the benefit is possible [2]
- moderately enhanced: a noticeable enhancement is possible, which will increase the quantity or quality of the benefit in a significant way [3]
- well enhanced: the benefit can be substantially enhanced to reach a far greater number of receptors or recipients and/or be of a much higher quality than the original benefit [4].

Reversibility

Reversibility (R) considers whether an impact is:

- irreversible: no amount of time or money will allow the impact to be substantially reversed [1]
- slightly reversible: the impact is not easy to reverse and will require much effort, taken immediately after the impact, and even then, the final result will not match the original environment prior to the impact [2]
- moderately reversible: much of the impact can be reversed, but action will have to be taken within a certain time and the amount of effort will be significant in order to achieve a fair degree of rehabilitation [3]
- mostly reversible: the impact can mostly be reversed, although if the duration of the impact is too long, it may make the rehabilitation less successful, but otherwise a satisfactory degree of rehabilitation can generally be achieved quite easily [4].

4.1.3 CALCULATING IMPACT SIGNIFICANCE

The table below summarises the scoring for all the criteria.

Figure 4-1: Scoring for Significance Criteria

CRITERION	SCORES					
	- ¼	1	2	3	4	5
N-nature	positive	negative	-	-	-	-
E-extent	-	site	local	regional	provincial	national
D-duration	-	very short	short	moderate	long	very long
I-intensity	-	negligible	minor	moderate	major	severe
P-probability	-	very unlikely	unlikely	likely	very likely	-
M-mitigation	-	none	slight	moderate	good	-
H-enhancement	-	none	slight	moderate	good	-
R-reversibility	-	none	slight	moderate	good	-

Impact significance is a net result of all the above criteria. The formula proposed to calculate impact significance (S) is:

For a negative impact: $S = N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$; and

For a positive impact: $S = N \times (E+D) \times I \times P \times (H)$.

Negative impacts score from 2 to 200. Positive impacts score from – ½ to -200.

4.1.4 UNDERSTANDING IMPACT SIGNIFICANCE

The following is a guide to interpreting the final scores of an impact (for negative impacts):

Figure 4-2: Final Significance Scoring		
Final score (S)	Impact significance	
0 – 10	negligible	the impact should cause no real damage to the environment, except where it has the opportunity to contribute to cumulative impacts
10 – 20	Low	the impact will be noticeable but should be localized or occur over a limited time period and not cause permanent or unacceptable changes; it should be addressed in an EMP and managed appropriately
20 – 50	moderate	the impact is significant and will affect the integrity of the environment; effort must be made to mitigate and reverse this impact; in addition the project benefits must be shown to outweigh the impact
50 – 100	High	the impact will affect the environment to such an extent that permanent damage is likely and recovery will be slow and difficult; the impact is unacceptable without real mitigation or reversal plans; project benefits must be proven to be very substantial; the approval of the project will be in jeopardy if this impact cannot be addressed
100 – 200	severe	the impact will result in large, permanent and severe impacts, such as local species extinctions, minor human migrations or local economic collapses; even projects with major benefits may not go ahead with this level of impact; project alternatives that are substantially different should be looked at, otherwise the project should not be approved

Two examples will help illustrate this system:

SCENARIO 1 – An industrial facility proposes discharging effluent containing a high salt content into a nearby stream. These salts will cause temporary problems for the ecosystem, but are washed downstream, diluted and will have no long term effects. The short term damage to the stream can be reversed fairly easily, but only if the ecosystem has not been seriously damaged by the salts over a long time. A mitigation measure is also proposed whereby during low flow periods (dry season) a pulse of clean water is discharged into the stream after the saline effluent, diluting the salts and pushing them downstream faster, so that the salts become so dilute as to have little or no effect.

From this scenario, the criteria are:
nature = negative = 1
extent = local = 2
duration = medium = 3

intensity = moderate = 3
probability = very likely = 4
mitigation = moderate = 3
reversibility = moderate = 3,

and therefore impact significance is:
S = N x (E+D) x I x P ÷ ½(M+R)
= 1 x (2+3) x 3 x 4 ÷ ½(3+3)
= 60 ÷ 3
= 20.

Note that the impact prior to mitigation is major, but that due to the mitigation and the fact that the ecosystem can recover easily from the effects of salt (high reversibility), the residual impact becomes minor/moderate.

SCENARIO 2 – The above scenario applies, except that the effluent contains metals. These metals become adsorbed onto clay and organic matter in the stream bed and are accumulative toxins within the ecosystem, getting into the food chain and concentrating upwards into predator species. Fresh water flushing will only very slightly mitigate this and ecosystem recovery will not be easy or fast.

From this scenario, the criteria are:
nature = negative = 1
extent = local = 2
duration = very long = 5
intensity = moderate = 3
probability = very likely = 4
mitigation = slight = 2
reversibility = slight = 2,

and therefore impact significance is:
S = N x (E+D) x I x P ÷ ½(M+R)
= 1 x (2+5) x 3 x 4 ÷ ½(2+2)
= 84 ÷ 2
= 42.

Note that in this case, the original impact (of the metals) is more serious than the salt, but it is the limited mitigation and reversibility that also act on the residual score and result in this score being moderate.

4.2 CONSTRUCTION PHASE IMPACTS

Most of the construction impact is considered to be mostly generic of nature. The following impact described below is considered as the most significant in terms of potential impact on soils. Table 4-1 & Table 4-2 include a description and set criteria to determine the extent/ magnitude of the impacts associated with the construction of the proposed project.

4.2.1 POTENTIAL PROJECT IMPACTS ON CURRENT LAND CAPABILITY/LAND-USE (I.E. LOSS OF EXTENSIVE LIVESTOCK GRAZING)

Table 4-1: Impacts on Soils – Significance Rating			
Nature (N)	Potentially negative impacts on land use as the area will be transformed and therefore a loss in the potential land capability for grazing.		1
Extent (E)	Site: The impact will be isolated to the development footprint.		1
Duration (D)	Very long term: The proposed facility is permanent but could be removed		5
Intensity (I)	Minor: The impact alters the environment in such a way that the natural processes or functions are hardly affected; the system does however, become more sensitive to other impacts		2
Probability (P)	Unlikely: Improbable due to low baseline agricultural/grazing potential.		1
Mitigation (M)	None possible limit disturbance to immediate surroundings.		-
Enhancement (H)	N/A		-
Reversibility (R)	Mostly reversible: the impact can mostly be reversed, although if the duration of the impact is too long, it may make the rehabilitation less successful, but otherwise a satisfactory degree of rehabilitation can generally be achieved quite easily.		4
Significance Rating with Mitigation - Negative Impact (S)	N x (E+D) x I x P ÷ ½(M+R)	**Negligible**	6
Significance Rating without Mitigation - Negative Impact (S)	N x (E+D) x I x P ÷ ½(M+R)	**Negligible**	6
Significance Rating -Positive Impact (S)	N x (E+D) x I x P x (H).		-

4.2.2 POTENTIAL PROJECT IMPACTS IN RESPECT OF POTENTIAL FOR ALTERNATIVE LAND-USE (CROP PRODUCTION)

Table 4-2: Impacts on Soils – Significance Rating		
Nature (N)	Potentially negative impacts from the proposed project will result in loss area which could be used to cultivate crops.	1
Extent (E)	Site: The impact will be isolated to the development site	1
Duration (D)	Very long term: The proposed facility is permanent but could be removed	5
Intensity (I)	Minor: The impact alters the environment in such a way that the natural processes or functions are hardly	2

Table 4-2: Impacts on Soils – Significance Rating			
	affected; the system does however, become more sensitive to other impacts. The nature of the underlying soils is of such a nature that it does not provide for productive agriculture.		
Probability (P)	Unlikely: Improbable due to low baseline agricultural potential.		1
Mitigation (M)	None possible limit disturbance to immediate surroundings.		
Enhancement (H)	N/A		-
Reversibility (R)	Mostly reversible: the impact can mostly be reversed, although if the duration of the impact is too long, it may make the rehabilitation less successful, but otherwise a satisfactory degree of rehabilitation can generally be achieved quite easily ,		4
Significance Rating with Mitigation - Negative Impact (S)	N x (E+D) x I x P ÷ ½(M+R)	**Negligible**	6
Significance Rating without Mitigation - Negative Impact (S)	N x (E+D) x I x P ÷ ½(M+R)	**Negligible**	6
Significance Rating -Positive Impact (S)	N x (E+D) x I x P x (H).		-

5. CONCLUSIONS

An assessment of the proposed project's potential impacts on land capability, land use, soils and agricultural potential concludes that there should be no discernable impacts on the aforementioned site as a result of the development of the proposed PV facility, and that the impacts associated with the proposed development are considered to be low, mostly as the site has a low agricultural potential. Due to the geology and climate the soils in the area is mostly shallow with a low carrying capacity for grazing. There are not really opportunities to change land use for agricultural. Any impact on the environment due to the proposed activity and the maintenance management in the area should be localized

The following recommendation must however be implemented:

1. Erosion must be managed though adequate control and mitigation. Early identification of erosion prone areas is essential.
2. Potential Impact from hydrocarbon soil contamination such vehicle oil/fuel leaks, concrete mixing and oil spillage should be prevented by providing overnight vehicle with drip trays, ensure concrete mixing does not take place on bear soils etc.

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APPENDIX 7.7: TRAFFIC ASSESSMENT

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Mar 21, 2019 11:02

BioTherm Energy (Pty) Ltd
Konkoonsies II Photovoltaic Power Plant

Traffic Assessment

Prepared by: Athol Schwarz — 02 April 2013 (Date)

Approvals

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Appendices

1. Introduction

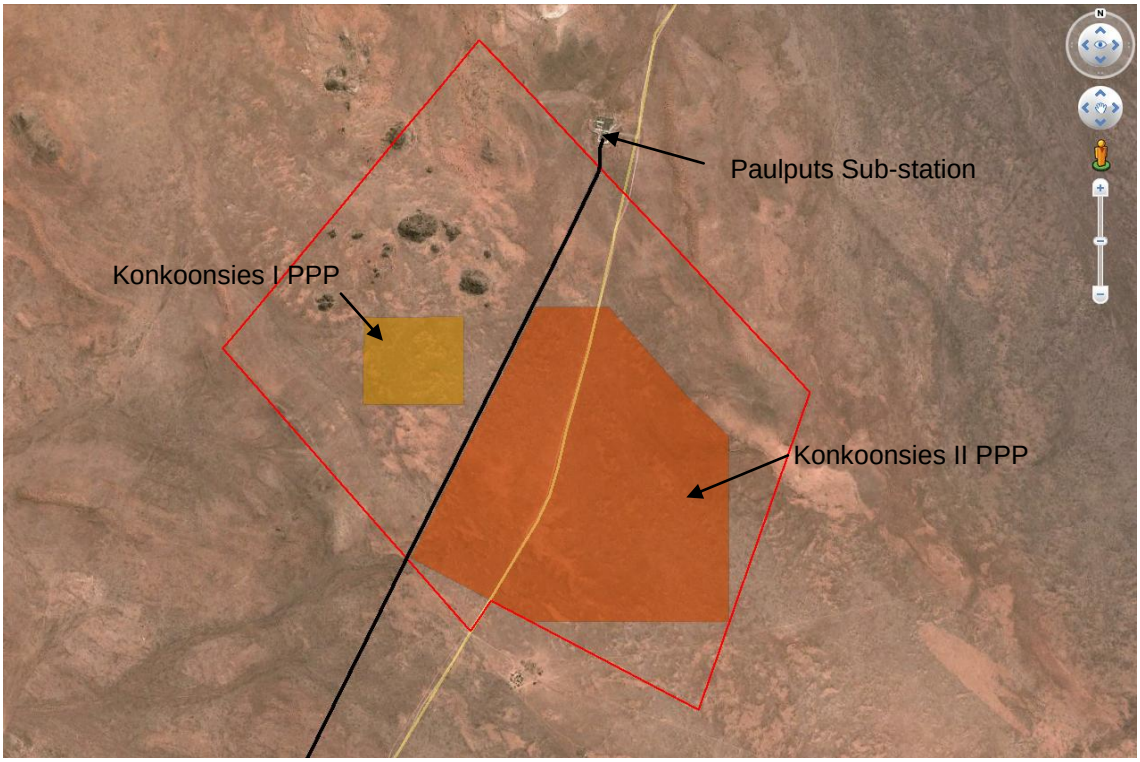
BioTherm Energy (Pty) Ltd requested Hatch Africa (Pty) Ltd to evaluate the impact of the traffic associated with the construction and operation of the proposed 75 MW Konkoonsies II Photovoltaic Power Plant in the area.

Konkoonsies II Photovoltaic Power Plant is located to the east of Konkoonsies I Photovoltaic Power Plant, in close proximity to Eskom's Paulputs substation. Access to the plant is via a gravel road, which is the link to the town of Pofadder.

The document addresses only the impact of the traffic volume on the National Road (N14) associated with the construction and operation of Konkoonsies II Photovoltaic Power Plant and does not address the traffic volumes or geometric design of the divisional and minor roads en route to the Konkoonsies II Photovoltaic Power Plant.

2. Site Location

Konkoonsies II Photovoltaic Power Plant is located to the east of Konkoonsies I Photovoltaic Power Plant, as shown on the Google Earth image provided below. Konkoonsies II Photovoltaic Power Plant is located approximately 30 km north-east of the town Pofadder in the Northern Cape Province of South Africa.



The Eskom Sub-Station (Paulputs) is approximately 1,5 km north of the Konkoonsies II Photovoltaic Power Plant.

3. Road Network

The road network around the Konkoonsies II Photovoltaic Power Plant (PPP) is displayed in the image below and consists of the National Road (N14), Divisional Road (R358), Minor Road (R-1) and Minor Road (R-2). The road numbers for the minor roads are not official road numbers.

There are two possible access routes to the Konkoonsies II Photovoltaic Power Plant from the National Road (N14). These are:

- via intersection 'A' and following roads R358 (11 km) and R-2 (22 km). The total length of this road is 33 km, the entire length of this road is gravel, or
- via intersection 'B' and following roads R-1 (22 km) and R-2 (6 km). The total length of this road is 28 km, of which only the last 6 km is gravel.

The distance between the intersections 'A' and 'B' is approximately 45 km. The travelling distance from Pofadder to the Konkoosies II PPP, via the R358, is in the order of 33 km (travelling time is expected to be in the order of 50 minutes), and the travelling distance from Pofadder to the Konkoosies II PPP, via R-1a, is in the order of 73 km (travelling time is expected to be in the order of 52 minutes). However, the travelling distance from Kakamas side to the Konkoonsies II PPP is 78 km shorter via road R-1a than via R358. However, the quality of the ride via road R-1a is more superior.

3.1 National Road – N14

The National Road - N14, extends from Springbok in the Northern Cape to Brakfontein Interchange (N1/N14/R28) in Gauteng, and passes through the town of Pofadder.

This is a single carriageway paved road with paved shoulders as shown in the image below.

The road is approximately 8 m wide and is located within a 45 m wide road reserve. The speed limit of the road is 120 km/h.

The design criteria for this road are not known. However, since this is a major rural road, it will be classified as a Category B road; thus, in accordance with TRH-4 – Structural design of flexible pavement for interurban and rural roads, the road would have been designed for a minimum daily traffic volume exceeding 600 equivalent vehicles units.

3.2 Divisional Road – R358

The Divisional Road – R358, extends from Bitterfontein (on the N7) in the Northern Cape to Onseepkans (on the Namibia Border) in the Northern Cape, and passes through the town of Pofadder.

This is a single carriageway gravel road as shown in the image below. The condition of this road is good.

The road is approximately 10 m wide and located within a road reserve that varies between 20 to 50 m wide.

The design criteria for this road is not known. However, since this is an important rural gravel road, it will be classified as a Category D road; thus, in accordance with TRH-4 – Structural design of flexible pavement for interurban and rural roads,, the road would have been designed for a minimum daily traffic volume not exceeding 500 equivalent vehicles units.

3.3 Minor Road R-1

The Minor Road R-1, extends from the National Road N14 (approximately 45 km north of Pofadder) to the Divisional Road R358 (approximately 6 km south of Onseepkans boarder post).

The first section of the road (R-1a), which is approximately 22 km long, is a single carriageway paved road with gravel shoulders as shown in the image below.

The road is approximately 6 m wide and is located within a 45 m wide road reserve.

The design criteria for this road is not known. However, since this is a rural road, it will be classified as a Category C road; thus, in accordance with TRH-4 – Structural design of flexible pavement for interurban and rural roads, the road would have been designed for a minimum daily traffic volume not exceeding 600 equivalent vehicles units.

The second section of the road (R-1b), is a single carriageway gravel road as shown in the image below.

3.4 Minor Road R-2

The Minor Road R-2, extends from the Divisional Road R358 (approximately 11 km north of Pofadder) to the Minor Road R-1 (approximately 22 km from N14). This is a single carriageway gravel road.

The design criteria for this road is not known. However, since this is a minor rural gravel road, it will be classified as a Category D road; thus, in accordance with TRH-4 – Structural design of flexible pavement for interurban and rural roads,, the road would have been designed for a minimum daily traffic not exceeding 500 equivalent vehicles units.

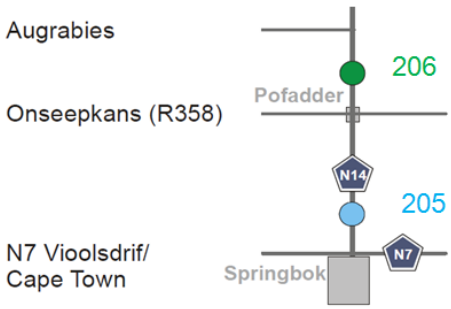
4. Existing Traffic Volumes

Data regarding the traffic volumes on the National Road (N14) was provided by Mikros Traffic Monitoring (Pty) Ltd. However, the most relevant counting stations are located to the west of Kakamas and east of Springbok.

Unfortunately, no traffic volume data is available for roads R358, R-1a and R-2.

4.1 Strip Diagram

The strip diagram for a section of the National Road (N14) , as provided by SANRAL is indicated below. The strip diagram indicates the counting station either side of the town of Pofadder. Counting station 205 is located between Springbok and Pofadder, while counting station 206 is located between Pofadder and Kakamas.



4.2 Counting Station 205

Counting station 205 is a permanent counting station, which is located 2,5 km east of Springbok on the N14.

The traffic volume data for this counting station was provided by Mikros Traffic Monitoring (Pty) Ltd for 2009, 2010 and 2011. A summary of the information is tabled below and all the data is provided in Appendix A.

	North (to Pofadder)			South (to Springbok)		
	2009	2010	2011	2009	2010	2011
Total number of vehicles	221 726	214 762	220 281	218 320	210 959	217 548
Average daily traffic (ADT)	608	588	605	598	578	598
Average daily truck traffic (ADTT)	41	43	47	31	41	46
Percentage of trucks	6,7%	7,3%	7,8%	6,4%	7,1%	7,6
Truck split % (short:medium:long)	44:22:34	45:21:34	43:21:36	41:23:36	43:21:36	41:22:37
Percentage of night traffic (20:00 - 06:00)	15,2%	14,6%	13,9%	13,2%	12,4%	12,0%
Highest volume rate (vehicles/hour)	182	103	230	167	98	546

The traffic volume per hour for 2009 is extracted and summarised below, in order to compare with the information provided for counting station 206.

	North (to Pofadder)		South (to Springbok)	
	date	vehicles/hour	date	vehicles/hour
Highest volume	28 Feb 2009	182	28 Feb 2009	167
15th highest volume	29 Jun 2009	83	28 Aug 2009	84
30th highest volume	1 Sep 2009	78	28 Nov 2009	81

4.3 Counting Station 206

Counting Station 206 is a secondary counting station, which is located 11 km west of Kakamas on the N14.

The traffic volume data for this counting station was provided by Mikros Traffic Monitoring (Pty) Ltd. Since this is a secondary counting station, the data obtained is not continuous. Traffic volume data was only provided for the period 20 August 2009 to 9 September 2009 (477 hours). A summary of the information is tabled below and all the data is provided in Appendix B.

	North (to Kakamas)			South (to Pofadder)		
	2009			2009		
Total number of vehicles	5 114			5 573		
Average daily traffic (ADT)	257			281		
Average daily truck traffic (ADTT)	36			39		
Percentage of trucks	14,0%			13,9%		
Truck split % (short:medium:long)	35:30:35			40:32:28		
Percentage of night traffic (20:00 - 06:00)	10,.9%			10,6%		
Highest volume rate (vehicles/hour)	53			49		

The traffic volume per hour is extracted and summarised below.

	North (to Kakamas)		South (to Pofadder)	
	date	vehicles/hour	date	vehicles/hour
Highest volume	26 Aug 2009	53	26 Aug 2009	49
15th highest volume	4 Sep 2009	28	31 Aug 2009	33
30th highest volume	8 Sep 2009	26	25 Aug 2009	30

4.4 Onseepkans Border Post

The traffic data for vehicles moving through the border post at Onseepkans, for 2010 and 2011, was obtained from the South African Revenue Services in Springbok, and is summarised in the table below.

	North (Departures)		South (Arrivals)	
	2010	2011	2010	2011
Total number of vehicles/year	1 958	1 990	1 697	1 658
Average daily traffic (ADT)	6	6	6	6

5. Expected Traffic Volumes

The expected number of vehicles travelling to the Photovoltaic Power Plant will be more intensive during the construction phase of the project, than during the operational phase.

The duration of the construction phase of this project is in the order of 15 to 18 months, and the operational phase is envisaged to be in the order of 20 years.

During the constructional phase of the project, the envisaged traffic on the road will include delivery of material and equipment and transportation of personnel.

Based on information obtained from similar size projects, the major components that are to be delivery to site and expected number of trips are as follows;

- photovoltaic panels - ±500 containers,
- structural elements for construction of the tables - ±160 truck loads, and
- inverters and other - ±60 containers.

The photovoltaic panels and inverters are to be imported from overseas and will be transported in standard containers, while the structural elements for construction of the tables will be transported from local fabrication plants. Since it is unlikely that adequate on site storage facilities will be provided for the storage of these major components, it is envisaged that these components will be delivered to site over a period of 12 months. This implies that approximately 720 trips are to be made over a period of 12 months, this relates to an ADT of less than 2.

Once the columns are installed, construction of the tables and installation of the panels is a very labour intensive operation. Based on information obtained from similar size projects, the maximum expected number of personnel required to execute the work on site is in the order of 400. It is assumed that 75% will be transported to site in 50 seater buses, 10% will drive to site in light vehicles, while the other 15% will be passengers.

During the operational phase of the project, it is envisaged that a small maintenance team will travel to site on a daily basis.

5.1 Construction Phase

During the constructional phase of the project, the envisaged traffic on the road will include delivery of material and equipment and transportation of personnel.

The anticipated number of vehicles travelling to the Photovoltaic Power Plant during the construction phase of this project, is tabled below, together with the envisaged increase in the average daily traffic (ADT).

Vehicle Category	Personnel	Equipment and Material
Light vehicles (GVM < 3 500 kg)	40	
Medium vehicles (GVM 3 500 – 16 000 kg)	7	
Heavy vehicles (GVM > 16000 kg)		2
ADT (% light, medium, heavy)	49 (82%:14%:4%)	

5.2 Operational Phase

During the operational phase of the project, it is envisaged that a small maintenance team will travel to site on a daily basis. It is assumed that 2 light vehicles and a small bus will be used to convey the staff to site. This would imply that the ADT on the roads to the site would increase by three.

6. Data Interpretation

6.1 Counting Station Comparison

Based on the traffic volume data provided for counting stations 205 and 206, the increase in traffic volume on the National Road N14 due to the construction of the Photovoltaic Power Plant can be determined. Since there is no traffic volume data for the minor roads en route to the Photovoltaic Power Plant, the impact on the traffic volumes will have to be surmised.

Considering the traffic volume data provided for counting stations 205 and 206, the first glaring anomaly is the disparity of ADT between the two counting stations. Based on the 2009 values only 42% of the vehicles, travelling north, which passed counting station 205, passed through counting station 206 and 53% more vehicles, travelling south, passed counting station 205 than what passed through counting station 206. This implies that, on average, 55% of the all traffic passing through counting station 205 does not pass through counting station 206.

To verify the large percentage of traffic passing through counting station 205 that does not pass through counting station 206 (as identified above), the highest traffic volume per hour from counting station 206 was compared with the traffic volumes per hour from counting station 205, on approximately the same dates as those indentified for counting station 206. The results of the comparison is as follows; of the vehicles, travelling north, only 68% which passed counting station 205, passed counting station 206, and 58% more traffic travelling south passed counting station 205 than counting station 206. This implies that, on average, 37% of the traffic passing counting station 205 does not pass through counting station 206.

This anomaly results from the volume of data collected at counting station 206, as there is a poor correlation between the two counting stations. Based on the poor correlation, only traffic volume data from counting station 205 is used in this study.

6.2 Traffic Volumes on National Roads

The only additional traffic, that will travel on the National Roads (N14) as a result of the Photovoltaic Power Plant construction, will be the delivery vehicles. Based on the information provided above, the ADT will increase by less than 2. The following scenarios were considered;

- If all the material and equipment required on site was to be transported from Cape Town then the ADT at counting station 205 (northerly direction) will increase by 2. This implies that the ADT will increase by less than 0,5% and the ADTT will increase by 4,5%.
- If all the material and equipment required on site was to be transported from Johannesburg then the ADT at counting station 205 (southerly direction) will increase by 2. This implies that the ADT will increase by less than 0,5% and the ADTT will increase by 5%.

6.3 Traffic Volumes on Local Roads

Without the relevant traffic volume data for the minor roads en route to the Photovoltaic Power Plant, it is difficult to draw any substantial conclusion on the impact of the existing traffic. However, based on the information provided above, the anticipated ADT during the construction phase of the Photovoltaic Power Plant is in the order of 49, of which 82% will be light vehicles and only 4% will be heavy vehicles. If the existing ADT of these roads is in the order of 50, then the impact on the road will be doubled. This is still very low in comparison with the traffic volume that the road would have been designed to accommodate.

7. Conclusion

The N14 is a National Road and the anticipated 0,5% increase in the ADT is insignificant. This is further attenuated due to the fact that the vehicles do not all arrive at site at the same time.

The additional ADT of 49, on either roads R358 or R-1a, will result in an increase of more than 200%, might appear significantly high. However, the combined ADT on either of these roads is less than 100 vehicles per day.

The anticipated traffic loads on the roads in the area is significantly less that the design capacity of these roads. With this in mind, the traffic volumes contributed by the construction and operation phases of the Photovoltaic Power Plant on the existing traffic volumes are considered insignificant.

Appendix A
Counting Station 205

205 **Springbok East**

TRAFFIC HIGHLIGHTS OF SITE 205				
1.1	Site Identifier			205
1.2	Site Name			Springbok East
1.3	Site Description			Between Springbok and Pofadder
1.4	Road Description	Route : N014	Road : N014 Section : 01	Distance : 2.5km
1.5	GPS Position			17.912500E -29.654444S
1.6	Number of Lanes			2
1.7	Station Type			Permanent
1.8	Requested Period			2009/01/01 - 2009/12/31
1.9	Length of record requested (hours)			8760
1.10	Actual First & Last Dates			2009/01/01 - 2009/12/31
1.11	Actual available data (hours)			8760
1.12	Percentage data available for requested period			100.0
		To Pofadder	To Springbok	Total
2.1	Total number of vehicles	221726	218320	440046
2.2	Average daily traffic (ADT)	608	598	1206
2.3	Average daily truck traffic (ADTT)	41	38	79
2.4	Percentage of trucks	6.7	6.4	6.6
2.5	Truck split % (short:medium:long)	44 : 22 : 34	41 : 23 : 36	43 : 22 : 35
2.6	Percentage of night traffic (20:00 - 06:00)	15.2	13.2	14.2
3.1	Speed limit (km/hr)			120
3.2	Average speed (km/hr)	98.5	108.0	103.2
3.3	Average speed - light vehicles (km/hr)	99.7	109.1	104.4
3.4	Average speed - heavy vehicles (km/hr)	82.6	90.7	86.5
3.5	Average night speed (km/hr)	97.6	107.2	102.0
3.6	15th centile speed (km/hr)	79.8	83.7	81.7
3.7	85th centile speed (km/hr)	119.9	132.0	126.0
3.8	Percentage vehicles in excess of speed limit	12.1	27.9	19.9
4.1	Percentage vehicles in flows over 600 vehicles/hr	0.0	0.0	0.0
4.2	Highest volume on the road (vehicles/hr)		2009/02/28 13:00:00	239
4.3	Highest volume in the North (vehs/hr)		2009/02/28 12:00:00	182
4.4	Highest volume in the South (vehs/hr)		2009/02/28 13:00:00	167
4.5	Highest volume in a lane (vehicles/hr)		2009/02/28 12:00:00	182
4.6	15th highest volume on the road (vehicles/hr)		2009/04/03 18:00:00	152
4.7	15th highest volume in the North direction (vehs/hr)		2009/06/29 17:00:00	83
4.8	15th highest volume in the South direction (vehs/hr)		2009/08/28 15:00:00	84
4.9	30th highest volume on the road (vehicles/hr)		2009/10/02 18:00:00	142
4.10	30th highest volume in the North direction (vehs/hr)		2009/09/01 18:00:00	78
4.11	30th highest volume in the South direction (vehs/hr)		2009/11/28 10:00:00	81
5.1	Percentage of vehicles less than 2s behind vehicle ahead	3.6	3.8	3.7
6.1	Total number of heavy vehicles	14850	14038	28888
6.2	Estimated average number of axles per truck	4.4	4.5	4.4
6.3	Estimated truck mass (Ton/truck)	25.3	26.0	25.7
6.4	Estimated average E80/truck	1.5	1.6	1.6
6.5	Estimated daily E80 on the road			123
6.6	Estimated daily E80 in the North direction			62
6.7	Estimated daily E80 in the South direction			61
6.8	Estimated daily E80 in the worst North lane			62
6.9	Estimated daily E80 in the worst South lane			61
6.10	ASSUMPTION on Axles/Truck (Short:Medium:Long)			(2.0 : 5.0 : 7.0)
6.11	ASSUMPTION on Mass/Truck (Short:Medium:Long)			(10.9 : 31.5 : 39.8)
6.12	ASSUMPTION on E80s/Truck (Short:Medium:Long)			(0.6 : 2.5 : 2.1)

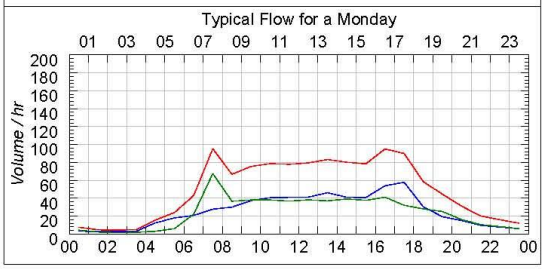
205 **Springbok East**

Typical Week Volume Report

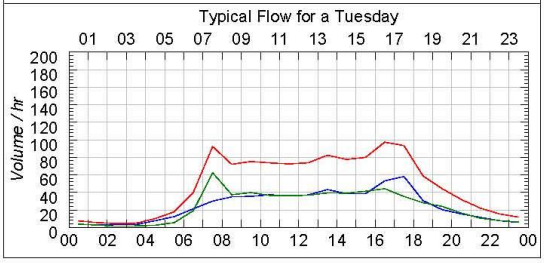
Site	: 205 - Springbok East
Region	: Northern Cape
Actual Period	: 2009/01/01 to 2009/12/31
Classification	: RSA Ext Lgt/Hvy
Day Type	: Normal Day&Fixed Public Holiday+

Total
To Pofadder
To Springbok
Total
Light
Heavy

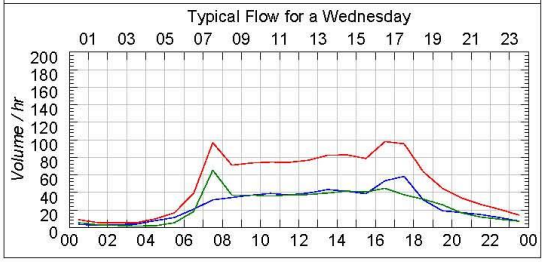
Typical Flow for a Monday



Typical Flow for a Tuesday



Typical Flow for a Wednesday



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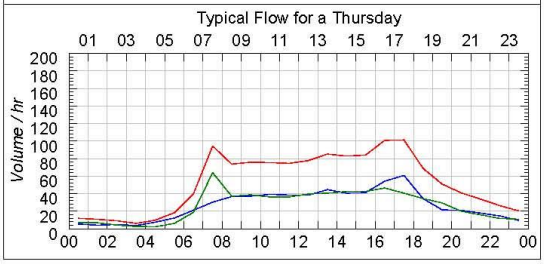

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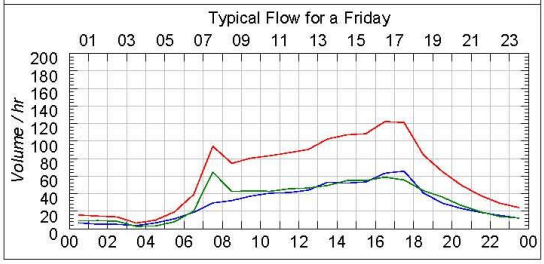

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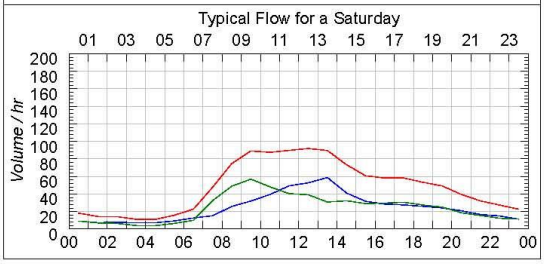
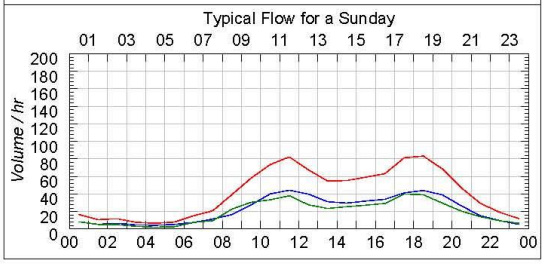
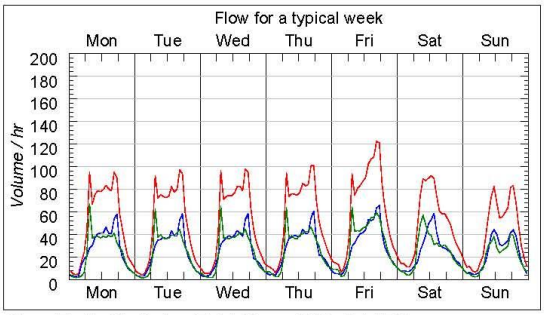
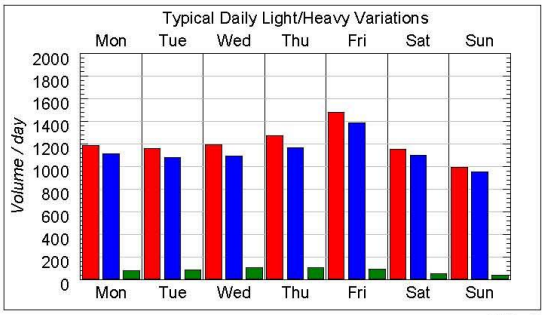


Typical Flow for a Sunday







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205 **Springbok East**

TRAFFIC HIGHLIGHTS OF SITE 205				
1.1	Site Identifier			205
1.2	Site Name			Springbok East
1.3	Site Description			Between Springbok and Pofadder
1.4	Road Description	Route : N014	Road : N014 Section : 01	Distance : 2.5km
1.5	GPS Position			17.912500E -29.654444S
1.6	Number of Lanes			2
1.7	Station Type			Permanent
1.8	Requested Period			2010/01/01 - 2010/12/31
1.9	Length of record requested (hours)			8760
1.10	Actual First & Last Dates			2010/01/01 - 2010/12/31
1.11	Actual available data (hours)			8760
1.12	Percentage data available for requested period			100.0
		To Pofadder	To Springbok	Total
2.1	Total number of vehicles	214762	210959	425721
2.2	Average daily traffic (ADT)	588	578	1166
2.3	Average daily truck traffic (ADTT)	43	41	84
2.4	Percentage of trucks	7.3	7.1	7.2
2.5	Truck split % (short:medium:long)	45 : 21 : 34	43 : 21 : 36	44 : 21 : 35
2.6	Percentage of night traffic (20:00 - 06:00)	14.6	12.4	13.5
3.1	Speed limit (km/hr)			120
3.2	Average speed (km/hr)	98.5	108.4	103.4
3.3	Average speed - light vehicles (km/hr)	99.7	109.8	104.7
3.4	Average speed - heavy vehicles (km/hr)	82.8	90.2	86.4
3.5	Average night speed (km/hr)	97.7	107.3	102.0
3.6	15th centile speed (km/hr)	79.8	85.8	81.7
3.7	85th centile speed (km/hr)	119.9	132.0	126.0
3.8	Percentage vehicles in excess of speed limit	11.9	28.8	20.3
4.1	Percentage vehicles in flows over 600 vehicles/hr	0.0	0.0	0.0
4.2	Highest volume on the road (vehicles/hr)		2010/11/05 17:00:00	169
4.3	Highest volume in the North (vehs/hr)		2010/11/26 18:00:00	103
4.4	Highest volume in the South (vehs/hr)		2010/04/01 14:00:00	98
4.5	Highest volume in a lane (vehicles/hr)		2010/11/26 18:00:00	103
4.6	15th highest volume on the road (vehicles/hr)		2010/04/01 14:00:00	150
4.7	15th highest volume in the North direction (vehs/hr)		2010/09/23 17:00:00	81
4.8	15th highest volume in the South direction (vehs/hr)		2010/12/10 17:00:00	82
4.9	30th highest volume on the road (vehicles/hr)		2010/06/04 17:00:00	142
4.10	30th highest volume in the North direction (vehs/hr)		2010/04/01 16:00:00	77
4.11	30th highest volume in the South direction (vehs/hr)		2010/04/01 18:00:00	78
5.1	Percentage of vehicles less than 2s behind vehicle ahead	3.5	3.6	3.6
6.1	Total number of heavy vehicles	15694	14993	30687
6.2	Estimated average number of axles per truck	4.3	4.4	4.4
6.3	Estimated truck mass (Ton/truck)	25.1	25.6	25.4
6.4	Estimated average E80/truck	1.5	1.5	1.5
6.5	Estimated daily E80 on the road			128
6.6	Estimated daily E80 in the North direction			65
6.7	Estimated daily E80 in the South direction			63
6.8	Estimated daily E80 in the worst North lane			65
6.9	Estimated daily E80 in the worst South lane			63
6.10	ASSUMPTION on Axles/Truck (Short:Medium:Long)			(2.0 : 5.0 : 7.0)
6.11	ASSUMPTION on Mass/Truck (Short:Medium:Long)			(10.9 : 31.5 : 39.8)
6.12	ASSUMPTION on E80s/Truck (Short:Medium:Long)			(0.6 : 2.5 : 2.1)

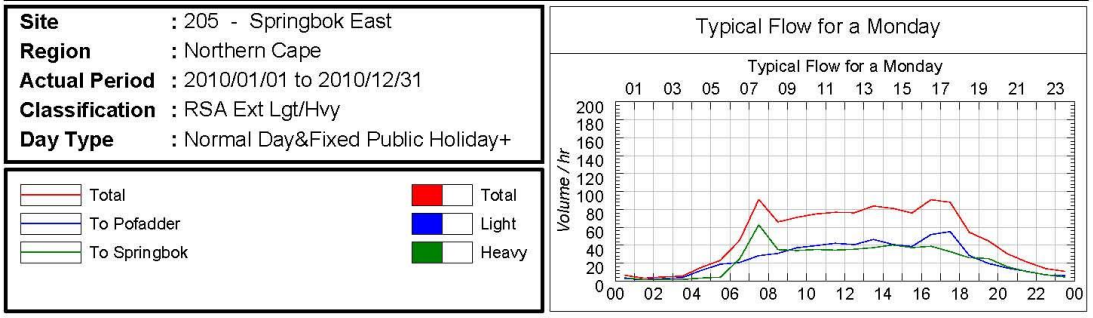
205 **Springbok East**

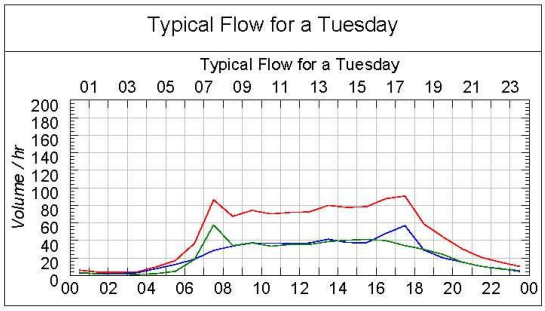
Typical Week Volume Report

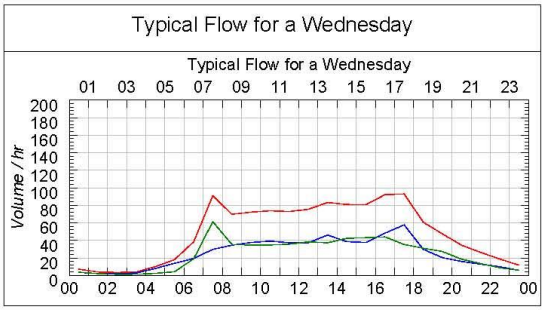
Site	: 205 - Springbok East
Region	: Northern Cape
Actual Period	: 2010/01/01 to 2010/12/31
Classification	: RSA Ext Lgt/Hvy
Day Type	: Normal Day&Fixed Public Holiday+

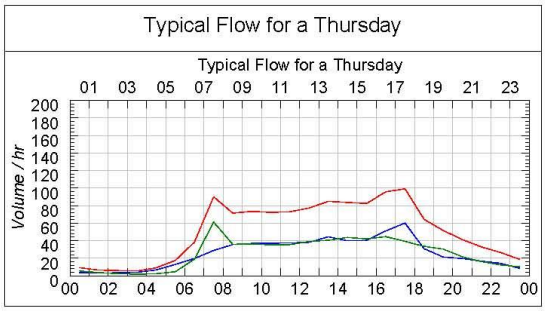
Total
To Pofadder
To Springbok

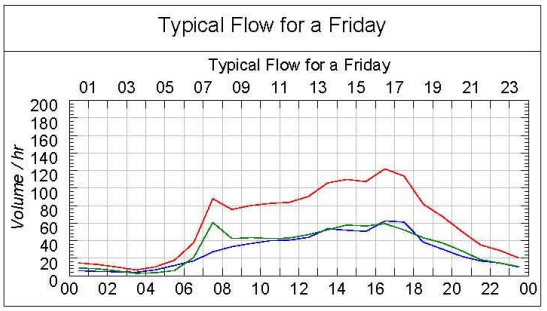
Total
Light
Heavy

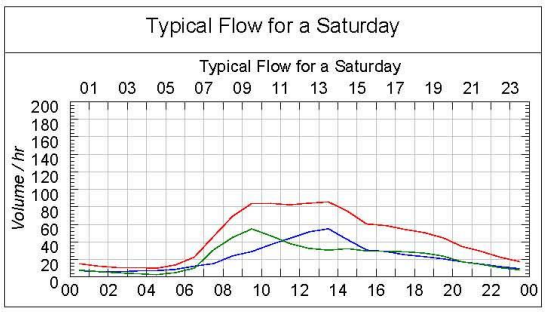


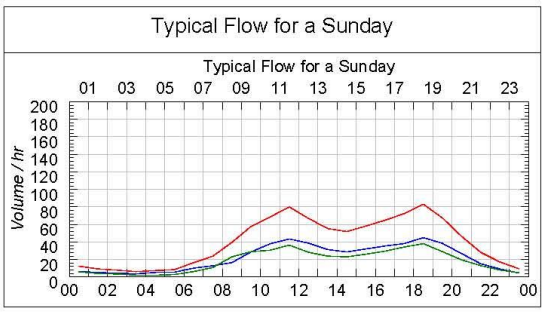


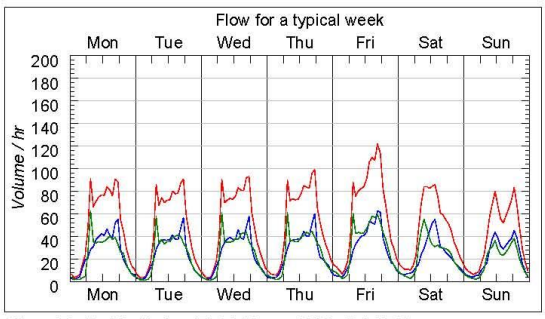


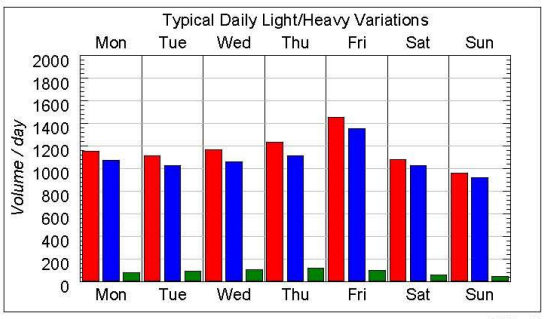












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205 **Springbok East**

TRAFFIC HIGHLIGHTS OF SITE 205				
1.1	Site Identifier			205
1.2	Site Name			Springbok East
1.3	Site Description			Between Springbok and Pofadder
1.4	Road Description	Route : N014	Road : N014 Section : 01	Distance : 2.5km
1.5	GPS Position			17.912500E -29.654444S
1.6	Number of Lanes			2
1.7	Station Type			Permanent
1.8	Requested Period			2011/01/01 - 2011/12/31
1.9	Length of record requested (hours)			8760
1.10	Actual First & Last Dates			2011/01/01 - 2011/12/31
1.11	Actual available data (hours)			8736
1.12	Percentage data available for requested period			99.7
		To Pofadder	To Springbok	Total
2.1	Total number of vehicles	220281	217548	437829
2.2	Average daily traffic (ADT)	605	598	1203
2.3	Average daily truck traffic (ADTT)	47	46	93
2.4	Percentage of trucks	7.8	7.6	7.7
2.5	Truck split % (short:medium:long)	43 : 21 : 36	41 : 22 : 37	42 : 21 : 37
2.6	Percentage of night traffic (20:00 - 06:00)	13.9	12.0	13.0
3.1	Speed limit (km/hr)			120
3.2	Average speed (km/hr)	98.5	107.9	103.2
3.3	Average speed - light vehicles (km/hr)	99.8	109.3	104.6
3.4	Average speed - heavy vehicles (km/hr)	82.8	90.2	86.4
3.5	Average night speed (km/hr)	97.4	107.7	102.1
3.6	15th centile speed (km/hr)	79.8	83.7	81.7
3.7	85th centile speed (km/hr)	119.9	132.0	126.0
3.8	Percentage vehicles in excess of speed limit	12.0	27.9	19.9
4.1	Percentage vehicles in flows over 600 vehicles/hr	0.0	0.0	0.2
4.2	Highest volume on the road (vehicles/hr)		2011/06/06 09:00:00	776
4.3	Highest volume in the North (vehs/hr)		2011/06/06 09:00:00	230
4.4	Highest volume in the South (vehs/hr)		2011/06/06 09:00:00	546
4.5	Highest volume in a lane (vehicles/hr)		2011/06/06 09:00:00	546
4.6	15th highest volume on the road (vehicles/hr)		2011/08/26 16:00:00	167
4.7	15th highest volume in the North direction (vehs/hr)		2011/11/25 17:00:00	88
4.8	15th highest volume in the South direction (vehs/hr)		2011/12/15 16:00:00	93
4.9	30th highest volume on the road (vehicles/hr)		2011/12/15 16:00:00	149
4.10	30th highest volume in the North direction (vehs/hr)		2011/09/30 17:00:00	80
4.11	30th highest volume in the South direction (vehs/hr)		2011/05/13 17:00:00	85
5.1	Percentage of vehicles less than 2s behind vehicle ahead	3.7	4.1	3.9
6.1	Total number of heavy vehicles	17196	16579	33775
6.2	Estimated average number of axles per truck	4.4	4.5	4.5
6.3	Estimated truck mass (Ton/truck)	25.6	26.0	25.8
6.4	Estimated average E80/truck	1.5	1.6	1.5
6.5	Estimated daily E80 on the road			144
6.6	Estimated daily E80 in the North direction			72
6.7	Estimated daily E80 in the South direction			71
6.8	Estimated daily E80 in the worst North lane			72
6.9	Estimated daily E80 in the worst South lane			71
6.10	ASSUMPTION on Axles/Truck (Short:Medium:Long)			(2.0 : 5.0 : 7.0)
6.11	ASSUMPTION on Mass/Truck (Short:Medium:Long)			(10.9 : 31.5 : 39.8)
6.12	ASSUMPTION on E80s/Truck (Short:Medium:Long)			(0.6 : 2.5 : 2.1)

205 **Springbok East**

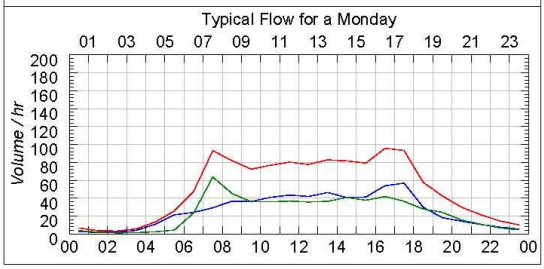
Typical Week Volume Report

Site	: 205 - Springbok East
Region	: Northern Cape
Actual Period	: 2011/01/01 to 2011/12/31
Classification	: RSA Ext Lgt/Hvy
Day Type	: Normal Day&Fixed Public Holiday+

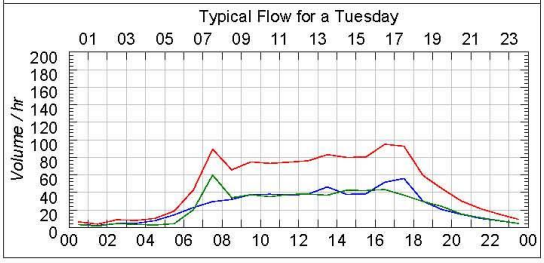
Total
To Pofadder
To Springbok

Total
Light
Heavy

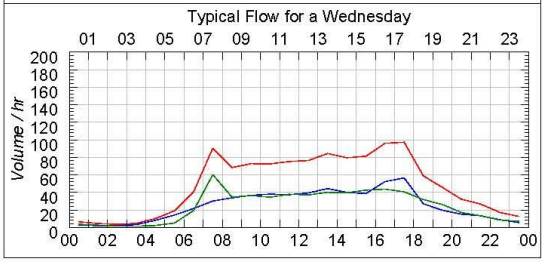
Typical Flow for a Monday



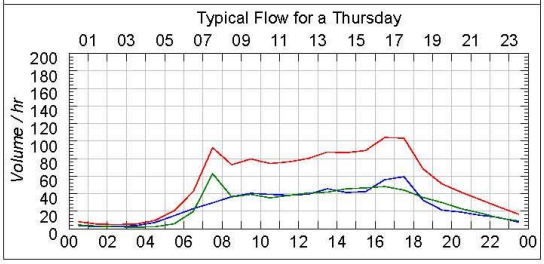
Typical Flow for a Tuesday



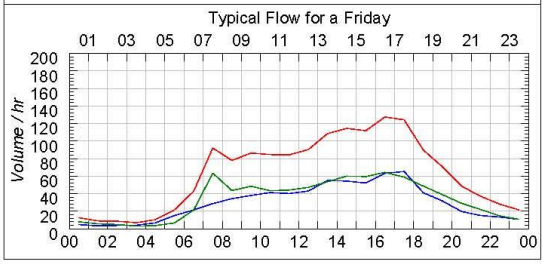
Typical Flow for a Wednesday



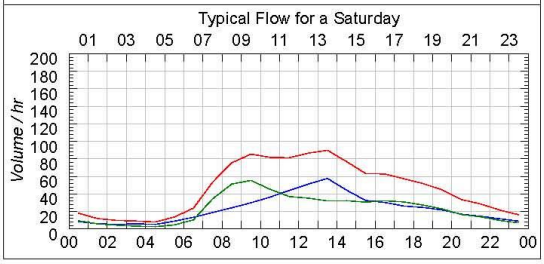
Typical Flow for a Thursday



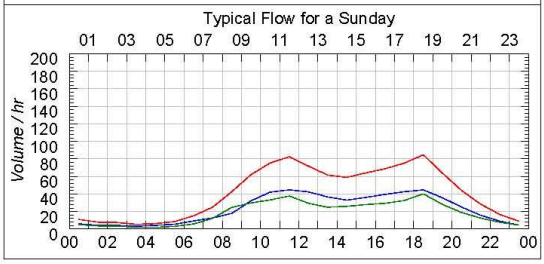
Typical Flow for a Friday

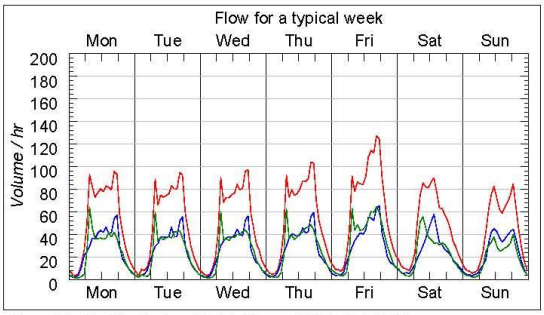


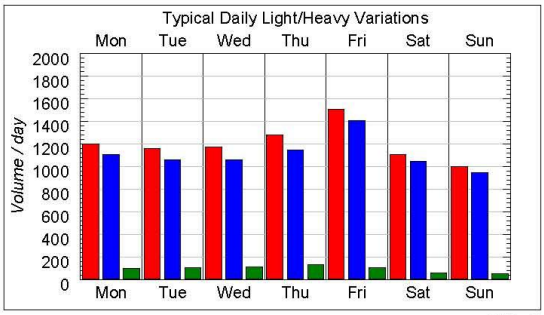
Typical Flow for a Saturday



Typical Flow for a Sunday







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Appendix B
Counting Station 206

206 **Kakamas West**

TRAFFIC HIGHLIGHTS OF SITE 206				
1.1	Site Identifier			206
1.2	Site Name			Kakamas West
1.3	Site Description			Between Pofadder and Kakamas
1.4	Road Description	Route : N014	Road : TR026 Section : 02	Distance : 119.5km
1.5	GPS Position			20.508223E -28.771084S
1.6	Number of Lanes			2
1.7	Station Type			Secondary
1.8	Requested Period			2009/01/01 - 2009/12/31
1.9	Length of record requested (hours)			8760
1.10	Actual First & Last Dates			2009/08/20 - 2009/09/09
1.11	Actual available data (hours)			477
1.12	Percentage data available for requested period			5.4
		To Kakamas	To Pofadder	Total
2.1	Total number of vehicles	5114	5573	10687
2.2	Average daily traffic (ADT)	257	281	538
2.3	Average daily truck traffic (ADTT)	36	39	75
2.4	Percentage of trucks	14.0	13.9	13.9
2.5	Truck split % (short:medium:long)	35 : 30 : 35	40 : 32 : 28	38 : 31 : 31
2.6	Percentage of night traffic (20:00 - 06:00)	10.9	10.6	10.8
3.1	Speed limit (km/hr)			120
3.2	Average speed (km/hr)	119.0	112.1	115.4
3.3	Average speed - light vehicles (km/hr)	123.1	116.2	119.5
3.4	Average speed - heavy vehicles (km/hr)	94.0	86.8	90.3
3.5	Average night speed (km/hr)	111.2	106.8	108.9
3.6	15th centile speed (km/hr)	95.8	91.7	93.7
3.7	85th centile speed (km/hr)	142.0	134.0	137.9
3.8	Percentage vehicles in excess of speed limit	48.4	34.1	41.0
4.1	Percentage vehicles in flows over 600 vehicles/hr	0.0	0.0	0.0
4.2	Highest volume on the road (vehicles/hr)		2009/08/26 17:00:00	76
4.3	Highest volume in the North (vehs/hr)		2009/08/26 17:00:00	53
4.4	Highest volume in the South (vehs/hr)		2009/08/26 09:00:00	49
4.5	Highest volume in a lane (vehicles/hr)		2009/08/26 17:00:00	53
4.6	15th highest volume on the road (vehicles/hr)		2009/08/28 14:00:00	55
4.7	15th highest volume in the North direction (vehs/hr)		2009/09/04 14:00:00	28
4.8	15th highest volume in the South direction (vehs/hr)		2009/08/31 09:00:00	33
4.9	30th highest volume on the road (vehicles/hr)		2009/09/07 12:00:00	49
4.10	30th highest volume in the North direction (vehs/hr)		2009/09/08 13:00:00	26
4.11	30th highest volume in the South direction (vehs/hr)		2009/08/25 10:00:00	30
5.1	Percentage of vehicles less than 2s behind vehicle ahead	2.3	3.0	2.7
6.1	Total number of heavy vehicles	716	772	1488
6.2	Estimated average number of axles per truck	4.6	4.4	4.5
6.3	Estimated truck mass (Ton/truck)	27.0	25.8	26.4
6.4	Estimated average E80/truck	1.7	1.6	1.7
6.5	Estimated daily E80 on the road			124
6.6	Estimated daily E80 in the North direction			61
6.7	Estimated daily E80 in the South direction			64
6.8	Estimated daily E80 in the worst North lane			61
6.9	Estimated daily E80 in the worst South lane			64
6.10	ASSUMPTION on Axles/Truck (Short:Medium:Long)			(2.0 : 5.0 : 7.0)
6.11	ASSUMPTION on Mass/Truck (Short:Medium:Long)			(10.9 : 31.5 : 39.8)
6.12	ASSUMPTION on E80s/Truck (Short:Medium:Long)			(0.6 : 2.5 : 2.1)

Mikros Traffic Monitoring (Pty) Ltd (012) 804-1710 206 - 1

206 **Kakamas West**

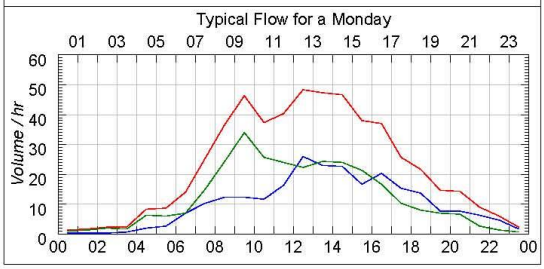
Typical Week Volume Report

Site	: 206 - Kakamas West
Region	: Northern Cape
Actual Period	: 2009/08/20 to 2009/09/09
Classification	: RSA Ext Lgt/Hvy
Day Type	: Normal Day&Fixed Public Holiday+

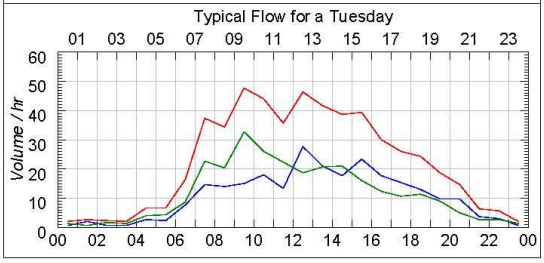
Total
To Kakamas
To Pofadder

Total
Light
Heavy

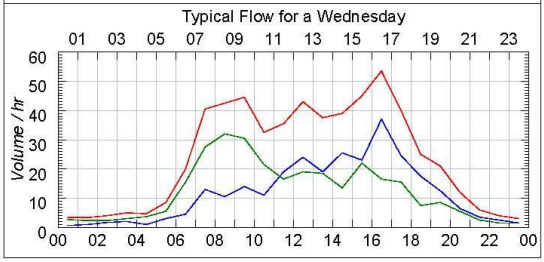
Typical Flow for a Monday



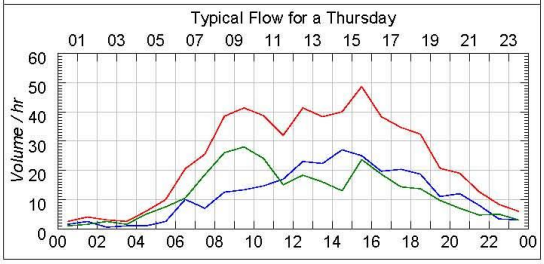
Typical Flow for a Tuesday



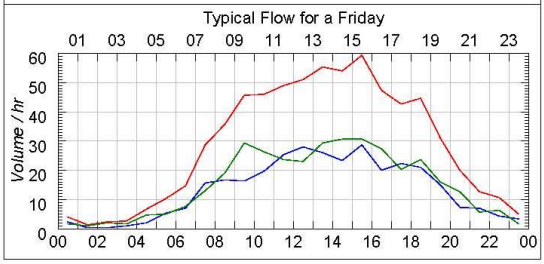
Typical Flow for a Wednesday



Typical Flow for a Thursday



Typical Flow for a Friday



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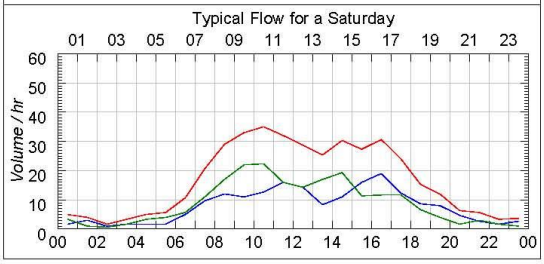
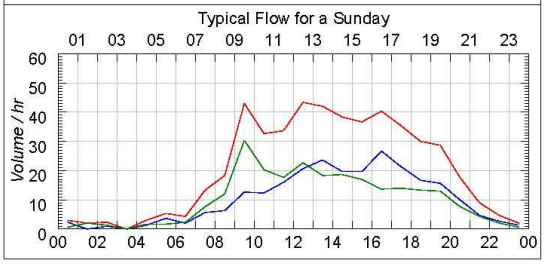
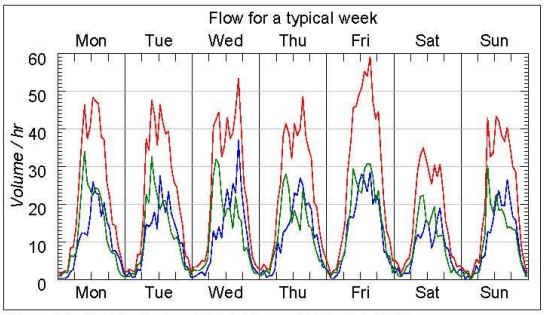
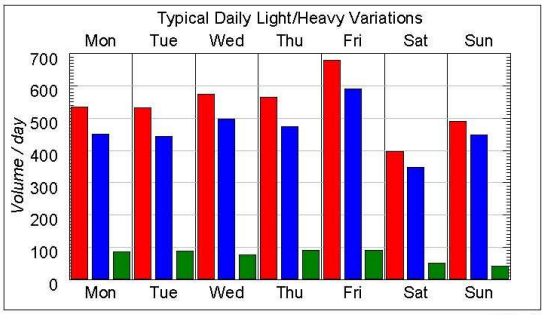


Typical Flow for a Sunday







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APPENDIX 8: ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

confidential
Kilpatrick Archer
Actis
Mar 21, 2019 11:02

PROPOSED DEVELOPMENT OF A PHOTO-VOLTAIC SOLAR POWER GENERATION PLANT ON PORTION 6 OF THE FARM KONKOONSIES 91 NEAR POFADDER IN THE NORTHERN CAPE

For:

BioTherm Energy (Pty) Ltd

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT (EMPR)

NEAS Reference: DEA/EIA/0000529/2011
DEA EIA reference number: 12/12/20/2443

Version 1: April 2013

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Mar 21, 2019 11:02

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT (EMPR)

FOR

PROPOSED DEVELOPMENT OF A PHOTO-VOLTAIC SOLAR POWER GENERATION PLANT ON PORTION 6 OF THE FARM KONKOONSIES 91 NEAR POFADDER IN THE NORTHERN CAPE

NATIONAL DEPARTMENT OF ENVIRONMENTAL AFFAIRS REFERENCE NUMBER: 12/12/20/2443

AND

NEAS REFERENCE NUMBER: DEA/EIA/0000529/2011

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Version 1: April 2013

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ABBREVIATIONS

BEP: Best Environmental Practice
BPEO: Best Practicable Environmental Option
CPV: Concentrated Photovoltaic
DAFF: Department of agriculture Fisheries and Forestry
DEA: Department of Environmental Affairs
DWA: Department of Water Affairs
EA: Environmental Authorisation
EAP: Environmental Assessment Practitioner
ECO: Environmental Control Officer
EO: Environmental Officer
EIA: Environmental Impact Assessment
EMPr Environmental Management Programme Report
IAPs: Interested and Affected Parties
IEM: Integrated Environmental Management (philosophy)
IEO: Internal Environmental Officer
IUCN: International Union for Conservation of Nature and Natural Resources
LED Local Economic Development
NCDENC Northern Cape Department of Environment and Nature Conservation
NCR: Non-conformance Reporting
NEMA: National Environmental Management Act, No. 107 of 1998
NERSA: National Energy Regulator of South Africa
Project Company: Biotherm Energy (Pty) Ltd
PSM: Project/Site Manager
RDL: Red Data Listed
Regulations: Regulations GN R.453, R.454, 455 and R.456 (18 June 2010), as amended. promulgated in terms of Section 24(5) read with Section 44, and Sections 24 and 24D of the National Environmental Management Act, 1998
SABS: South Africa bureau of Standards
WULA: Water Use Licence Application

GLOSSARY OF TERMS

Alternatives: Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternatives.

Archaeological material: Remains resulting from human activities which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures

Cumulative impacts: The impacts of an activity that in itself may not be significant, but may become significant when added to the existing and potential impacts eventuating from similar diverse activities or undertakings in the area

Direct impacts: Impacts that are caused directly by the activity and generally occur at the same time and at the same place of the activity (e.g. noise generated by blasting operations on the site of the activity). These impacts are usually associated with the construction, operations or maintenance of an activity and are generally obvious and quantifiable.

Early Stone Age: A very early period of human development dating between 300 000 and 2.6 million years ago.

Endangered species: Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included here are taxa whose numbers of individuals have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

Endemic: An "endemic" is a species that grows in a particular area (is native to that region) and has a restricted distribution. It is only found in a particular place. Whether something is endemic or not depends in the geographical boundaries of the area in question and the area can be defined at different scales.

Environment: A holistic definition of the term "environment" is adopted, that includes biophysical, social and economic components, as well as the connections within and between these components.

Environmental impact: An action or series of actions that have an effect on the environment.

Environmental Impact Assessment: Environmental Impact Assessment, as defined in the NEMA EIA Regulations, is a systematic process of identifying, assessing and reporting environmental impacts associated with an activity.

Environmental management: Ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.

Environmental Management Programme: An operational plan that organises and coordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a proposal and its on-going maintenance after implementation.

Heritage: That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resource Act of 2000).

Indigenous: All biological organisms that occurred naturally within the study area prior to 1800.

Indirect impacts: Indirect or induced changes that may occur as a result of the activity (e.g. the reduction of water in a stream that supplies water to a reservoir that supplies water to the activity). These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken, or that occur at a different place as a result of the activity.

Interested and affected party: Individual or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups and the public.

National Integrated Resource Plan: Commissioned by NERSA in response to the National Energy Policy with objectives relating to affordable energy services, in order to provide a long term, cost effective resource plant for meeting electricity demand, which is consistent with reliable electricity supply and environmental, social, and economic policies.

Photovoltaic cell: Semiconductors which absorb solar radiation to produce electricity.

Photovoltaic effect: Electricity can be generated using photovoltaic panels (semiconductors) which are comprised of individual photovoltaic cells that absorb solar energy to produce what is referred to as the Photovoltaic Effect.

Rare species: Taxa with small world populations that are not at present endangered or vulnerable, but are at risk as some unexpected threat could easily cause a critical decline. These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range.

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

Significant impact: An impact that by its magnitude, duration, intensity, or probability of occurrence may have a notable effect on one or more aspects of the environment.

1. INTRODUCTION

BioTherm Energy (Pty) Ltd is proposing to develop a commercial photo-voltaic (PV) solar power facility on Portion 6 of the farm Konkoonsies 91 approximately 36 km's north- west of the town of Pofadder in the Northern Cape Province. The proposed development will be referred to as the Konkoonsies II PV Solar Energy Facility. The Konkoonsies I solar facility is located within the area assessed as part of the environmental assessment and has recently reached financial close (DEA Ref: 12/12/20/2098/1) and will begin construction so as to reach commercial operations by the end of December 2013.

The proposed project would entail the development of a Photo-voltaic (PV) solar power plant up to 267 hectares in extent with a generation capacity of approximately 133 MW, covering the entire feasible area. The final capacity would be dependent on the continuing development of photovoltaic technologies, as more efficient modules may become available by the time that the project would begin construction. The development footprint can however not exceed 267 hectares; however the generation capacity may vary based on the availability of more efficient PV panels. The IPP Procurement programme currently allows for a maximum export capacity of 75 MW per individual solar PV project that is bid into the Department of Energy's REIPP programme. The available generation capacity allocation issued by Eskom will determine if the site can ultimately be developed in multiple phases.

The Environmental Impact Report presented a comprehensive assessment of the anticipated environmental impacts over the full life-cycle of the proposed Konkoonsies II PV facility on Portion 6 of the farm Konkoonsies 19. Table 1-1 contains a summary of the environmental impact assessment significance rating. The project could potentially result in direct and indirect negative and positive impacts of significance in the absence of appropriate environmental management solutions. The environmental assessment practitioner's (EAP's) however, believes that appropriate/feasible mitigation is readily available to the proponent that would effectively reduce the significance of potentially negative impacts to within acceptable levels. These impacts and mitigation measures that are assessed as part of this detailed Environmental assessment report (EIR) have been incorporated into this EMPr. This report, once approved by the DEA, will be the Konkoonsies II PV Solar Energy Facility's formal plan to manage the development and associated environment in an appropriate and responsible manner.

Table 1-1: Tabular Summary of Impact Assessment

Aspect	Impact Significance (No mitigation)	Impact Significance (mitigation)
Construction & Operation		
Fauna & Flora	Moderate (-)	Low (-)
Waste Generation	Low (-)	Low (-)
Ground/Surface water		
• Ground and Surface Water Quality	Moderate (-)	Low (-)
• Surface Water Runoff (During construction & Operation	Low (-)	Negligible (-)
Heritage	Low (-)	Negligible (-)
Soil & Agricultural Potential		
• Impacts on current land capability/land-use	Negligible (-)	Negligible (-)
• impacts in respect of potential for alternative land-use	Negligible (-)	Negligible (-)
Visual	Moderate (-)	Moderate (-)
Traffic	Negligible (-)	Negligible (-)

Socio Economic		
• Negative impacts on Socio Economics (mainly during Construction)	Moderate (-)	Low (-)
• **Positive** Impact on Socio Economics	**Moderate (+)**	**Moderate (+)**

This document is compiled to meet the requirements for the development of an environmental management programme, in terms of Regulation 33 of the 2010 EIA Regulations under the National Environmental Management Act, 1998 (Act No 107 of 1998)[NEMA], as amended.

In addition to the above, this Environmental Management Programme report (EMPr) is compiled in accordance with the Integrated Environmental Management (IEM) philosophy which aims to achieve a desirable balance between conservation and development (DEAT, 1992). IEM prescribes a methodology for ensuring that environmental management principles are fully integrated into all stages of the development process. It advocates the use of several environmental management tools that are appropriate for the various levels of decision-making. One such tool is an EMPr.

The IEM guidelines encourage a pro-active approach to sourcing, collating and presenting information in a manner that can be interpreted at all levels. The basic principles underpinning IEM are that there be:

- informed decision-making;
- accountability for information on which decisions are based;
- accountability for decisions made;
- a broad meaning given to the term environment (i.e. one that includes physical, biological, social, economic, cultural, historical and political components);
- an open, participatory approach in the planning of proposals;
- consultation with interested and affected parties;
- due consideration of alternative options;
- an attempt to mitigate negative impacts and enhance positive aspects of proposals;
- an attempt to ensure that the 'social costs' of development proposals (those borne by society, rather than the facility) be outweighed by the 'social benefits' (benefits to society as a results of the actions of the facility);
- democratic regard for individual rights and obligations;
- compliance with these principles during all stages of the planning, implementation and decommissioning of the proposals (i.e. from 'cradle to grave'); and
- the opportunity for public and specialist input in the decision-making process.

This EMPr is compiled using the following concepts and implementation requirements, so that the higher principles of sustainable development are realised:

- **Continuous improvement.** The project proponent (or implementing organisation) must commit to review and to continually improve environmental management, with the objective of improving overall environmental performance.
- **Broad level of commitment.** A broad level of commitment is required from all levels of management as well as the workforce in order for the development and implementation of this EMPr to be successful and effective.
- **Flexible and responsive**. The implementation of the EMPr must respond to new and changing circumstances, i.e. rapid short-term responses to problems or incidents. The EMPr is a dynamic "living" document and thus regular planned review and revision of the EMPr must be carried out.

- **Integration across operations**. This EMPr must integrate across existing line functions and operational units such as health, safety and environmental departments in a company/project. This is done to change the narrow mind-set of seeing environmental management as a single domain unit.
- **Legislation.** It is understood that any development project, during its construction phase is a dynamic activity within a dynamic environment. The Proponent, Engineer, Contractor and Sub-contractor must therefore be aware that certain activities conducted during construction may require further licensing or environmental approval, e.g. river or stream diversions, bulk fuel storage, waste disposal, etc. The Contractor must consult the ER, EO and ECO on a regular basis in this regard.

1.1 BACKGROUND

1.1.1 PHOTOVOLTAIC SOLAR FACILITIES

Photovoltaic power production has been doubling roughly every 2 years, increasing by an average of 48% each year since 2002, making it the world's fastest-growing energy technology. The volume of new grid-connected PV capacities world-wide rose from 16 GW in 2010 to 27 GW in 2011. This increased the total installed PV capacity world-wide to over 67 GW at the end of 2011. Roughly 90% of PV generating capacity consists of grid-tied electrical systems. Such installations may be ground-mounted (and sometimes integrated with farming and grazing) or built into the roof or walls of a building, known as Building Integrated Photovoltaics. Due to the growing demand for renewable energy sources, the manufacturing of solar cells and photo-voltaic modules has advanced dramatically in recent years.

Photovoltaics (PVs) are materials that convert solar radiation directly into electricity. Photovoltaic solar cells are divided into two distinct groups: Traditional crystalline silicon solar cells and thin film solar cells. The absorbed solar radiation excites the electrons inside the cells and produces what is referred to as the photovoltaic effect. The crystalline silicon solar cells are made from monocrystalline or polycrystalline silicon. The thin film technologies are comprised of thinner layers of semiconductor material which are produced using a splutter process. Photovoltaic solar power plants comprise of solar modules connected together to form solar arrays for the production of electricity. Direct current electricity is produced from the solar array which in turn is connected to inverters for conversion to alternating current. Power from the inverters is then stepped up via transformers to voltages suitable for injection into the national grid for distribution to consumers.

Solar power plants can either have fixed tilt systems or tracking systems as shown in the diagrams below. Modules in a fixed tilt system are mounted at an optimised angle facing the sun. With tracking systems, the surface of the arrays is moved to follow the sun resulting in large radiation gains. Systems can be set to track the sun's daily path and/or its annual path.

The proposed project may potentially also use Concentrated Photovoltaic (CPV). CPV systems are very unique because they concentrate sunlight though a lens onto high performance solar cells and by doing so, increase the electricity generated. These CPV panels are mounted on tracking systems as to maximise the collection of energy from the sun. The concentrated light improves the efficiency of the cells and reduces the amount of expensive solar cell material needed to produce a specific amount of electricity. Some of these CPV panels can generate twice as much power per hectare in comparison with

conventional solar panel technology. Certain designs of CPV use 23.5 meter wide panels with more than 1000 pairs of lenses and solar cells on each. CPV panels are mounted on a dual axis system and installed with tracking systems to follow the sun throughout the day.

Photovoltaic (PV) arrays can be up to several hundred hectares in spatial extent. The panels are mounted on metal structures that are fixed into the ground, either through a concrete foundation or a deep seated screw. Central inverters are wired to sections of the PV field, which can have a rated power of 500 kW-1250 kW each. The inverter is a pulse width mode inverter that converts DC current to AC current at grid frequency. A typical central inverter rated at 500 kW has a size of approximately 3 m x 2.5 m x 1 m and an output voltage of 480 V Alternating Current (AC).

The grid connection requires transformation of the voltage from 480 V up to between 22,000 V and 400 000 V depending on the existing infrastructure. The normal components and size of a distribution rated electrical substation is also required. Tracking Arrays comprise of one (single axis) or two (dual –axis) motors and a sun sensor used to track the sun. The motors usually contain gears and moving parts that need greasing from time to time.

1.1.2 SUMMARY OF THE PHOTOVOLTAIC FACILITY

The solar power generation facility is proposed to accommodate an array of photovoltaic (PV) panels with a generation capacity of approximately 133 MW, depending on the specific technology, covering the entire feasible area of the site (267 hectares). The study area was assessed in detail and the entire feasible area for development has been determined based on the assessment (See Appendix 1). Approximately 1.5 – 2 hectares are required per MW of installed PV panels. The following infrastructure is required for the establishment of PV solar facilities:

- Foundations to support the PV panels.
- The plant consists of arrays of photovoltaic (PV) panels: The panels are placed in number rows with a buffer from the boundary fence and access roads in between the each row. Panels will have a junction box located below the rows where all connections between rows meet up. Underground cables run from this box to the inverter/transformer house at 400 V-1000 V Direct Current (DC).
- Panels will be placed on a fixed rotating structure, which is done to ensure up and down movement to ensure maximum absorption of solar radiation. Each of these arrays of panels is expected to be approximately 3 m in height for fixed arrays to 9m for tracking systems.
- Access and inside roads/paths – An access road to the site as well as internal roads between the PV arrays would need to be constructed.
- Trenching – all DC and AC wiring within the PV plant must be buried underground. Trenches will have a river sand base, space for pipes, backfill of sifted soil and soft sand and concrete layer where vehicles will pass. Cable trenches will be approximately 600 mm (0.6 m) deep and 400 mm (0.4 m) wide and backfilled with sand. Manhole covers will be placed every 40 m or at each direction change. A concrete slab will be placed where vehicles pass over cable trenches.
- Inverter/transformer building-- 6 m X 3 m brick buildings located within the PV array each containing an inverter and a step up transformer will be constructed in the plant. The number of buildings will be dependent on the size of plant and inverters chosen. Alternatively a pre-packaged inverter/transformer housed in a concrete substation for outdoors can be utilised.

- Combined guard house/ control room – One (1) brick building of approximately 100m^2 on the perimeter of the plant. Guardhouse will include a small kitchen and toilet. Building will include a storeroom for spare parts kept onsite. The control room will contain switchgear and monitoring equipment for the PV plant. The buildings will be a standard height of approximately 3 m.
- Connection to grid: The grid connection requires transformation of the voltage from 480 V to between 22,000 V and 400,000 V depending on the available infrastructure. The normal components and size of a distribution rated electrical substation will be required.
- A small switching station for the plant will be located on the outside of the control room.

1.1. ACTIVITIES PROPOSED DURING DEVELOPMENT STAGES OF THE PROJECT

1.1.1. CONSTRUCTION PHASE

The physical construction (footprint) of the PV facility will cover the entire feasible area of the site identified through the EIA. An approved solar facility of 10 MW capacity , which is about to begin constructionis located within the study (DEA Ref: 12/12/20/2098/1) (see Appendix 1) This feasible area was only determined after all relevant specialist work and other environmental factors have been considered (see Appendix 1)

There will be approximately 100-200 construction workers on site. Majority of the construction workers will be sourced from local communities and will be transported to the site during construction. The typical procedures for the construction phase of the PV facility are as follows:

- Establishment of access roads: During the construction period internal roads need to be established; however these roads will only be temporary. There are a number of permanent roads that need to be established for operation and will be gravel based. Existing roads will be used where possible.
- Preparation of the site: Vegetation would need to be cleared for the footprint of the infrastructure as well as for the access roads to the site/internal roads and the laydown of the yard, etc. Topsoil stripping from the construction of access roads and infrastructure would need to be stockpiled and used to rehabilitated areas of the construction footprint.
- Transportation of equipment and components to the site: The main component of the proposed facility would be transported by road to the site. Excavators, graders, trucks and compacting equipment will need to be brought to the site.
- Establishment of workshops, temporary laydown areas and construction camps: Once all the equipment has been brought to the site a dedicated laydown and equipment camps will be established. Fuel will be stored on site during construction; appropriate mitigation measures must be employed to ensure no pollution occurs as a result.
- Construction of the PV array: The foundations for the PV panel array will be excavated. Another option would be to use a ramming system for the support structure which does not require excavation but is dependent on the geotechnical condition of the ground. Concrete and aggregates would need to be brought to the site. Trenches would also need to be excavated for underground connection of the panels to the inverters and subsequently to the plant substation.
- Site rehabilitation: Removal of all construction equipment from the site and rehabilitation of areas where reasonable and practical.

1.1.2. OPERATIONAL PHASE

The PV solar facility operational lifespan is estimated at approximately 20-25 years. The facility would create many permanent employment opportunities ranging from for skilled to unskilled individuals. The typical activities during the operational phase would be as follows:

- Operation of the electrical infrastructure and PV panels: Incoming solar radiation will be converted by the PV panels into electrical energy; associated inverters will convert this electrical energy into alternating current. This alternating current will be stepped up via transformers to grid voltage and transmitted via overhead cables to the Paulputs substation. Electrical and mechanical routine maintenance will also be carried out. Regular cleaning of the panels is also required and very labour intensive.
- Cleaning of PV panels using water: The major maintenance of the PV plant is that it requires quarterly cleaning with water to remove dust from the panels. The water will temporarily be stored in tanks on site. Water will be sources under existing agreements between the project company and the local municipality (refer to Appendix 2). The option to abstract groundwater for these purposes also available. The panels would need to be cleaned of dust quarterly. The water requirements for the facility would be approximately 2500 m³ per annum.
- Site security: Security will be stationed 24 hours a day on the site. The entire development area would have to be fenced off and security cameras installed.

1.2 ADMINISTRATIVE INFORMATION

The following section and associated set of tables provide pertinent administrative information pertaining to the Project Company's associated development/lease area, as well as the environmental assessment practitioner who developed the EMPr (Table 1-2 to Table 1-4 to Table 1-5).

Table 1-2: Name and Address of the Proponent.	
Owner and Name of Facility	BioTherm Energy (Pty) Ltd
Company Registration	2003/0202443/70
Physical Address	Building 1, Leslie Ave East Design Quarter District Fourways Johannesburg
Postal Address	Same as above
Telephone	011 367 4600
Fax	011 367 4601
Director	Mr Werner Engelbrecht

Table 1-3: Details of facilities Environmental Control Officer (ECO0	
Name	TBD
Physical Address	TBD
Postal Address	TBD
Telephone	TBD
Fax	TBD
Email	TBD

Table 1-4: Details of EAP	
Name of Company	EScience Associates (Pty) Ltd.

Contact Person	Mr. Roelof Letter
Postal Address	PO Box 2950 Saxonwold 2132 JHB
Physical Address	9 Victoria Street Oaklands 2192 JHB
Telephone	(011) 718 6380
Fax	086 512 5681
Email	roelof@escience.co.za
Qualifications	BSc. (Hons) Environmental Management,

Table 1-5: Surface Rights and Title Deed Description Relevant to the relevant farm portions.

Farm Name	Surveyor General SG code.	Surface Rights
Portion 6 of the Farm Konkoonsies 91	C03600000000009100006	Gloudina Maria van der Heever
Portion 4 of the Farm Scuit-Klip 92	C03600000000009200004	Gerhard Visser

1.3 LAND TENURE AND ADJACENT LAND USE

.Table 1-6: Neighbouring Towns

Town	Distance/Direction
Pofadder	Approximately 36 km south west of the facility in the Northern Cape
Onseepkans Border post	Approximately 30km north west of the facility in the Northern Cape
Kakamas	Approximately 103 km east of the facility in the Northern Cape

1.4 PLANNED LIFE OF THE FACILITY

The proposed PV facility is expected to be decommissioned after 20 -25 years of operation, with the option to repower if economically viable. If the economic life is extended this would mostly involve disassembling of components and installing more appropriate technologies of the time; however if it is decided to close the facility, the site would need to be prepared to accommodate the relevant decommissioning activities.

If the facility is to be decommissioned it would most likely be followed by disassembling of all the individual components of the entire plant. All materials that can be recycled/ reused would be identified and responsibly managed. All foundation materials and associated infrastructures would need to be removed and disposed of at an appropriate location.

Once the entire facility has been removed the area should be reshaped and re-vegetated so as to ensure that the environment is rehabilitated to a condition similar to before construction of the facility began. Decommissioning and closure would therefore be required as per Table 2-13; this plan should also be approved by DEA before commencement.

2. ENVIRONMENTAL MANAGEMENT PROGRAMME

In terms of The Constitution of the Republic of South Africa (Act No. 108 of 1996), everyone has the right to, "*an environment that is not harmful to their health or well-being and to have the environment protected, for benefit of present and future generations, through reasonable legislation and other measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development and use of natural resources while prompting justifiable economic and social development*". The needs of the environment, as well as Interested and Affected Parties (IAPs) should thus be integrated into overall project management. This EMPr provides a tool for meeting this objective by providing detailed mitigation and management commitments by Project Company for the project in question.

The environmental mitigation tables to follow provide the management measures recommended to manage the potential impacts rated in the EIA. In addition to the management measures, the tables prioritize the commitments (either prior to a phase, during a phase and/or on-going) and indicate the person responsible to ensure that these commitments are adhered to and implemented.

The Proponent has assessed these commitments and will be requested to sign off on the same. (Please refer to section 8)

2.1 LEGISLATION

The environmental component of the project will comply with the requirements of, *inter alia*, the following legislation (and relevant Regulations promulgated hereunder):

- Constitution of South Africa (Act No. 108 of 1996);
- The National Environmental Management Act (Act No. 107 of 1998), as amended;
- The National Water Act (Act No. 36 of 1998);
- National Forests Act, Act 84 of 1998 (NFA);
- Northern Cape Nature Conservation Act, Act 9 of 2009 (NCNCA),
- The Conservation of Agricultural Resources Act (Act No.43 of 1983);
- The Hazardous Substances Act (Act No. 15 of 1973);
- The National Heritage Resources Act (Act No. 25 of 1999); and
- The National Environmental Management: Biodiversity Act (Act No. 10 of 2004).

2.2 ROLES AND RESPONSIBILITIES

It is the responsibility of Project Company to ensure that the commitments made in this chapter are realised. Facility Management needs to make sure that not only are sufficient funds set aside for this, but that a suitable management and working structure is in place. This includes a system whereby all employees, contractors, sub-contractors and anyone delivering a service to the solar plant, is made aware and forced to abide by the commitments in this chapter.

2.2.1 THE PROJECT PROPONENT (THE PROJECT COMPANY)

The Project Company will be responsible for the overall implementation, monitoring and enforcement of the activities as outlined in the EMPr. The project manager, or other senior designate from the Project Company, will be responsible for overseeing that environmental compliance and monitoring is performed, and will undertake all correspondence with the relevant authorities.

The Project Company remains ultimately responsible for ensuring that all activities are implemented according to the provisions of the EMPr and all conditions of relevant

licences/permits/approvals/authorisations. Although specific role-players will be appointed by the Project Company to perform certain functions on its behalf, the ultimate responsibility is not delegated. The Project Company has to ensure that sufficient resources (time, financial, human, equipment, etc.) are available to these other parties to effectively perform their tasks in terms of the EMPr. Because the Project Company is liable for restoring negligent damage caused to the environment, each member of staff has to be responsible and accountable for compliance as per the EMPr.

2.2.2 PROJECT/SITE MANAGER (PSM)

The Project Company must appoint/designate a senior representative as Project/Site Manager (PSM) to act on its behalf. The duties of this representative, as relevant, would include:

- Ensure that the EMPr is part of all relevant contractual documentation so that any contractors are bound to the conditions of the EMPr and relevant licences, permits/approvals/authorisations;
- Monitor the undertaking of environmental awareness training for all new personnel coming onto the site, or undertake environmental awareness courses themselves;
- Appoint an Internal Environmental Officer (IEO) to assist with day-to-day EMPr implementation and monitoring duties if required;
- Ensure that the necessary licenses, environmental authorisation and permits have been obtained and are maintained;
- Comply with the contents of the EMPr to ensure that the requirements of the EMPr are met;
- Monitor and verify that the EMPr is adhered to at all times and take action if the specifications are not followed;
- Monitor and verify that environmental impacts are kept to a minimum;
- Review operational procedures in conjunction with the IEO;
- Assist the IEO in finding environmentally responsible and effective solutions to any problems encountered during implementation;
- Inspect the site and surrounding areas from time to time; and
- Monitor, review and verify compliance with the EMPr as reported by the IEO.

2.2.3 INTERNAL ENVIRONMENTAL OFFICER (IEO)/(PRACTITIONER)

The Project Company Internal Environmental Officer/Manager (IEO) will be responsible for monitoring, reviewing and verifying compliance with the EMPr on a day-to-day basis. This role may be fulfilled by any suitably qualified and responsible representative involved with daily on-site operations (e.g. Environmental Manager/Officer/Practitioner). In particular, the IEO shall:

- Regularly inspect and continuously monitor the site to ascertain the level of compliance with the EMPr;
- During the construction phase, the IEO must oversee all the environmental aspects relating to the development and provide auditing of compliance with the EMPr;
- Maintain inspection reports on file;
- Monitor and verify through bi-annual audits that the EMPr is adhered to at all times and take action if the specifications are not followed;
- Monitor and verify that environmental impacts are kept to a minimum;
- Assist Project Company in finding environmentally responsible solutions to problems;
- Keep records of all activities/incidents concerning environment performance;
- Keep a register of complaints from IAPs;

- Provide material/manuals and support for raising environmental awareness of staff;
- Ensure that activities on site comply with legislation of relevance to the environment;
- Liaise with relevant authorities;
- Liaise with contractors regarding environmental management;
- Complete checklists as necessary; and
- Continually, internally review the EMPr and submit monthly reports to the PSM.

a) Liaison with Authorities

The IEO would be responsible for liaising with all relevant competent authorities (NCDENC, DEA, DAFF and DWA). The IEO would be responsible for submitting annual Environmental Audit Reports on the activities related to the proposed activities to these departments. These audit reports will be based on the mitigating measures recommended and will include a description of the general state of the site, with specific reference to problem areas and areas of non-compliance. A record of all audits and communications with the authorities must be kept by the IEO.

b) Liaison with Contractors

The IEO will be responsible for informing the contractors of any decisions that are taken concerning the natural and social environment during the project activities. This would also include informing the contractors of the necessary corrective actions to be taken against employees transgressing the management activities stipulated in this EMPr.

2.2.4 ENVIRONMENTAL CONTROL OFFICER (ECO)

It is recommended that an independent Environmental Control Officer (ECO) be appointed by Project Company to oversee relevant environmental aspects relating to this development for the construction phase. He/she would need to conduct internal audits during construction every six months to assess compliance with the EMPr and be responsible for providing feedback on potential environmental problems associated with the activities on site. The ECO will also be responsible for undertaking an annual external audit for submission to the relevant competent authority/authorities.

The ECO will:

- Assist the IEO in ensuring that necessary waste license and other relevant licenses/permits/approvals/authorisations have been obtained;
- Undertaking routine monitoring and/or appointing a competent person/institution to be responsible for specialist monitoring, if necessary;
- Undertake independent audits with regards to compliance with the EMPr;
  Compile audit reports identifying areas of non-compliance and proposals for rectification thereof; and
  Assist Project Company in achieving and maintaining first-rate environmental management practices.

2.3 MONITORING, AUDITING, RECORDING, REPORTING AND UPDATING

An essential aspect of any EMPr is the review process. This includes monitoring, auditing, record keeping, reporting and updating. The findings of the review process can inform planning of the PV facility, allowing future operations to benefit from the experiences of the past.

2.3.1 MONITORING

Monitoring needs to be kept to a manageable task and therefore needs to target the most important instructions in the EMPr, where the risk of environmental damage is the greatest. Monitoring needs to include both a routine aspect and allow for erratic or unpredictable events, such as floods or human caused incidents (spills, etc.). Some routine monitoring can be done at varied intervals (e.g. alien vegetation observations).

2.3.2 AUDITING

Auditing (of performance assessments) can be done internally, or by an external party. Internal audits are recommended but optional, whilst an external audit is essential, as it provides an unbiased report on the implementation of the EMPr. An audit can be a thorough audit of every single instruction in the EMPr, or a strategic sample of the most important instructions, but it must be made clear which type of audit is being done.

Audits must include the following three key investigation techniques:

- Document review, including previous audit reports, technical reports, monitoring data, etc.;
- Interviews with staff (not only the Environmental Manager); and
- Site visit or walkabout.

An audit must always be documented in a report that contains observations/findings and recommendations. It is recommended that an external audit be conducted at least annually on the EMPr.

2.3.3 RECORD KEEPING

Record keeping must be done in such a way that all information generated can be accessed easily in the future. The information must also be clearly marked or labelled so that it is obvious to what the information applies.

The following types of information typically need to be stored:

- Observations and comments from monitoring of the EMPr implementation;
- Monitoring reports presenting the above three categories;
- Audit reports, both internal and external;
- Incident/event reports;
- Correspondence: e.g. letters showing appointment of auditors, addressing non-compliant sub-contractors, government responses, etc.;
- Authorisations and approvals;
- Master documents, such as EIA reports and the EMPr (including the latest approved EMPr and any approved addendums); and
- A working copy of the EMPr, with proposed amendments.

2.3.4 REPORTING

Adequate monitoring, auditing and record keeping make reporting a simple task. Information and existing reports can be assembled and presented to whoever may need them. Knowing what reporting is necessary can help inform the type of monitoring and the system of record keeping. Typical reporting requirements include:

- Company performance/management system reports (e.g. performance targets);
- Company environmental/sustainability reports (part of annual reports);
- Audit reports, including review of the EMPr; and

- Incident/event reports.

2.3.5 UPDATING THE EMPR

It is recommended that a working copy of the EMPr be kept available at all times and any observations, thoughts or proposals be placed in the working file for consideration later. The need to revise the EMPr is dependent upon how many changes are needed. A well-established operation with few changes may not need to revise its EMPr for many years, whilst a fast changing operation may need a revision at least annually.

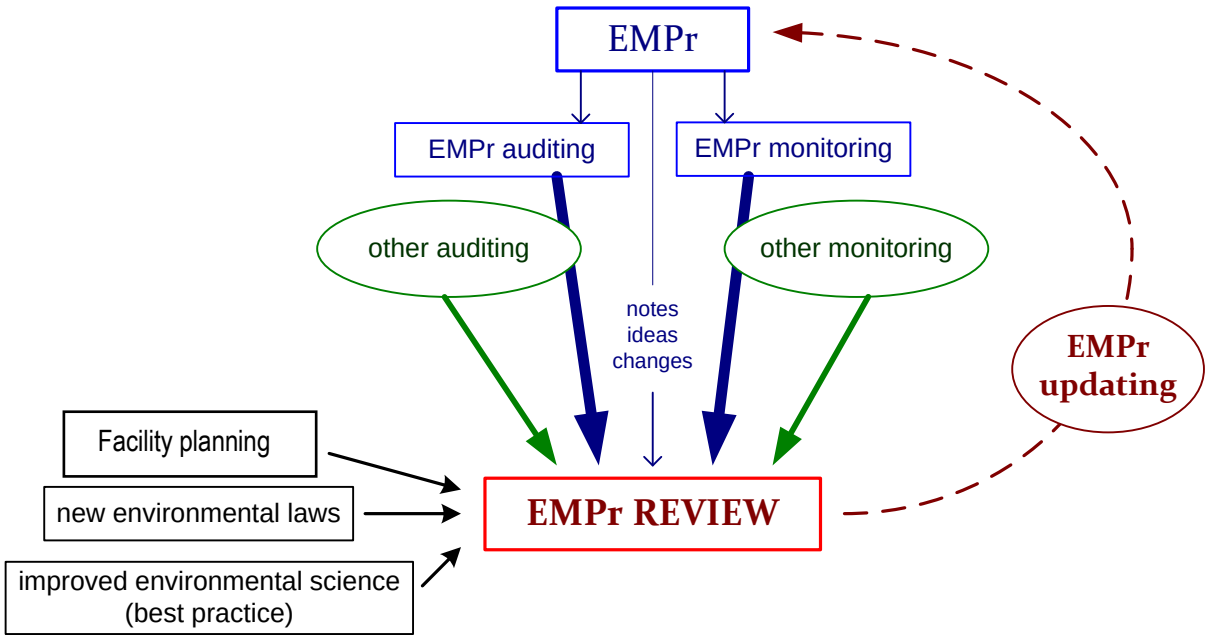


Figure 2-1: Conceptual diagram for EMPr review cycle.

No formal storm water- or erosion management plan(s) have been compiled for the subject development, for the reasons to follows (as stated by the appointed hydrological specialist for the project; AED, 2012). However, being a dynamic document, this EMPr should be updated accordingly to cater to any erosion that may indeed be identified during the construction or operational phases of the development (unlikely):

"The slope of the study area is very low, the area is arid, hot and dry with very little vegetation cover, while the ground surface is made up of sand that would readily absorb any surface water run-off and in the event of rain falling on this area, the chances of surface water running off the area is somewhat remote. The general area within which the study area locates has a surface run-off figure of only 0.55 mm of the annual rainfall falling on the area into surface watercourses. Given that the study area locates on a watershed between two quaternary catchments, this value is more likely to be zero in this particulate part of the catchment…

…Although there is very little chance of producing surface run off from the study area, during a severe storm with a return period of 50 years, some 4 048 m³ could theoretically flow off the area covered by the solar panels over a 24-hour period. This water will

however be classified as uncontaminated water and could either be left to run off the area, as it would have done had there not been any development…".

2.4 NOTE ON DEVELOPMENT PHASES

Typically an EMPr is divided into the actions required for each phase of a development, namely:

- Planning and design;
- Construction;
- Operations (the life of the activity); and
- Closure and aftercare.

The mitigation tables that follow have been compiled to consist of seven (7) criteria, as follows:

- "Activity/Structure/Infrastructure" - This row will identify the issue being addressed, e.g. activities potentially impacting on ground water resources at the processing plant;
- Environmental Aspect – That being the environmental parameter/s potentially impacted upon by the activity, structure or infrastructure under consideration;
- Impacts – Describes, for every applicable environmental aspect, the potentially negative changes that could result from the activity, structure or infrastructure under consideration;
- Mitigation Actions - This column will include all the necessary environmental management measures for each activity, structure or infrastructure under consideration;
- Measurable targets - indicate what evidence is to be used as an indication to whether or not the 'Management Actions' have been effectively implemented;
- Responsible Party – Indicates that party who is ultimately responsible for ensuring that the prescribed mitigation measures are appropriately implemented within the specified time-frames; and
- Time-frames/Frequency of action – This column provides time guidelines for the 'Responsible party' by which he/she is to take action to manage the required mitigation.

2.5 PRE-CONSTRUCTION, PLANNING AND DESIGN

Table 2-1: Mitigation for Pre-construction, Planning and Design Phase

ASPECT	ACTIVITY	MANAGEMENT ACTIONS & MONITORING	RESPONSIBILITY	FREQUENCY
1. PROJECT PLANNING & DESIGN PHASE				
1.1 Management (Set-up structures and procedures for implementation of EMPr)	Update the EMPr after detailed design has been completed	This EMPr must be updated to ensure that it is relevant to the detailed design of all applicable structures and supporting infrastructure	Proponent	Once-off prior to commencement
	Update the EMPr to reflect the requirements of the DEA approval, Environmental Authorisation, permits etc.	This EMPr must be updated to ensure that all specific conditions of relevant approvals, licences and authorisations issued for this project have been incorporated into the EMPr provisions.	Proponent	Once-off prior to commencement
	Appointment and duties of ECO	The project proponent must appoint an independent Environmental Control Officer (ECO) who must monitor compliance with the EMPr.	Proponent, ECO	Once-off prior to commencement
	Appointment of and duties of IEO	Appoint an Internal Environmental Officer (IEO) who will be required to monitor the site with a direct hands-on approach and ensure compliance and co-operation of all personnel.	PSM	Once-off prior to commencement if required.
	Management of staff and contractors	The EMPr must be made binding to contractors and must be included in tender documentation for the contract.	Proponent, Contractor/s	Once-off before contractor appointments
		The EMPr must be made readily available to the contractors, staff, as well as other relevant role-players associated with the project.	Proponent	Continuous
1.2 Training	Training of staff and contractors	Contractors and staff must be properly trained in all environmental aspects relating to this EMPr and associated EIR undertaken, relating to their role in the project's construction and operation, as per requirements of the associated environmental awareness plan.	Proponent, Contractor/s	Once-off prior to commencement & update as required
1.3 Legal Compliance	Environmental Authorisation	Obtain environmental authorisation, in terms of the National Environmental Management Act (107 of 1998), from the National department of Environmental Affairs for all activities triggered in either GN. R. 543, 544, 545 or 546 of the 2010 NEMA Regulations of 18 June 2010	Proponent	Once-off prior to commencement
	Removal/destruction of protected floral species	Permits applicable to the removal, relocation or destruction of protected floral species must be obtained prior to undertaking any such activity from the Northern Cape Department of Environment and Nature Conservation (NCDENC) & DAFF	Proponent	Once-off prior to commencement
	Water Use Licence	Apply for an integrated water use permit/licence in terms of the National Water Act, Act No. 36 of 1998 if required.	Proponent	If Required

Table 2-1: Mitigation for Pre-construction, Planning and Design Phase

ASPECT	ACTIVITY	MANAGEMENT ACTIONS & MONITORING	RESPONSIBILITY	FREQUENCY
	Any other conditions	All relevant management and mitigation required by the Environmental Authorisation and any other environmental authorisations or licences or permits, must be incorporated into the project design	Proponent	Once-off prior to commencement (where practical)
1.4 Erosion	Design	Storm water management and erosion control must begin in the construction phase and must be integrated into the design features of the facility.	Proponent	Once off before construction commences
1.5 Biodiversity	Protected Plant Rescue and Relocation	The proponent must obtain all necessary permits for the rescue and relocation of protected plant species from development footprints, i.t.o. the Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) & NEM:BA, prior to commencing with construction activities; where application for such to Northern Cape DENC must be supported by a 'Protected Plant Rescue and Relocation Plan' developed by a competent ecological specialist	Proponent	One off

2.6 CONSTRUCTION

Table 2-2: General					
Activity/Structure/Infrastructure	General Construction requirements				
Environmental Aspect	**Potential Impact/s**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
General concerns	Compliance with the EMPr and specific conditions of Environmental Authorisation.	Monitor site activities and compliance with management plans on a continuous basis.	Compliance	IEO/ ECO	Continuous
		Identify, propose, monitor and sign off on the implementation of rectification measures.	Compliance	IEO/ ECO, PSM	Continuous
		Audit compliance with EMPr, DAFF permit, and environmental authorisation and report audit findings to the competent authority	Compliance	ECO	As determined by authority. Audit report 30 days after construction completed to be submitted to DEA
	Environmental incident during the construction phase	National DEA must immediately be informed if any serious incidents occur which are likely to have detrimental effects on the environment. A record of these incidents must be kept along with what remedial action was taken. It is the project company's responsibility for any damage caused to the environment resulting from activities occurring on site.	Incident register kept and all incidents recorded. Significant incidents reported to authority	PSM, ECO	Immediately after incident occurs
	Loss of plant cover leading to erosion as well as loss of faunal habitat and loss of specimens of protected plants	Erosion control must begin in the construction phase and has to be integrated into the design features of the facility.	Minimal impact on terrestrial environment.	Proponent, PSM and ECO	Once off and regular monitoring and corrective action if trans located species are struggling
		Demarcate areas to be cleared.	No wholesale clearing of vegetation outside of the development footprint		Continuous
		Translocate protected species prior to the commencement of construction activities.	Successful translocation of protected species. Minimal impact on terrestrial environment.		Once off before construction commences and regular inspection of these areas

Table 2-2: General					
Activity/Structure/Infrastructure	General Construction requirements				
Environmental Aspect	**Potential Impact/s**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
	Air quality	Dust entrainment emanating from vehicular travel on gravel roads in the area will need to be controlled with the use of dust suppression sprayers. Speed limits for trucks of no more than 60 km/h on gravel roads must be enforced in order to further control dust. Emissions emanating from the exhausts of truck and diesel generators on the site are deemed to be negligible. It is not likely that any other construction activity will greatly (if at all) affect air quality in the vicinity of the site.	Minimise generation of dust	Contractor, IEO/ ECO	Daily
	Traffic management	It is foreseen that there will be an increase in traffic volumes to and from the construction site while the PV panels are being erected on the site and the electrical reticulation is put in place. There is only one access road to the site, and as such vehicles travelling in both directions will use the road. Due to the nature of the area, there is very minimal amount of traffic in any event, and as such the increase in a few trucks everyday will have no impact on overall traffic volumes. Daily control must however be implemented to ensure than any traffic on and off the site is monitored by a guard house and control gate on the site. Traffic to and from the site must be managed appropriately. A parking area must be roughly demarcated on the site close to the construction site office. Traffic movement around the site must	Ensure traffic impact responsibly addressed	Contractor, IEO/ ECO	Continuous

Table 2-2: General					
Activity/Structure/Infrastructure	General Construction requirements				
Environmental Aspect	**Potential Impact/s**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
		be kept to a minimum and must only happen when very necessary to avoid more disturbances around the site.			
	Waste	All ablution facilities must be maintained regularly, as required, and sewage must be collected and disposed of at suitably licensed facilities. In the event the on-site ablution facilities (e.g. chemical toilets, septic tanks, etc) are required then these must comply with the relevant regulatory requirements and standards.	Ensure that sewage waste is appropriately managed.	ECO	Continuous
Social economic	Construction hazards	Construction/activities must be planned and undertaken in compliance with the Occupational Health and Safety Amendment Act, Act No. 181 of 1993, and the regulations thereunder, including but not necessarily limited to: General Safety Regulations, 1986, Construction Regulations, 2003; and, the National Building Regulations and Building Standards Act, 1977 (Act No.103 of 1977) and regulations thereunder.	Safe working conditions for staff, contractor and visitors.	PSM, Contractors	Continuous
		Construction workers must be made aware that no alcohol/drugs are allowed on site and no workers under the influence are permitted on site. Construction workers must be made aware that firearms or traditional weapons will not be allowed on site unless approved for security purposes.	Safe working conditions for staff, contractor and visitors.	PSM/IEO/ Contractors	Continuous
	Construction requirements	Implement a skills transfer and capacity building programme.	Local economic up-litfment as well empowers local communities through education.	Proponent, PSM	Before construction commences monthly review
		Contribute to relevant LED programmes in the local municipality as far as possible.			
		No informal settlements must be allowed close to or on the site.			

Table 2-2: General					
Activity/Structure/Infrastructure	General Construction requirements				
Environmental Aspect	**Potential Impact/s**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
		Construction workers and permanent employees must wear uniforms, PPE and name tags to be easily identifiable.			

Table 2-3: Construction Camp/laydown area Establishment					
Activity/Structure/Infrastructure	Establishment of temporary construction camp facilities (Including administrative offices, ablution facilities, fuel storage, concrete/cement batching, vehicle workshops and raw/construction material storage).				
Environmental Aspect	**Potential Impact/s**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
Ground water	Negative quality impacts resulting from temporary ablution/sanitary facilities	Contractor/s must provide appropriate (capacity/effective containment of grey and black water), above-ground, ablution/sanitary arrangements for employees, and maintain/service such for the duration of their occupation within the camp/s. **Contractors must provide a Method Statement indicating how compliance with this action will be achieved.**	No contact between black /grey water and site soils. No offensive odours emanating from ablution facilities.	Proponent, Contractor	Once-off before construction commences, with weekly maintenance thereafter
	Negative quality impacts resulting from cement/concrete batching activities	Concrete batching must take place on durable, impermeable, bunded surfaces.	No contact between concrete/raw material and soils.	Proponent, Contractor	Once-off
		Run-off from batching activities must be effectively contained and prevented from entering the environment (i.e. soils, surface water). **Contractors must provide a Method Statement indicating how compliance with this action will be achieved.**	No contact between potentially contaminated run-off and soils or surface water	Proponent, Contractor	Once-off before construction commences
	Negative quality impacts resulting from the storage of fuel, oil and hazardous materials	Above ground fuel, or oil storage tanks, must be located within appropriately sized, impermeable, bund walls (inclusive of valve for release of storm water ingress, unless otherwise roofed)	Bund wall capacity sized to at least 110% of the cumulative volume of fuel and oil stored therein. Records of weekly bund wall integrity inspections kept on record	Proponent, Contractor	Continuous. Weekly inspections of bund wall integrity.
		Appropriate hydrocarbon spill management kits must be kept and maintained on site wherever fuels and oils are stored, and where refuelling and /or servicing of plant, vehicles and machinery takes place, in order to manage potential hydrocarbon spillages effectively	Spill management kits available on site and replenished as necessary	Proponent, Contractor	Continuous

Table 2-3: Construction Camp/laydown area Establishment					
Activity/Structure/Infrastructure	Establishment of temporary construction camp facilities (Including administrative offices, ablution facilities, fuel storage, concrete/cement batching, vehicle workshops and raw/construction material storage).				
Environmental Aspect	**Potential Impact/s**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
		Training, in the use and maintenance of the above mentioned kits, as well as any contaminated waste products, must be provided to ALL staff either directly or indirectly, involved in any of the activities identified above.	Records of training kept.	Proponent, Contractor	Once-off, with annual refresher training every year thereafter also all new staff – in a year much can change
		Hazardous material/chemical containers must be stored within appropriately sized, impermeable, bund walls/containers (inclusive of valve for release of storm water ingress, unless otherwise roofed).	Bund wall capacity sized to at least 110% of the volume of the largest chemical container stored therein. Records of weekly bund wall integrity inspections kept on record	Proponent, Contractor	Continuous. Weekly inspections of bund wall integrity.
		Soil contaminated through the spillages of fuel, oil or hazardous materials within the construction camp must be immediately collected and placed within a dedicated, water-tight, skip/container within the camp/s, for subsequent disposal at an appropriately licensed waste disposal facility	Dedicated 'contaminated soil' skip/container on site. Contents removed to landfill site. Safe disposal certificates kept on record for all contaminated soil removed from site.	Proponent, Contractor	Continuous
		During construction all sewage waste must be stored in a closed system. A schedule for servicing and disposal of the sewage waste will be set forth so as not to cause unpleasant or unhygienic conditions for the site personnel by an approved service provider specializing in the maintenance and treatment/disposal of sewage waste. Soak away systems must only be allowed during the construction period. Financial Feasibility of using dry waste sanitation systems must be undertaken and used and implemented	To ensure responsible waste management systems.	PSM. IEO/ ECO	Once-off & inspect daily
	Negative quality impacts resulting from vehicle/plant workshops and wash bays	All servicing of vehicles and equipment is to take place strictly within dedicated workshops within construction camp or otherwise off-site at appropriate service yards.	No servicing of plant or vehicles outside of dedicated workshop areas.	Proponent, Contractor	Continuous

Table 2-3: Construction Camp/laydown area Establishment					
Activity/Structure/Infrastructure	Establishment of temporary construction camp facilities (Including administrative offices, ablution facilities, fuel storage, concrete/cement batching, vehicle workshops and raw/construction material storage).				
Environmental Aspect	**Potential Impact/s**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
		Potentially contaminated wash water must be effectively diverted, contained and managed, such that no hydrocarbon contaminants are ever in contact with site soils. **Contractors must provide a Method Statement indicating how compliance with this action will be achieved.**	No contact between potentially contaminated wash water and site soils or storm water flows	Proponent, Contractor	Once-off before construction commences, continuous monitoring
Biodiversity	Loss of plant cover leading to erosion as well as loss of faunal habitat and loss of specimens of protected plants	Translocate protected species prior to the commencement of construction activities if possible.	Successful translocation of protected species. Minimal impact on terrestrial environment.	Proponent, PSM and ECO	Once off before construction commences.
		Erosion control should begin in the construction phase and should be integrated into the design features of the facility.	No erosion		Once off and regular monitoring and corrective action if trans located species are struggling
		Demarcate areas that must be cleared.	No clearing of vegetation outside of the development footprint.		Continuous
	Reduced biodiversity due to construction camp/s establishment in green-field areas	Construction camps may only be established within the authorised development footprints of the proposed project elements.	No vegetation can be cleared above that already require clearing as part of the approved project elements	Proponent, Contractor	Once-off
	Poaching/killing of indigenous site fauna	Under no circumstances is the poaching, or killing, of indigenous site fauna by the contractor, or his/her employees, to be tolerated.	No harm to indigenous site fauna. Records kept on file of applicable training by contractor	Proponent, Contractor	Continuous. Once-off training, with annual refreshers every year thereafter
		Non-compliance with the above condition to constitute grounds for the immediate, permanent removal of guilty parties from site.	Signed declarations by contractor and all his/her employees in acknowledgement of this provision.	Proponent, Contractor	Continuous
	Destruction of site flora through unauthorised 'harvesting' thereof	Under no circumstances are wood, plant, or medicinal plants, to be 'harvested' by the contractor, or his/her employees	No destruction or 'harvesting' of indigenous site flora. Records kept	Proponent, Contractor	Continuous. Once-off training, with annual refreshers every

Table 2-3: Construction Camp/laydown area Establishment					
Activity/Structure/Infrastructure	Establishment of temporary construction camp facilities (Including administrative offices, ablution facilities, fuel storage, concrete/cement batching, vehicle workshops and raw/construction material storage).				
Environmental Aspect	**Potential Impact/s**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
			on file of applicable training by contractor		year thereafter
		Non-compliance with the above condition to constitute grounds for the immediate, permanent, removal of guilty parties from site	Signed declarations by contractor and all his/her employees in acknowledgement of this provision	Proponent, Contractor	Continuous
	Anthropogenic veld fires resulting in biodiversity loss	If fires, for the purposes of cooking, are to be tolerated within the construction camp/s, the following conditions are to apply: • Must be well removed from fuel and hazardous material storage areas, • Must be well removed from indigenous vegetation (at least 15 m); • Fire-extinguisher must be readily available; • Must be screened from wind with non-flammable material/s; • Non-smouldering ash residues must be disposed of to general waste skip/s, or containers, in the camp, and • Must be a dedicated fireplace fit for purpose, with water at hand to extinguish and douse ash afterwards etc.	Well managed, clearly designated, area/s established for cooking fires.	Proponent, Contractor	Continuous
	*Infestation and propagation of alien invasive floral species	Contractors must ensure that alien invasive floral species within the bounds of their camp/s are managed in accordance with relevant provisions of the alien invasive species management plan to be developed by the site ECO, inclusive of quick 'weed identification' flash-card sets	No alien invasive floral species infestation within site	Proponent, Contractor	Continuous
		Contractors to receive training and assistance by environmental officer in regard to the above requirements	Copy of alien invasive species management plan provided to contractor/s. Records available of relevant	Proponent, Contractor	Once-off

Table 2-3: Construction Camp/laydown area Establishment					
Activity/Structure/Infrastructure	Establishment of temporary construction camp facilities (Including administrative offices, ablution facilities, fuel storage, concrete/cement batching, vehicle workshops and raw/construction material storage).				
Environmental Aspect	**Potential Impact/s**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
			training		
Soils	Negative impacts on quality due to inappropriate waste management	Contractors must provide sufficient, water-tight, skips/containers on site for the separate storage of general and hazardous waste.	Sufficient skips provided for. No mixing of general and hazardous waste streams	Proponent, Contractor	Once-off
		Under no circumstances must waste be stored on site anywhere but in the appropriate skips/containers provided for such, unless otherwise in water-tight drums placed intermittently throughout the camp/s that will ultimately be decanted into primary waste storage skips/containers.	No *ad hoc* waste stockpiling on bare soil surfaces.	Proponent, Contractor	Continuous
		Waste skips/containers must be cleared when full, such that waste doesn't over-flow onto adjacent ground.	No evidence of full, or over-flowing, waste skips/bins	Proponent, Contractor	Continuous
		Safe disposal/management certificates must be obtained, and kept on file, for all waste removed from site; where the waste management facility/contractor used for such purposes must be appropriately licensed/permitted for such.	Records of safe disposal/management certificates kept on record	Proponent, Contractor	Continuous
		The contractor is responsible for ensuring that wind-blown litter is collected from the bounds of the camp/s on a daily basis.	No evidence of wind-blown litter. Records of daily collections/inspections kept on record.	Proponent, Contractor	Continuous
Socio-economics	Social impacts stemming from an influx of contractors and associated employees	Only contractor/s and his/her employees, or sub-contractors, may gain access to, such facilities in the construction camp **Contractors must provide a Method Statement indicating how compliance with this action will be achieved.**	Well controlled access to camp	Proponent, Contractor	Continuous
		Access by the contractor and his/her employees to adjacent farms (i.e. other than those falling within the ambit of the project) is strictly forbidden; unless otherwise agreed upon, in	No trespassing by unauthorised parties	Proponent, Contractor	Continuous

Table 2-3: Construction Camp/laydown area Establishment					
Activity/Structure/Infrastructure	Establishment of temporary construction camp facilities (Including administrative offices, ablution facilities, fuel storage, concrete/cement batching, vehicle workshops and raw/construction material storage).				
Environmental Aspect	**Potential Impact/s**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
		writing, by the relevant landowner/s. Trespassing is to constitute immediate grounds for the permanent removal of guilty parties from the project.			
		Where possible, local goods and services must be procured instead of imported ones, where local goods are readily available and offered at competitive prices.	Maximum feasible procurement of local goods and services during the construction period	Proponent, Contractor	Continuous
		The negative impact on housing and service delivery provision pressures could be reduced by sourcing the majority of construction workers from local communities, thus reducing the need to bring new people into the local area.	Use of local labour sourced from the District to the greatest extent practical	Proponent, Contractor	Continuous
		If the construction crew is accommodated on site, it must be according to the local authority's (Municipality) by-laws.	Compliance with by-laws.	Contractor	Once-off (if necessary)
General	Numerous	Contractor/s are required to provide written method statements to the ECO/ environmental manager, detailing how they intend to achieve compliance with the EMPr in relation to the following aspects of construction camp management: • Provision of ablution/sanitary arrangements for their employees; • Black and grey water management within the camp/s; • Storm water management within the construction camp/s; and • Site access management.	Written, IEO/ECO approved method statements in place as required	Contractor, environmental manager and ECO	Once-off prior to commencement

Table 2-4: : Vegetation Clearance					
Activity/Structure/Infrastructure	Vegetation clearance, leading to ultimate establishment of construction camp, foundations for PV panels, inverter/transformer building, trenches, access road and combined guard house/control room as well grid connection.				
Environmental Aspect	**Impact**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
Ground water	Degraded groundwater quality through hydrocarbon contamination	Plant and vehicles used on site must be well maintained/serviced, and visually inspected (at least daily) by their respective operators for hydrocarbon (i.e. oil, fuel and hydraulic fluids) leaks.	Records on file of daily visual plant and vehicle inspections	Proponent, Contractor	Continuous
Biodiversity	Loss of plant cover leading to erosion as well as loss of faunal habitat and loss of specimens of protected plants	Translocate protected species prior to the commencement of construction activities.	Successful translocation of protected species, Minimal impact on terrestrial environment	Proponent, PSM and ECO	Once off and regular monitoring and corrective action if trans located species are struggling
		Erosion control must begin in the construction phase and has to be integrated into the design features of the facility.	No clearing of vegetation outside of the development footprint		Continuous
		Loss of plant cover leading to erosion as well as loss of faunal habitat and loss of specimens of protected plants.	No clearing of vegetation outside of the development footprint		Once off before construction commences and regular inspection of these areas
		Vegetation clearing to be kept to a minimum. No unnecessary vegetation to be cleared. A ground layer between the panels should be left in place where possible.	Minimise the direct impact on vegetation and reduce risk of erosion	ECO	Continues during vegetation clearance
	Destruction of habitat leading to overall loss of biodiversity (Incl. relocation, removal and destruction of protected floral species)	Vegetation clearance must be limited to the smallest area practical to enable construction activities and the establishment of structures and infrastructure. These areas need to be clearly marked out (e.g. taped off) under the supervision/assistance of the ECO or IEO as vegetation clearance proceeds on site. Required to ensure that all vegetation clearance is restricted to designated areas to the greatest extent practical (Appendix A has relevance).	No unnecessary clearance of indigenous vegetation. Vegetation clearance according done only final development areas	PSM, ECO	Continuous
		No protected floral species may be removed, relocated or destroyed without the necessary permits for such having been obtained from the relevant competent authority.	Copies of permits on file prior to proceeding with vegetation clearance	Proponent, Contractor	Once-off
		The removal, relocation or destruction of protected	EMPr appropriately	Proponent,	Continuous

Table 2-4: : Vegetation Clearance					
Activity/Structure/Infrastructure	Vegetation clearance, leading to ultimate establishment of construction camp, foundations for PV panels, inverter/transformer building, trenches, access road and combined guard house/control room as well grid connection.				
Environmental Aspect	**Impact**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
		plant and tree species must be undertaken in compliance with all conditions stipulated in the above mentioned permits.	updated to include specific conditions of permitting	Contractor	
		Continued establishment of indigenous vegetation in areas that are disturbed during construction. The plants could be translocated either to a safe area outside the development footprint or used within the site for education and aesthetic purposes.	To reduce the impact on natural vegetation. To ensure management responsibility environmental good environmental management.	Contractor, IEO/ ECO	Daily, weekly
		Brush and grass from cleared areas must be set aside as far as feasible and reasonable and used to encourage the re-vegetation of disturbed areas by packing the brush onto the cleared areas in rows.		ECO, PSM	Continuously
	Establishment of alien invasive floral species and associated negative impacts on biodiversity	All areas stripped of indigenous vegetation cover need to be regularly inspected for the potential establishment of alien invasive species, and appropriate control measures applied where these species are observed to have established.	Proof of training, in 'weed' identification, provided to mandated 'inspector/s. Inspection register maintained by the contractor/s, as well as documentation of any control measures applied (location, method & effectiveness at the very least)	Proponent, Contractor	Weekly 'weed' inspections (Summer). Monthly 'weed' inspections (Winter) Problem species cleared within 5 calendar days of their identification.
		A copy of the alien invasive species management plan, inclusive of quick 'weed identification' flash-card sets, to be supplied to the relevant contractor/s involved in vegetation stripping.	Proof of contractor's receipt of the management plan	Proponent	Once-off
Soils	Loss of topsoil to vegetation stripping, thereby reducing remaining available extent thereof for rehabilitation efforts at closure	The degree of 'topsoil' lost to vegetation stripping needs to be kept to an absolute minimum by the relevant contractor/s.	Minimal loss of topsoil with 'stripped' vegetation.	Proponent, Contractor	Continuous
	Erosion losses from exposed	Any runnels, or erosion channels, developing	No evidence on site of	Proponent,	Continuous. Remedial

Table 2-4: : Vegetation Clearance					
Activity/Structure/Infrastructure	Vegetation clearance, leading to ultimate establishment of construction camp, foundations for PV panels, inverter/transformer building, trenches, access road and combined guard house/control room as well grid connection.				
Environmental Aspect	**Impact**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
	soil surfaces	during any construction, or on-going operational and maintenance period, shall be back-filled and consolidated immediately and the area restored to the proper condition. The contractor shall not allow erosion to develop on a large scale before effecting repairs and all erosion damage shall be repaired as soon as possible (Topsoil washed away shall be replaced).	erosion channels. Topsoil has been appropriately replaced where it has been lost through surface storm water flows.	Contractor	action within 48 hours.
Heritage Resources	Negative impacts on elements of cultural, or heritage, significance	Basic training needs to be provided to the relevant ECO, as well as their relevant vehicle/grader operator/s, in the identification of possibly encountered elements of cultural and heritage significance (e.g. archaeological sites, graves, etc.).	Proof of basic training by an appropriately qualified archaeological specialist	PSM	Once-off, prior to commencement of vegetation stripping
		If archaeological sites are exposed during vegetation stripping, it must immediately be reported to the Local and National Branches of the South African Heritage Resources Agency (SAHRA)	No unauthorised disturbances to elements of potential cultural, or heritage, significance	Proponent, Contractor	If required. Reporting of archaeological finds within 24hours
		Under no circumstances shall archaeological or paleontological artefacts discovered on site during construction or operational activities be removed, destroyed or interfered with.	Compliance with the provisions of the National Heritage Resources Act (Act No. 25 of 1999)[HRA].	Proponent, Contractor	Continuous
Socio-economics	Efficient reuse of all stripped vegetation	All stripped vegetation not suitable as fire wood must be chipped and utilised elsewhere on site as mulch/compost material	Recovery and use of all stripped vegetation to the greatest extent possible	Proponent, Contractor	Continuous

Table 2-5: : Topsoil Stripping

Activity/Structure/Infrastructure	Topsoil stripping, leading to ultimate establishment of construction camp, foundations for PV panels, inverter/transformer building, trenches, access road and combined guard house/control room as well grid connection..				
Environmental Aspect	**Impact**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
Ground water	Degraded groundwater quality through hydrocarbon contamination	Plant and vehicles used on site must be well maintained/serviced, and visually inspected (at least daily) by their respective operators for hydrocarbon (i.e. oil, fuel and hydraulic fluids) leaks.	Records on file of daily visual plant and vehicle inspections	Proponent, Contractor	Continuous
Biodiversity	Establishment of alien invasive floral species and associated negative impacts on biodiversity	All areas stripped of indigenous vegetation cover and topsoil need to be regularly inspected for the potential establishment of alien invasive species, and appropriate control measures applied where these species are observed to have established.	Proof of training, in 'weed' identification, provided to mandated 'inspector/s. Inspection register maintained by the contractor/s, as well as documentation of any control measures applied (location, method & effectiveness at the very least)	Proponent, Contractor	Weekly (summer)/ monthly (winter)'weed' inspections. Problem species cleared within 5 calendar days of their identification.
		Alien invasive species management plan, identification' through flash-card sets, to be supplied to the relevant contractor/s involved in topsoil stripping	Proof of contractor's receipt of the management plan	Proponent	Once-off
Soils	Reduced effectiveness of rehabilitation efforts at closure, resulting from poor topsoil management practices	Topsoil to be stripped to a depth of at least 30 cm from all physical development foundations and stockpiled for reuse in rehabilitation efforts post construction period.	Photographic evidence of topsoil stripping, as well as data logging	Proponent, Contractor	Continuous
		Vegetation stripping must not be conducted more than a week (7 calendar days) prior to topsoil stripping, in preparation of development.	No areas left bare of vegetation for longer than a week following the 'stripping' thereof for development.	Proponent, Contractor	Continuous. Seven (7) day window
		Topsoil stockpiles must not exceed 2 m in height.	Topsoil stockpile height optimisation	Proponent, Contractor	Continuous
		Topsoil stockpile areas must be taped off and sign posted as 'no-go' areas' and subsequently marked on the surface infrastructure plan	Appropriate access control in place for topsoil stockpiles	Proponent, Contractor	Once off taped establishment. Continuous enforcement
		Stockpiles must be monitored for alien vegetation any existing alien vegetation must be removed	Records kept on file of at least monthly	Proponent	Continuous

Table 2-5: : Topsoil Stripping

Activity/Structure/Infrastructure	Topsoil stripping, leading to ultimate establishment of construction camp, foundations for PV panels, inverter/transformer building, trenches, access road and combined guard house/control room as well grid connection..				
Environmental Aspect	**Impact**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
		and destroyed.	inspections		
Heritage Resources	Negative impacts on elements of cultural, or heritage, significance	Basic training needs to be provided to the relevant ECO, as well as their relevant vehicle/grader operator/s, in the identification of possibly encountered elements of cultural and heritage significance (e.g. archaeological sites, graves, etc.).	Proof of basic training by an appropriately qualified archaeological specialist	PSM.	Once-off, prior to commencement of topsoil stripping
		If archaeological sites are exposed during topsoil stripping, it must immediately be reported to the Local and National Branches of the South African Heritage Resources Agency (SAHRA),	No unauthorised disturbances to elements of potential cultural, or heritage, significance	Proponent, Contractor	If required. Reporting of archaeological finds within 24 hours
		Under no circumstances shall archaeological artefacts discovered on site during construction or operational activities be removed, destroyed or interfered with.	Compliance with the provisions of the National Heritage Resources Act (Act No. 25 of 1999)[HRA].	Proponent, Contractor	Continuous

Table 2-6: Civil- and Earthworks					
Activity/Structure/Infrastructure	Establishment of structural and infrastructural foundations/founding conditions and associated, operational, compacted working 'floors'				
Environmental Aspect	**Impact**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
Topography	Soil erosion resulting from the creation of steep, unnatural, slopes	No slopes with gradient > 3:1 must be established on site; unless otherwise protected from erosion by appropriate storm water management measures, or slope stabilisation/re-vegetation	No slopes > 3:1	PSM, Contractor	Continuous
Ground water	Degraded groundwater quality through hydrocarbon contamination	Plant and vehicles used on site must be well maintained/serviced, and visually inspected (at least daily) by their respective operators for hydrocarbon (i.e. oil, fuel and hydraulic fluids) leaks.	Records on file of daily visual plant and vehicle inspections	PSM, Contractor	Continuous
		Cement mixing must only be allowed within dedicated areas within the construction camp. Care must be taken to ensure spillages are reduced.	Ensure cement mixing does not impact on the groundwater environment	PSM, contractor	Continuous
Biodiversity	Biodiversity loss through destruction of natural habitat	Civil- and earth works may only proceed where vegetation- and topsoil stripping have been effected in compliance with the provisions of the EMPr.	No extension of the development footprint beyond that approved development area in terms of this EMPr. All attempts must be made to also reduce disturbance of vegetation within the development area as far possible.	PSM, Contractor	Continuous
Heritage Resources	Negative impacts on elements of cultural, or heritage, significance	Basic training needs to be provided to the relevant ECO, as well as their relevant vehicle/grader operator/s, in the identification of possibly encountered elements of cultural and heritage significance (e.g. archaeological sites, graves, etc.).	Proof of basic training by an appropriately qualified archaeological specialist	PSM.	Once-off, prior to commencement of vegetation stripping
		If archaeological sites are exposed during topsoil stripping, it must immediately be reported to the Local and National Branches of the South African Heritage Resources Agency (SAHRA),	No unauthorised disturbances to elements of potential cultural, or heritage, significance	Proponent, Contractor	Continuous. Reporting of archaeological finds within 24hours
		Under no circumstances shall archaeological	Compliance with the	Proponent,	Continuous

Table 2-6: Civil- and Earthworks					
Activity/Structure/Infrastructure	Establishment of structural and infrastructural foundations/founding conditions and associated, operational, compacted working 'floors'				
Environmental Aspect	**Impact**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
		artefacts discovered on site during construction or operational activities be removed, destroyed or interfered with.	provisions of the National Heritage Resources Act (Act No. 25 of 1999)[HRA].	Contractor	

Table 2-7: Waste Generation and Management					
Activity/Structure/Infrastructure	Construction related waste (general and hazardous) generation and management				
Environmental Aspect	**Impact**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
Air Quality	Degraded air quality due to the burning of waste	Under no circumstances must waste ever be burnt, or buried, on site.	Safe waste disposal/management certificates on record for all waste generated during the construction phase	Proponent, Contractor	Continuous
Ground water	Diminished ground water quality through poor waste management practices	Waste oil generated from vehicle workshops/drip trays must be immediately stored in sealable, water-tight, steel drums or containers within an impermeable bund wall with a capacity of at least 110% of the volume of the largest container/drum held therein – for subsequent removal from site for either recovery, or disposal thereof.	Waste oil storage area/s appropriately bunded. Safe disposal/management certificates on record for all oil removed from site	Proponent, Contractor	Once-off bund establishment. Continuous requirement for storage of waste oil.
		Waste oil storage areas may only be placed within relevant construction/contractor's camp.	No waste oil storage outside of any dedicated contractor's camp/s	Proponent, Contractor	Continuous
		Ensure that no refuse or builders rubble generated on the premises be placed, dumped or deposited of on adjacent/surrounding properties including road verges, roads or public places and open spaces during or after the construction period outside areas demarcated for waste (in accordance with the layout plan produced).	All discard materials produced during construction must be taken offsite and deposited in an accredited landfill site.	Contractor, IEO/ ECO	Weekly
		The Contractor shall ensure that waste and surplus food, food packaging and organic waste are not deposited by his employees anywhere on the site except in refuse bins for removal on a weekly basis by the Contractor.	Refuse bins shall be weather and animal-proof	Contractor, IEO/ ECO	Weekly
		A suitable leak proof container for the storage of oiled equipment (filters, drip tray contents and oil changes etc.) must be established.	To ensure that groundwater is not negatively affected	Contractor, IEO/ ECO	Once-off & inspect daily
		The temporary waste areas used during the construction phase must be properly demarcated;	Waste areas must have adequate signage.	Contractor, IEO/ ECO	Once-off & inspect daily
		Hazardous waste that could be found during the construction includes, construction debris and material contaminated with hydrocarbons and sewage sludge, waste oil, oil and diesel filters,	Ensure proper handling and storage of hazardous materials, as to not impact on the receiving	IEO	Inspect daily

Table 2-7: Waste Generation and Management					
Activity/Structure/Infrastructure	Construction related waste (general and hazardous) generation and management				
Environmental Aspect	**Impact**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
		waste paint, phenolic waste, water contaminated by hazardous substances, batteries and fluorescent bulbs. Hazardous waste must be stored in a covered waste skip or container placed on an impervious bunded surface in a designated hazardous waste storage area. Liquid hazardous waste must be stored within a sealed container within the hazardous waste skip. All hazardous waste must be transported and disposed of by an approved service provider at a facility registered to receive such waste and adequate records kept of disposal.	environment		
Surface water	Surface storm water contamination through contact with waste material/s	Surface storm water run-off must not be able to flow through any waste storage areas. Nor must skips/containers, or waste storage areas, be positioned where surface water may pond or flow preferentially during rainfall events	No contact between construction waste and surface water	Proponent, Contractor	Continuous
Soils	Soil contamination through contact with waste material/s	Waste must not be temporarily stored on bare soil surfaces; Except where: • The waste is regarded as being 'inert' (e.g. waste bricks, un-contaminated steel scrap, etc.), in terms of the definition provided for in the National Environmental Management: Waste Act (59 of 2008); • The waste will be removed from site within 30 days of the generation thereof; and • No component of the waste is susceptible to dispersal by wind	No contact between site soils and potential contaminants in construction waste/s	Proponent, Contractor	Continuous
		Construction waste generated on site by contractor/s must be gathered up daily and placed in skips/containers appropriate to the classification thereof (i.e. hazardous vs. general waste).	No waste strewn over site over-night. No mixing of general and hazardous wastes	Proponent, Contractor	Daily, for the duration of the construction period
		Skips/containers must, therefore, be clearly marked for classification purposes.	Waste skips clearly marked for applicable waste types to be	Proponent, Contractor	Once-off

Table 2-7: Waste Generation and Management					
Activity/Structure/Infrastructure	Construction related waste (general and hazardous) generation and management				
Environmental Aspect	**Impact**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
			discarded therein		
		Safe disposal/management certificates must be obtained for all waste removed from site.	Safe disposal/ management certificates kept on record	Proponent, Contractor	Continuous, for every incidence of waste removal from site
		Waste may only be taken to appropriately licensed/permitted waste management facilities.	Proof of facility licensing kept on record	Proponent, Contractor	Continuous
		Waste skip/container collection and replenishment schedules must be developed and managed pro-actively by the contractor/s, in order to ensure that no skips/containers are left full and/or over-flowing for any extended period of time and that there is always appropriate temporary waste storage capacity on site.	Temporary waste storage capacity available to the contractor/s	Proponent, Contractor	Continuous. No skip left full on site for more than a week.
		During construction all sewage waste should be stored in a closed system. A schedule for servicing and disposal of the sewage waste will be set forth so as not to cause unpleasant or unhygienic conditions for the site personnel by an approved service provider specializing in the maintenance and treatment/disposal of sewage waste. Soak away systems should only be allowed during the construction period in the event of lack of adequate municipal services. Dry or digester sanitation systems should be used if municipal services are unavailable.	As to ensure the integrity of soil and groundwater environments.	PSM. IEO/ ECO	Once-off & inspect daily
	Unsustainable use of natural resources and unnecessary landfill airspace utilisation	Contractors will be required to provide a method statement specific to waste minimisation, reuse, recovery and recycling, as well as temporary storage and disposal; where such plans would need to be signed off by competent site environmental personnel/environmental control officer (ECO) prior to the start of construction activities. **Contractors must provide a Method Statement indicating how compliance with this action will be achieved.**	Approved method statement/s on record	Proponent, Contractor	Once-off, prior to commencement

Table 2-8: Raw/Construction Material Stockpiles and Storage					
Activity/Structure/Infrastructure	Storage of raw/construction materials on site during the construction phase				
Environmental Aspect	**Impact**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
Topography	Alteration of site topography, such that preferential storm water flows, or sensitive ecological features, are disrupted/disturbed	Raw/construction material storage areas and stockpiles may not be established within the authorised development area.	No disturbances to prominent drainage lines. No construction activities outside the authorised development areas	Proponent, Contractor	Continuous
Biodiversity	Biodiversity loss through unnecessary habitat destruction	Raw/construction material storage may only take place within the development footprint of project structures and infrastructure, or designated construction camp.	No storage of materials in 'green-field' areas	Proponent, Contractor	Continuous
Soils	Soil contamination through inappropriate storage of hazardous construction materials	Where daily quotas/stocks of hazardous materials are to be stored outside of the construction camp, the materials must be stored such that there is no contact between the material and site soils.	No contact between site soils and hazardous construction materials	Proponent, Contractor	Continuous

Table 2-9: Post Construction Activities					
Activity/Structure/Infrastructure	**Site Clean Up and Rehabilitation before operation of the facility commences.**				
Environmental Aspect	**Impact**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
Site Clean Up and Rehabilitation	Post construction activities	All temporary structures and imported material must be removed and adequately disposed of.	As to ensure sufficient site clean-up	Contractor/ PSM.	Once off
		Areas affected by construction activities have to be de-compacted by means of scarification or ripping.	To ensure water infiltration and effective rehabilitation of vegetation.	Contractor/ PSM.	Once off
		Topsoil must be placed over the areas that need to be reinstated.	To ensure effective rehabilitation and re-vegetation.	ECO/ PSM. contractor	Once off, continuous monitoring
		Access to the reinstated areas must be limited to allow for natural re-vegetation of the disturbed areas from the seed banks and surrounding habitat.	To ensure that the integrity of the rehabilitation attempt not compromised.	Contractor/ ECO	Once off, continuous monitoring
		Vegetation from cleared areas that was set aside must be used to encourage the re-vegetation of disturbed areas by packing the brush onto the cleared areas in rows.	To use cleared vegetation for re-vegetation.	Contractor/ ECO	Once off, continuous monitoring
		Any indigenous vegetation damaged or removed unnecessarily during the construction phase must be replaced with the same species and size.	To ensure only the delineated development footprint disturbed.	Contractor/ ECO	As required.
		Any areas outside of the construction site which have been inadvertently damaged at any point during construction must be rehabilitated immediately.	To ensure only the delineated development footprint disturbed.	ECO	Once off
		No exotic plants may be used for rehabilitation purposes. The site is to be fenced off and all invasive plants must be removed from the site before project commissioning.	Only indigenous plant must be used.	ECO	Once off, continuous monitoring

2.8 OPERATIONAL PHASE

Table 2-10: General					
Activity/Structure/Infrastructure	General Operational requirements				
Environmental Aspect	**Potential Impact/s**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
General concerns	Compliance with the EMPr and specific conditions of Environmental Authorisation, any other permit.	Monitor site activities and compliance with management plans on a continuous basis.	Ensure legal compliance and implement duty of care	IEO/ ECO	Continuous
		Identify, propose, monitor and sign off on the implementation of rectification measures.	To ensure effective implementation of EMPr requirements	IEO/ ECO, PSM	Continuous
		Audit compliance with EMPr and environmental authorisation and report audit findings to the competent authority.	Legal compliance	ECO	As determined by authority. Audit report 30 days after construction completed to be submitted to DEA
	Environmental incident during the construction phase	National DEA must immediately be informed must any serious incident which is likely to have detrimental effects on the environment. A record of these incidents must be kept along with what remedial action was taken. The project company is responsible for any damage caused to the environment resulting from activities occurring on site.	Legal compliance	PSM, ECO	Immediately after incident occurs
		Rehabilitation of any damaged caused to the environment due to any event or incident occurring on site.	Duty of Care	PSM	As required
	Air quality	Dust entrainment emanating from vehicular travel on gravel roads in the area will need to be controlled with the use of dust suppression sprayers. Speed limits for trucks of no more than 60 km/h on gravel roads must be enforced in order to further control dust. Emissions emanating from the exhausts of truck and diesel generators on the site are deemed to be negligible. It is not likely that any other operational activity	Minimise generation of dust	Contractor, IEO/ ECO	Daily

Table 2-10: General					
Activity/Structure/Infrastructure	General Operational requirements				
Environmental Aspect	**Potential Impact/s**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
		will greatly (if at all) effect air quality in the vicinity of the site.			
	Traffic management	There is only one access road to the site, and as such vehicles travelling in both directions will use the road. Due to the nature of the area, there is very minimal traffic in any event, and as such the increase in a few trucks everyday will have no impact on overall traffic volumes. Daily control must however be implemented to ensure than any traffic on and off the site is monitored by a guard house and control gate on the site. Traffic to and from the site must be managed appropriately. A parking area must be roughly demarcated on the site close to the construction site office. Traffic movement around the site must be kept to a minimum and should only happen when very necessary to avoid more disturbances around the site.	Ensure traffic impacts responsibly addressed.	Contractor, IEO/ ECO	Continuous
Social economic	Operational hazards	A protocol for response during emergencies must be developed and maintained. This protocol must be kept at the site office/control room.	Ensure that emergency preparedness before occurrence.	PSM	Once-off & updated as required
		An on-site safety plan must be available and all staff must be trained in the appropriate emergency procedures.		PSM, IEO	Once-off & updated as required
		Ensure that the contact details of the police or security company, ambulance service and fire brigade are available on site.		IEO	Once-off & updated as required

Table 2-11: Operation of the electrical infrastructure and PV panels

Activity/Structure/Infrastructure	Operation of the PV plant and relevant infrastructure				
Environmental Aspect	**Impact**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
Access control	Unauthorised access to 'controlled' area by un-authorised, un-trained parties	The site must be fenced off from the remainder of the operations and access thereto well regulated by a designated operator.	No unauthorised access to the facility. Records kept of all access gained to the plant area	Proponent	Continuous
Ground water	Negative quality impacts resulting from ablution/sanitary facilities	Provide appropriate (capacity/effective containment of grey and black water), above-ground, ablution/sanitary arrangements for employees, and maintain/service such for the duration of their operational lifespan.	No contact between black /grey water and site soils. No offensive odours emanating from ablution facilities.	Proponent, Contractor	Once-off, with weekly maintenance thereafter
	Negative quality impacts resulting from the storage of fuel, oil and hazardous materials	Appropriate hydrocarbon spill management kits must be kept and maintained on site wherever fuels and oils are stored, and where refuelling and /or servicing of plant, vehicles and machinery takes place, in order to manage potential hydrocarbon spillages effectively.	Spill management kits available on site and replenished as necessary	Proponent	Continuous
		Training, in the use and maintenance of the abovementioned kits, as well as any contaminated waste products, must be provided to ALL staff either directly or indirectly, involved in any of the activities identified above.	Records of training kept on record	Proponent	Once-off, with annual refresher training every year thereafter
		Soil contaminated through the spillages of fuel, oil or hazardous materials within the construction camp must be immediately collected and placed within a dedicated, water-tight, skip/container within the camp/s, for subsequent disposal at an appropriately licensed hazardous waste disposal facility.	Dedicated 'contaminated soil' skip/container on site. Contents removed to hazardous landfill site. Safe disposal certificates kept on record for all contaminated soil removed from site.	Proponent	Continuous
		A schedule for servicing and disposal of the sewage waste will be set forth so as not to cause unpleasant or unhygienic conditions for the site personnel by an approved service provider specializing in the maintenance and treatment/disposal of sewage waste. Soak away systems must be avoided. Other methods must be considered such as dry systems, etc.	Ensure responsible management of sanitation systems which are best environmental option.	PSM. IEO/ ECO	Once-off & inspect daily
	Negative quality impacts	No servicing of vehicles and equipment is to take	No servicing of vehicles	Proponent	Continuous

Table 2-11: Operation of the electrical infrastructure and PV panels

Activity/Structure/Infrastructure	Operation of the PV plant and relevant infrastructure				
Environmental Aspect	**Impact**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
	resulting from vehicles	place on site an only off-site at appropriate service yards.	equipment on site		
	Aquifer abstraction	Each 75MW PV array is only proposed to utilise up to 2500 m^3 per year, which, when abstracted over a period of 12 months, is 208 m^3 per month. Groundwater levels in the borehole must however be checked and recorded on a monthly basis, to determine water levels variations. All attempts should be made to use rainwater runoff from the panels and divert to storage tank to use as cleaning water.	Ensure responsible use of groundwater in water scares area.	PSM	Monthly, if groundwater water is used.
Surface Water	Erosion	Erosion due to surface runoff from the panels must be monitored. Early identification is crucial, whereby corrective action must be taken immediately.	To ensure topsoil integrity and soil structures	ECO or IEO	Weekly
	Contamination from washing detergents used to wash solar panels	Make use of accredited bio-degradable detergents for the washing of solar panels.	As to not contaminate soils or groundwater.	ECO	Once off – regular monitoring
Biodiversity	Poaching/killing of indigenous site fauna	Under no circumstances is the poaching, or killing, of indigenous site fauna by the contractor, or his/her employees, to be tolerated.	No harm to indigenous site fauna. Records kept on file of applicable training by contractor	Proponent, PSM	Continuous. Once-off training, with annual refreshers every year thereafter
		Non-compliance with the above condition to constitute grounds for the immediate, permanent removal of guilty parties from site	Signed declarations by contractor and all his/her employees in acknowledgement of this provision	Proponent, PSM	Continuous
	Destruction of site flora through unauthorised 'harvesting' thereof	Under no circumstances are wood, plant, or medicinal plants, to be 'harvested' by the contractor, or his/her employees.	No destruction/'harvesting' indigenous site flora. Records kept on file of applicable training by contractor	Proponent, PSM	Continuous. Once-off training, with annual refreshers every year thereafter
		Non-compliance with the above condition to constitute ground for the immediate, permanent removal of guilty parties from site	Signed declarations by contractor and all his/her employees in	Proponent, PSM	Continuous

Table 2-11: Operation of the electrical infrastructure and PV panels

Activity/Structure/Infrastructure	Operation of the PV plant and relevant infrastructure				
Environmental Aspect	**Impact**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
			acknowledgement of this provision		
	Anthropogenic veld fires resulting in biodiversity loss	If fires, for the purposes of cooking, are to be tolerated within the control/security office, the following conditions are to apply: • Must be well removed from fuel and hazardous material storage areas. • Fire-extinguisher must be readily available; • Must be screened from wind with non-flammable material/s; and • Non-smouldering ash residues must be disposed of too general waste skip/s, or containers, in the camp.	Well managed, clearly designated, area/s established for cooking fires.	Proponent, PSM	Continuous
	*Infestation and propagation of alien invasive floral species	The Project Company must ensure that alien invasive floral species within the bounds and perimeter of the facility are managed in accordance with relevant provisions of the alien invasive species management plan.	No alien invasive floral species infestation within facility and outskirts	Proponent, PSM	Continuous
		Employees to receive training and assistance by environmental officer in regard to the above requirements.	Copy of alien invasive species management plan provided to contractor/s. Records available of relevant training.	Proponent, PSM	Once-off
Socio-economics	Social impacts stemming from an influx of contractors and associated employees	Only security, employees and contractor/s and his/her employees, or sub-contractors, may gain access to the facility.	Well controlled access to facility	Proponent, PSM	Continuous
		Access by the employees/contractors/security to adjacent farms (i.e. other than those falling within the ambit of the project) is strictly forbidden, unless otherwise agreed upon, in writing, by the relevant landowner/s. Trespassing is to constitute immediate grounds for the permanent removal of guilty parties from the project.	No trespassing	Proponent, PSM	Continuous
		The negative impact on housing and service	Use of local labour	Proponent, PSM	Continuous

Table 2-11: Operation of the electrical infrastructure and PV panels					
Activity/Structure/Infrastructure	Operation of the PV plant and relevant infrastructure				
Environmental Aspect	**Impact**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
		delivery provision pressures could be reduced by sourcing the majority of permanent/maintenance employment from local communities, thus reducing the need to bring new people into the local area.	sourced from the District to the greatest extent practical		

Table 2-12: Waste Generation and Management					
Activity/Structure/Infrastructure	Operation related waste (general and hazardous) generation and management				
Environmental Aspect	**Impact**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
Air Quality	Degraded air quality due to the burning of waste	Under no circumstances must waste ever be burnt, or buried, on site.	Safe waste disposal/management certificates on record for all waste generated during the construction phase	Proponent, PSM	Continuous
Ground water	Diminished ground water quality through poor waste management practices	Waste oil generated from vehicle workshops/drip trays or transformer oil must be immediately stored in sealable, water-tight, steel drums or containers within an impermeable bund wall with a capacity of at least 110% of the volume of the largest container/drum held therein – for subsequent removal from site for either recovery, or disposal thereof.	Waste oil/transformer liquid storage area/s appropriately bunded. Safe disposal/management certificates on record for all oil removed from site	Proponent, PSM	Once-off bund establishment. Continuous requirement for storage of waste oil.
		Waste oil/ transformer oil storage areas may only be placed within relevant demarcated areas.	No waste oil storage outside of any dedicated areas	Proponent, PSM	Continuous
		Ensure that no refuse or builders rubble generated on the premises be placed, dumped or deposited of on adjacent/surrounding properties including road verges, roads or public places and open spaces during or after the operational period outside areas demarcated for waste (in accordance with the layout plan produced).	All discard materials produced during construction must be taken offsite and deposited in an accredited landfill site.	Proponent, PSM	Weekly
		The project company shall ensure that waste and surplus food, food packaging and organic waste are not deposited by his employees anywhere on the site except in refuse bins for removal on a weekly basis by the Contractor.	Refuse bins shall be weather and animal-proof	Proponent, PSM	Weekly
		A suitable leak proof container for the storage of oiled equipment (filters, drip tray contents and oil changes etc.) must be established.	To ensure that groundwater is not negatively affected	Proponent, PSM	Once-off & inspect daily
Surface water	Surface storm water contamination through contact with waste material/s	Surface storm water run-off must not be able to flow through any waste storage areas. Nor must skips/containers, or waste storage areas, be positioned where surface water may pond or flow	No contact between construction waste and surface water	Proponent, PSM	Continuous

Table 2-12: Waste Generation and Management					
Activity/Structure/Infrastructure	Operation related waste (general and hazardous) generation and management				
Environmental Aspect	**Impact**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
		preferentially during rainfall events			
Soils	Soil contamination through contact with waste material/s	Waste must not be temporarily stored on bare soil surfaces; Except where: • The waste is regarded as being 'inert' (e.g. waste bricks, un-contaminated steel scrap, etc.), in terms of the definition provided for in the National Environmental Management: Waste Act (59 of 2008); • The waste will be removed from site within 30 days of the generation thereof; and • No component of the waste is susceptible to dispersal by wind	No contact between site soils and potential contaminants in construction waste/s	PSM. IEO/ ECO	Continuous
		Any building rubble waste generated on site by contractor/s / project company must be gathered up daily and placed in skips/containers appropriate to the classification thereof (i.e. hazardous Vs. general waste) .	No waste strewn over site over-night. No mixing of general and hazardous wastes	PSM. IEO/ ECO	Daily, for the duration of the construction period
		Skips/containers must, therefore, be clearly marked for classification purposes.	Waste skips clearly marked for applicable waste types to be discarded therein	PSM. IEO/ ECO	Once-off
		Safe disposal//management certificates must be obtained for all waste removed from site.	Safe disposal//management certificates kept on record	PSM. IEO/ ECO	Continuous, for every incidence of waste removal from site
		Waste may only be taken to appropriately licensed/permitted waste management facilities	Proof of facility licensing kept on record	PSM. IEO/ ECO	Continuous
		Waste skip/container collection and replenishment schedules must be developed and managed pro-actively by the contractor/s, in order to ensure that no skips/containers are left full and/or over-flowing for any extended period of time and that there is always appropriate temporary waste storage capacity on site.	Temporary waste storage capacity available to the contractor/s	PSM. IEO/ ECO	Continuous. No skip left full on site for more than a week.
		A schedule for servicing and disposal of the	As to ensure the integrity	PSM.	Once-off & inspect daily

Table 2-12: Waste Generation and Management					
Activity/Structure/Infrastructure	Operation related waste (general and hazardous) generation and management				
Environmental Aspect	**Impact**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
		sewage waste will be set forth so as not to cause unpleasant or unhygienic conditions for the site personnel by an approved service provider specializing in the maintenance and treatment/disposal of sewage waste. Soak away systems must only be allowed during the construction period in the event of lack of adequate municipal services. Further investigation must be employed regarding dry system use, due to the arid nature and water scarcity.	of soil and groundwater environments.	IEO/ ECO	
	Unsustainable use of natural resources and unnecessary landfill airspace utilisation	The Project Company will provide a policy to specify waste minimisation, reuse, recovery and recycling, as well as temporary storage and disposal; where such plans would need to be signed off by competent site environmental personnel/environmental control officer (ECO) prior to the start of site operations.	Approved before operation commences.	Proponent, PSM. IEO/ ECO	Once-off, prior to commencement

2.10 DECOMMISSIONING PHASE

Table 2-13: Decommissioning plan and closure plan

Activity/Structure/Infrastructure	Planned Permanent Closure and Decommissioning				
Environmental Aspect	**Impact**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
Rehabilitation	N/A	This activity will not be decommissioned in the foreseeable future if economically viable. This project has an extended lifespan period, with potential for later expansion. From this, it is determined that decommissioning of the project will only occur after 20-25 years. Due to this, no possible mitigation can at this stage be tabled, due to many environmental changes that may take place over time, which will subsequently render any mitigation discussed, void. With this in mind a preliminary decommissioning and closure plan has been developed for the site below. The purpose of this plan is to act as a guideline for the mitigation and management measures to be implemented to avoid, reduce and minimize potential environmental impacts arising out of the decommissioning of the facility and infrastructure. However, if the panels are removed, they will be sent to a recycling facility. Depending on the technological advancements that will have taken place during the life span of the plant, some of the infrastructure such as frames can be used for a new plant, otherwise they can be removed and also recycled. This must be undertaken according to the plan (see below)	To responsibly rehabilitate the area to a degree similar to its present state.	Contractor/Applicant/EO/rehabilitation specialist	Once off prior to rehabilitation
		Suitable financial provisions by project company must be made for decommissioning and closure according to the developed decommissioning plan.			

Table 2-13: Decommissioning plan and closure plan

Activity//Structure//Infrastructure	**Dismantle and removal of above Ground Structures**				
Environmental Aspect	**Impact**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame//Frequency**
Existing infrastructure and planning	N/A	Identify existing structures and volume/weight requirements prior to commencement of dismantling. Furthermore, identify and arrange contracts for removal and recycling of materials.	To ensure proper planning before initiating decommissioning activities.	Contractor/ PSM	Once off (prior to commencement)
		Ensure sufficient housing of construction workers in nearby towns thus utilizing existing service infrastructure.		Contractor	Continuous
		Identify where and when possible disruptions to traffic flow could occur and communicate with the relative authorities and affected parties (Community/ Landowner liaison forum).		Contractor	Continuous
		Where new access is required off an existing road, permission must be obtained from the relevant authority (e.g. provincial/ local roads agency).		Contractor	Continuous
		Undertake a survey of the pre-decommissioning state of the road infrastructure and repair damage directly resulting from the decommissioning activities.		Contractor/ Applicant	Prior to commencement. Continuous.
		Water for the purposes of decommissioning must be obtained from and approved by , licensed sources where relevant		Contractor	Continuous
		Fencing is to be removed following all above and below ground structure removal. Fencing material is to be recycled as far as possible and any non-recyclable material is to be disposed of at a licensed disposal facility.		Contractor	At time of removal thereof
		Adequate ablution facilities must be provided (no less than 1 toilet for every 15 workers).		Contractor ECO	Continuous
		All ablution facilities must be maintained regularly, as required, and sewage must be		ECO	Continuous

Table 2-13: Decommissioning plan and closure plan					
		collected and disposed of at suitably licensed facilities. In the event the on-site ablution facilities (e.g. chemical toilets, septic tanks, etc.) are required then these must comply with the relevant regulatory requirements and standards.			
		A staging area for storage/lay down of modules and waste must be identified and delineated prior to commencement.		Contractor/ PSM	Once off (prior to commencement)
Dismantling	N/A	All vehicles and equipment utilized must be in good working order and must be checked on a regular (daily) basis for leaks, emission concerns, etc.	Ensure responsible reuse, recycling and disposal of facility infrastructure	Contractor	Continuous
		Separation of recyclable and non-recyclable waste must be undertaken at source and storage areas clearly defined.		Contractor	Continuous
		Various recyclable waste streams must be removed from site to a licensed waste recycling facility and non-recyclable waste must be disposed of at a licensed waste disposal facility.		Contractor	Continuous
		The speed limit on the access roads must be set to 60 km/hr. on gravel roads, 30 km/hr. through residential areas and thereafter follow safe/legal operational speeds for the particular vehicles and provincial/national roads. Construction workers must be made aware of their specific responsibilities in terms of the environmental impacts i.e. controlling noise levels, reducing dust, not poaching. Construction workers must be made aware that no alcohol/drugs are allowed on site and no workers under the influence are permitted on site. Construction workers must be made aware that firearms or traditional weapons will not be allowed on site unless approved for security purposes.		Contractor	Continuous

Table 2-13: Decommissioning plan and closure plan

Activity//Structure//Infrastructure	**Concrete Removal (in the event that the module structural foundations utilize concrete)**				
Environmental Aspect	**Impact**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame//Frequency**
Storage	N/A	All concrete waste is to be stored in a designated area applicable to its disposal route	To ensure decommissioning done responsible and required successful manner	Contractor//ECO	Continuous
		No concrete waste is to be left in situ.		Contractor	Continuous
Removal	N/A	All concrete is to be disposed of at a licensed disposal facility or alternatively removed from site to a recycling facility for processing		Contractor	Continuous
Activity//Structure//Infrastructure	**Remove and Dismantle Underground Utilities**				
Environmental Aspect	**Impact**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame//Frequency**
General	N/A	All underground utilities are to be removed and adequately recycled or disposed of.	Remove all anthropogenic components from the site	Contractor	Continuous
		A plan/schematic on the location and extent of underground utilities is to be made available to all construction personnel undertaking this activity.		Contractor	Continuous
Trenching	N/A	Trenches for the removal of underground utilities must be kept to a minimum size and depth in order to successfully remove all utilities.		Contractor//ECO	Continuous
		Soil is to be stockpiled adjacent to the trench for ease of backfilling purposes and to avoid unnecessary translocation of soil types/seed banks. Topsoil must be stored separately from subsoil and backfilled in the order in which they were removed.		Contractor /ECO	Continuous
		Storm water management measures are to be implemented must there be a need for such.		Contractor	Continuous
Activity//Structure/Infrastructure	**Removal of access roads**				
Environmental Aspect	**Impact**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
Road Removal	N/A	All internal and external access roads are to be removed following removal of all above and below ground infrastructure.	Ensure all areas are decommissioned	Contractor	Continuous

Table 2-13: Decommissioning plan and closure plan					
		Soil/gravel comprising the access roads which was imported is to be disposed of at a licensed disposal facility or alternatively and on approval of the relevant authority, utilized in the stabilization of erosion gullies or reinstatement of old borrow pits/diggings.		Contractor/ECO	Continuous
Storage	N/A	Temporary storage of soil/gravel stockpiles will be permitted in designated areas within the project footprint. These stockpiles will be protected from wind and water erosion must this occur.		Contractor	Continuous
Activity/Structure/Infrastructure	**Final Site Contour and Rehabilitation**				
Environmental Aspect	**Impact**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
Contouring	N/A	The site will be contoured to its pre-construction condition as far as practicably possible or alternatively to the requirements of the landowner.	Ensure landscape it somewhat similar to previous state ensure erosion not occur through steep slopes.	Contractor/Applicant	Once-off planning prior to contouring
		Grading activities are to be limited to previously disturbed areas that require re-contouring.		Contractor/ECO	Continuous
		Disturbance of natural drainage patterns and vegetation will be kept to a minimum.		Contractor	Continuous
Rehabilitation	N/A	Following contouring, all disturbed areas must be assessed for rehabilitation augmentation requirements (such as topsoil augmentation, seeding, planting, etc.). This must ideally be undertaken by a professional and experienced rehabilitation specialist applicable to the province and site specific location.		Contractor/Applicant/ECO/rehabilitation specialist	Once off prior to rehabilitation
		Only endemic species are to be utilized in the vegetation establishment. The density of species is to approximate the surrounding species' specific densities as far as possible.		Contractor/ECO/rehabilitation specialist	Continuous
		A weed control and eradication program must be developed and implemented should the need for such arise. All category listed weeds (CARA) are to be controlled.		Contractor/EAP/Rehabilitation Specialist	Continuous

Table 2-13: Decommissioning plan and closure plan					
		The use of herbicide (and/or pesticides) must first be agreed with the relevant authority must the need for such use arise.		Contractor/Registered pest control officer	Continuous
		Regular monitoring of the rehabilitation efforts must be undertaken to promptly identify concerns and actions required.		Contractor/ECO/Applicant	Following rehabilitation works on a regular basis (frequency to be determined and agreed upon)
		Aftercare must be provided as and when needed to ensure adequate rehabilitation of the site.		Contractor/ECO/Applicant	As and when the need for such is identified
Activity/Structure/Infrastructure	**Planned Permanent Closure and Decommissioning**				
Environmental Aspect	**Impact**	**Management Actions**	**Target**	**Responsible Party**	**Time-frame/Frequency**
Rehabilitation	N/A	This activity will not be decommissioned in the foreseeable future. This project has an extended lifespan period, with potential for later expansion. From this, it is determined that decommissioning of the project will only occur after 20-25. Due to this, no possible mitigation can at this stage be tabled, due to many environmental changes that may take place over time, which will subsequently render any mitigation discussed, void. With this in mind a preliminary decommissioning and closure plan has been developed for the site. The purpose of this plan is to act as a guideline for the mitigation and management measures to be implemented to avoid, reduce and minimize potential environmental impacts arising out of the decommissioning of the facility and infrastructure. This plan above is considered an extension of the EMPr and therefore legally binding. However, if the panels will be removed, they will be sent to a recycling facility. Depending on the technological	To responsibly rehabilitate the area to a degree similar to its present state.	Contractor/Applicant/ECO/rehabilitation specialist	Once off prior to rehabilitation

Table 2-13: Decommissioning plan and closure plan					
		advancements that will have taken place during the life span of the plant some of the infrastructure, such as frames can be used for a new plant otherwise they can be removed and also recycled. This must be undertaken according to the plan (see above)			
		Suitable financial provisions by project company must be made for decommissioning and closure; according to the developed decommissioning plan.			

3. ENVIRONMENTAL REHABILITATION

This rehabilitation plan provides details as to how site rehabilitation (whether this is concurrent with construction, operation, or upon potential decommissioning of the site) should be undertaken, with a step by step break-down of the rehabilitation measures to be implemented.

3.1 PRINCIPLES OF REHABILITATION

The following principles should be followed during the planning, implementation and post-implementation phases of the rehabilitation process:

- Comprehensively define and plan the rehabilitation process prior to any disturbance taking place;
- Define and agree upon end-goals for the rehabilitation process, such as land-use, rehabilitation objectives, areas to be rehabilitated, etc.;
- Prevent and continually manage the propagation and establishment of alien and invasive species;
- As far as is practical, implement concurrent rehabilitation in order to limit degradation of soil biota;
- Limit the footprint area of the disturbing activity in order to minimise environmental damage;
- Rehabilitation earthworks should aim to reshape the disturbed areas to represent the area prior to disturbance and to present a safe, functional and sustainable environment;
- Visual impacts of rehabilitated areas must be minimised by recreating natural landforms and ensuring that reshaped areas are visually suited to surrounding landscapes;
- Natural landforms such as drainage lines, undulating areas and ridges, which have been damaged during activities, must be restored;
- Implement erosion control measures to prevent the loss of topsoil during and after construction activities;
- Rip and aerate all compacted soils in order to allow for plant establishment and growth;
- Re-vegetate all disturbed areas with suitable floral cover and methods;
- After completion of activities ensure that the site is safe for use by the intended land users and remove all activity equipment; and
- Implement a monitoring plan to determine the efficacy of the rehabilitation exercise (This should be a long-term monitoring program).

3.2 REHABILITATION OBJECTIVES

Before any rehabilitation measures are implemented, it is of vital importance to define goals and objectives for the rehabilitation procedures. These objectives include:

- Defining an end-use for the area in question and returning the area to as-close-as-possible to the pre-development environment;
- Ascertain whether the proposed end-use is compatible with the land capability of the area;
- Resources allocated to rehabilitation procedures must be sufficient to ensure effective rehabilitation;
- Contractors entrusted with rehabilitation operations must be suitably qualified;
- Planning of rehabilitation must be implemented as part of the planning and pre-construction phase of the proposed project;

- Continual record-keeping must be implemented in order to ensure effective and responsible rehabilitation; and
- Monitoring and aftercare must be implemented in order to ensure efficacy of rehabilitation.

3.2.1 LAND-USE OBJECTIVES (DECOMMISSIONING)

The remote and arid nature of the site, in combination with the low average annual rainfall (approximately 100mm/annum) of the region and poor agricultural potential of the site soils (i.e. 'poor' in respect of planted crop production), limits the range of potentially feasible end land-use alternatives available to the proponent. To this end, the end/rehabilitated land-use for the site is proposed as extensive grazing land; where according to the draft JTGDM EMF, stocking rates in the Northern Cape are 14 -30ha/LSU. The Agricultural Research Council's Institute for Soil, Climate and Water (ARC-ISCW), put this figure at closer to 20-25ha / LSU for the region in question.

It is proposed, therefore, that the most feasible end land-use of the aforementioned option would be as follows; where closure of the facility would be conditional to –

All rehabilitated land should be capable of sustainably supporting an extensive livestock production system of at least 30ha / large stock unit (LSU).

3.2.2 ECOLOGICAL OBJECTIVES

Apart from ensuring that the rehabilitation of the site yields outcomes supportive of sustainable economic activity(ies), a further critical objective of the site rehabilitation is to achieve a stable, climax state, representative of the pre-development vegetation types; where the ecological system functioning of the plant community(ies) is tolerant of the prevailing environmental conditions of the region.

The 'ecological' objective of site rehabilitation at the facility is thus to -

Ultimately ensure that efforts by the proponent to re-establish 'Bushmanland Arid Grassland' over disturbed footprints yields stable, climax state, floral communities with ecosystem functioning and biological diversity at least resembling pre-development conditions to the extent that reasonable and feasible rehabilitation efforts allow.

3.2.3 GENERAL OBJECTIVES

Apart from the land use and 'ecological' objectives stated in the preceding sections, the potential closure and decommissioning of the operations would need to see the subject areas made safe, to the extent that –

The rehabilitated development site should not pose any significant direct, indirect or residual risks to either human health and livelihoods, or environmental quality, over the short-, medium- or long-term post closure and rehabilitation thereof.

3.3 GENERAL SURFACE REHABILITATION

The 'general surface rehabilitation' of degraded/disturbed development areas to meet the stated end land-use and ecological objectives, must comply with the following broad sequentially implemented phases of rehabilitation(Table 3-1):

Phase 1: Removal of all surface structures, infrastructure, as well as any other anthropogenic materials that may act to impede subsequent phases of rehabilitation;
Phase 2: Preparation and amelioration of structural and infrastructural development Footprints, as well as disturbed areas, for further rehabilitation;
Phase 3: Replacement of stockpiled topsoil to a depth of at least 30cm;
Phase 4: Initial hydro-seeding of prepared areas to establish basal cover for subsequent phases of rehabilitation;
Phase 5: Initial maintenance and monitoring of basal cover;
Phase 6: Establishment of 'Bushmanland Arid Grassland' once sufficient basal cover is achieved; and
Phase 7: On-going monitoring and maintenance.

3.4 MAINTENANCE OF REHABILITATED AREAS

All areas must be maintained for a period of at least three years after formal rehabilitation ceases. During maintenance, the following should be done:

- Clearing of alien and invasive plants on a bi-annual basis to allow native and indigenous plants to out-compete alien and invasive species, and take a strong hold in the area;
- Watering of larger trees that were planted during rehabilitation to allow for these trees to establish adequately;
- Patching/fixing (if necessary) of any areas that have eroded since rehabilitation;
- If hydro-seeding was used and not effective during 1st application, a second application of hydro-seed mixture may have to be applied in certain areas. The application of hydro-seed should be at the discretion of the hydro-seeding specialist;
- Maintain water run-off areas so as to not increase chances of further potential erosion;
- Encourage growth of plants and grasses by cordoning off, fertilising and watering areas that have struggled to take root or re-vegetate; and
- Areas of high importance (i.e. slopes) should be more vigorously maintained, fertilized and watered during maintenance (under the guidance of a suitable specialist).

Table 3-1: Requirements for General Surface Rehabilitation				
No.	Management/Monitoring Measures	Target	Responsible party(ies)	* Time-frames
PHASE 1: Removal of Surface Structures and Infrastructure (Decommissioning and Closure Only)				
1.1	All surface structures, infrastructure and 'hard surfaces' (*inter alia*, redundant surfaced roads, landscaped and paved areas) are to be demolished and removed from the disturbed development footprint; unless an alternative/continued use for any such items is agreed upon, in writing, with the competent authority (in conjunction with the local authority)	Development footprint/site cleared of all facility related structures and infrastructure.	Proponent, contractor	Once-off
1.2	The foundations of removed structures and infrastructure are to be removed to a depth of at least 0.5m below ground level.	No remaining sub-surface structures that may impede further phases of rehabilitation, or the ultimate root penetration of re-introduced plant species.	Proponent, contractor	Once-off
1.3	Care should be taken in implementing 1.1 & 1.2 above to ensure nominal losses of underlying soils.	No evidence of significant sub-surface soil loss	Proponent, contractor	On-going
1.4	On-going alien and invasive floral species control is required through all phases of rehabilitation.	No establishment and propagation of 'undesirable' plant species over rehabilitation sites.	Proponent, contractor	On-going. Fort-nightly inspections; unless otherwise expressly stated for subsequent phases of rehabilitation
PHASE 2: Preparation of underlying soils for further phases of rehabilitation				
2.1	Exposed, compacted, soil surfaces must be ripped to a depth of at least 0.5m to allow for adequate aeration and plant root penetration.	No topsoil replacement to compacted underlying soil horizons.	Proponent, contractor	Once-off
2.2	Pre-development topography should be reasonably restored through shaping, such that the topography of rehabilitated areas will ultimately be commensurate with that of adjacent, non-disturbed areas.	No evidence of significant alteration to 'natural', pre-development, surface drainage and topographical regime.	Proponent, contractor	On-going

Table 3-1: Requirements for General Surface Rehabilitation				
No.	Management/Monitoring Measures	Target	Responsible party(ies)	* Time-frames
2.3	A 'post-rehabilitation' surface contour plan should be developed by the proponent in consultation with a specialist surface water hydrologist, such that would then inform implementation of 2.2 above.	Post-decommissioning contour plan on record. Said plan mitigates potentially significant impacts on surface hydrology.	Proponent, Specialist hydrologist	Once-off, within 12 months of EMP approval
2.4	Care should be taken in choosing a method/machinery to implement 2.2 above, such that ripped soils are not re-compacted through efforts to appropriately shape the disturbed sites.	No topsoil replacement to compacted underlying soil horizons.	Proponent, contractor	Once-off
2.5	Vehicular access to rehabilitation sites from this phase of rehabilitation onward should be limited to vehicles/machinery expressly required for the sound implementation of this plan.	No *ad hoc*, unauthorised, vehicular movements over rehabilitation sites.	Proponent, contractor	On-going
PHASE 3: Topsoil / growth substrate replacement/preparation				
3.1	Topsoil should be replaced to a consistent depth of at least 30cm across areas prepared in terms of phase 2.	Topsoil replacement implemented prior to further efforts to re-introduce basal cover. Even surface, free from surface ponding of water.	Proponent, contractor	Once-off
3.2	Topsoil should be screened, as necessary, to remove any foreign objects, rocks, etc., prior to the replacement thereof.	Replacement of topsoil that is fit for purpose, and which does not impede the proponent from achieving the stated end-use objectives for the site.	Proponent, contractor	On-going
3.3	Any areas with slope >3° should be inspected weekly for signs of topsoil erosion following the replacement thereof, and appropriate action taken to curb any problematic areas.	Records of weekly 'erosion inspections'. No topsoil erosion following replacement.	Proponent, contractor	Monitor weekly, address erosion within 48 hours

Table 3-1: Requirements for General Surface Rehabilitation				
No.	Management/Monitoring Measures	Target	Responsible party(ies)	* Time-frames
3.4	Care should be taken during topsoil replacement to minimise the extent to which vehicle movement over replaced topsoil may act to compact these surfaces.	No significant compaction of soil surfaces prior to commencement of re-seeding (phase 4)	Proponent, contractor	On-going
PHASE 4: Re-seeding for basal cover establishment				
4.1	A grass mixture of endemic grasses known to be non-invasive within the area, such as *inter alia Stipagrostis anomala, Stipagrostis obtusa, Stipagrostis ciliata var. capensis, Stipagrostis uniplumis var. neesii and Schmidtia kalahariensis* should be utilised in the re-seeding process for the re-introduction of basal cover over rehabilitation sites.	Establishment of basal cover commensurate with the indigenous floral communities of the pre-development site, such that would also allow the proponent to meet the stated ecological objectives for the rehabilitated site(s).	Proponent, contractor, ecological / rehabilitation specialist	Once-off
4.2	The proponent should investigate the commercial availability of seed stocks of the aforementioned grass species; and if not commercially available, the proponent must implement a seed harvesting programme from undisturbed areas of the farm (in conjunction with a competent specialist).	Sufficient available seed stock on hand to effect rehabilitation that meets the stated land-use objective for the site.	Proponent, specialist	Proof of commercial availability within 3 months of the EMP approval, or seed harvesting programme commencement within 12 months.
4.3	Hydro-seeding, or any other suitable means of re-introducing basal cover, should be planned and implemented in conjunction with the professional inputs and services of a competent contractor, with experience in such undertakings (proven track record in the Northern Cape preferable).	Optimal establishment of basal cover that will ensure that the proponent achieves the stated ecological objectives for the site.	Proponent	Once-off appointment with on-going management thereafter
4.4	Re-seeding should commence within 30 days of topsoil replacement, and areas should be free of alien and invasive plants.	Records kept of topsoil replacement and re-seeding dates for all rehabilitation sites.	Proponent, contractor	Within 30 days of topsoil replacement

Table 3-1: Requirements for General Surface Rehabilitation				
No.	Management/Monitoring Measures	Target	Responsible party(ies)	* Time-frames
4.5	The potential requirements for the irrigation and fertilisation of seeded areas, is to be done according to the recommendations and specifications of the specialist contractor appointed for this work.	Optimised efficacy of efforts to establish appropriate basal cover over rehabilitated areas.	Proponent, contractor	Once-off
4.6	No grazing on rehabilitated areas is to occur within three years of phase 4 completion.	• Documented records of dates upon which re-seeding was effected; • Establishment of robust basal cover prior to introducing grazing herbivores; and • Proponent to meet stated ecological objectives for the rehabilitated sites	Proponent	3 years from re-seeding
PHASE 5: Intermediary monitoring and maintenance of basal cover				
5.1	Weekly monitoring should take place in order to ascertain the efficacy of the seeding, and to repair any areas where gullies or rills are forming. Appropriate interventions to be adopted where basal cover establishment fails.	Documented records of weekly inspections. Basal cover establishment commensurate with comparable adjacent undisturbed areas of the farm Konkoonsies (i.e. % cover relative to exposed soil surfaces).	Proponent, contractor	Weekly monitoring until adequate basal cover establishment has been confirmed by ecological specialist
5.2	Regular application of fertiliser, under the guidance of a suitably qualified soil scientist, should take place in order to ensure efficient establishment of vegetation cover until such time as sufficient organic matter is being produced by the established grasses to allow for self-sustaining growth.	Basal cover establishment commensurate with comparable adjacent undisturbed areas of the farm Konkoonsies (i.e. % cover relative to exposed soil surfaces).	Proponent, soil scientist	On-going, as per specialist recommendations

Table 3-1: Requirements for General Surface Rehabilitation				
No.	Management/Monitoring Measures	Target	Responsible party(ies)	* Time-frames
5.3	If re-seeding for basal cover establishment was not effective during 1st application, a second application of hydro-seed mixture may have to be applied in certain areas. The application of hydro-seed should be at the discretion of the specialist contractor.	Basal cover establishment commensurate with comparable adjacent undisturbed areas of the farm Konkoonsies (i.e. % cover relative to exposed soil surfaces).	Proponent, contractor	As necessary, per specialist recommendations
PHASE 6: Establishment of Bushmanland Arid Grassland				
6.1	Once sufficient basal cover has been established, the introduction of species representative of the applicable vegetation types over the site may commence.	Establishment of stable, climax state, plant communities on rehabilitated areas.	Proponent, contractor	On-going
6.2	Introduction of these species should commence through the stages of natural succession [i.e. Pioneer species, Secondary species (e.g. *Rhigozum trichotomum, Lycium eenii, Hermannia spinosa and Eriocephalus microphyllus var. pubescens*) and Climax state (e.g. *Boscia foetida subsp. foetida* and *Parkinsonia africana*)].	Establishment of stable, climax-state, plant communities on rehabilitated areas.	Proponent, contractor	On-going
6.3	The potential requirements for the irrigation and fertilisation of re-introduced floral species, is to be done according to the recommendations and specifications of the specialist contractor appointed for this work.	Effective establishment and growth of introduced floral species.	Proponent, contractor	On-going.
PHASE 7: On-going monitoring, maintenance and aftercare				
7.1	Monitoring and maintenance (as necessary) of phase 6 implementation is to be effected for at least three years following the completion of active species re-introduction to the site.	• At least 80%, sustainable, establishment of re-introduced plants/trees; and • 'Ecological' objectives for site closure / rehabilitation met.	Proponent	On-going, Monthly inspections for at least two years; every 6 months thereafter if efforts to rehabilitate are proving effective.

Table 3-1: Requirements for General Surface Rehabilitation				
No.	Management/Monitoring Measures	Target	Responsible party(ies)	* Time-frames
GENERAL PROVISIONS				
8.1	External, independent, 'Rehabilitation' compliance audits must be undertaken by a competent auditor for all areas where rehabilitation is being implemented on site. Audit to at least document compliance with this plan, as well as any other relevant provisions of the EMP.	Full compliance with the provisions for site rehabilitation.	Proponent, External Auditor	Every 6 months for as long as any rehabilitation (concurrent and/or closure) is being undertaken at the site
8.2	The proponent must comply with all relevant enviro-legal provisions concerning protected floral species, in executing any relevant provision of this plan.	Full legal compliance for the duration of rehabilitation efforts.	Proponent	On-going

3.5 CONCLUSIONS AND SUMMARY OF REHABILITATION PLAN

This rehabilitation plan has taken into consideration all possible areas that need to be rehabilitated on the project site. The effective end result of rehabilitation should be to return the rehabilitated project areas as close to their previous state as is possible and practical. All acceptable options for recycling and reuse should be considered before final disposal of any building materials, steel structures, electrical equipment or any associated equipment that could be reused, recycled or appropriately scrapped.

The rehabilitation plan is a working document and should change as seen fit. The process of rehabilitation is diverse and various obstacles will be encountered during rehabilitation which may call for a revision in this plan. Maintenance of all rehabilitation must be on-going for a period of three years. This maintenance will help to ensure that all rehabilitated areas, re-vegetated areas and alien invasive control is undertaken.

Rehabilitation of disturbed areas, as far as is practical, should proceed concurrently with the remainder of the construction period, as well as the initial operational phase of the facility. Disturbed areas should be rehabilitated as quickly as possible. The requirements for such are similar for concurrent and closure rehabilitation.

4. ALIEN INVASIVE MANAGEMENT PLAN

The following three alien invasive species were recorded with the topo-cadastral grids associated with the development site:

1. *Datura stramonium L. ;*
2. *Nicotiana glauca R.C. Grah; and*
3. *Prosopis glandulosa.*

These species are classified as either category 1 and 2 in terms of the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)[CARA]. Category 2 species implies species which are: "*plants that are useful for commercial plant production purposes but are proven plant invaders under uncontrolled conditions outside demarcated areas*", while category 1 species are: "*are weeds and serve no useful economic purpose and possess characteristics that are harmful to humans, animals or the environment*". Therefore these species need to be controlled and eradicated from disturbed development areas and /or open spaces on the development terrain. No species listed as alien invasive in terms of the Northern Cape Nature Conservation Act (9 of 2009) was recorded in the adjacent topo-cadastral grids. It is highly likely that other alien invasive species occur within the development site, but this will require further assessment and documentation through observation during the construction period (by a suitably qualified specialist ecologist) in particular.

The control methods can be divided into four basic methods of weed control, listed below (definitions compiled by using Bromilow, 2001 and www.dwaf.gov.za):

1. Physical/manual (chopping and slashing; digging and bulldozing; cultivation or hoeing);
2. Cultural (crop rotation; the use of catch crops; winter ploughing; irrigation management; fire);
3. Biological (insects and diseases); and
4. Chemical (herbicides).

Control measures to be adopted onsite should fall within categories 1 and 4 above. It should be noted that the category of each species as indicated within the CARA (2001) is indicated within the DWA accepted control methods table and where the species is not considered in one of the categories, but control methods is deemed necessary, it is indicated with N/A.

General guidelines to take into consideration during alien and invasive control on the development site, are as follows:

- Do not leave herbicide mixed and "ready-to-use" - use it all on the day that it is mixed;
- Use a crop oil with the herbicide; this assists the herbicide to "cling" to the leaves;
- To prevent confusion use a dye in the sprayer so that field workers can see individuals already sprayed;
- Do not spray in the heat of the day. The plant protects itself from water loss, and this reduces the take-up of the herbicide;
- Use all herbicides in the recommended dosages;
- If it is a flowering plant, remove flower heads before seeds are dispersed. Care should be taken not to disperse seeds while picking and transporting of flowers. It is

recommended that all flower heads be placed directly into a plastic bag where after suitably discarded off;

- Care should be taken that all alien/weed vegetation is removed prior to seed production. This typically occurs in the early summer;
- All plant material removed should be taken to an area isolated from surrounding natural areas with a bunded surface; and
- All plant material should be covered with a sail during transportation by road to prevent any blow-off from the vehicle.

Table 4-1: Requirements for Alien and Invasive Floral Species Control				
No.	Management/Monitoring Measures	Target	Responsible party(ies)	Time-frames
1: General Provisions				
1.1	A suitably qualified specialist (ecologist) must establish an inventory of alien and invasive floral species likely to be encountered during the construction and operational phases.	Documented inventory readily available (baseline established prior to commencement of the activity)	Proponent, specialist ecologist	Once-off prior to construction
1.2	The proponent must develop laminated flash cards to allow for the easy onsite identification of all species identified in terms of 1.1 above. Flash cards should be distributed to all contractors and parties mandated to undertake weed control measures onsite during construction and operation.	Proof of flash card development and distribution to contractors and site personnel. Flash cards to detail acceptable (DAFF consultation / acceptance) removal / management measures.	Proponent, contractor	Once-off. Replaced as necessary.
1.3	The provisions of this plan are relevant to all development areas and associated no-go areas (open spaces), as well as development phases.	No alien and invasive floral species infestations on site (including open spaces designated as no-go areas) – Appendix 1 refers.	Proponent	Continuous
2: Monitoring / Inspections				
2.1	The proponent must undertake weekly 'weed inspections' in Summer (September to February) and monthly 'weed inspections' in Winter months (March to August)	Complete log of inspections for the entire duration of construction and facility operation (documenting the 'inspector', date, time, findings, action required, signature).	Proponent	Continuous
3: Clearance / Removal				
3.1	Alien invasive species infestations noted during inspections must be cleared / managed using an appropriate method (as signed off by the project ECO and/or specialist ecologist) within five calendar days. The advice of DAFF to be sought in the event of uncertainty over the appropriateness / suitability of any method of clearance.	Signed off method statements on record for species specific control methods. Clearance of infestations.	Proponent, ECO, specialist ecologist	Continuous

Table 4-1: Requirements for Alien and Invasive Floral Species Control				
No.	Management/Monitoring Measures	Target	Responsible party(ies)	Time-frames
3.2	Alien species cleared from site must be temporarily stored in sealed plastic bags or containers for the duration of their storage onsite.	No possible seed propagation onsite due to inappropriate storage	Proponent	Continuous
3.3	The material referred to in 3.2 above should be disposed of to landfill	Disposal to landfill of cleared problem plants	Proponent	Continuous
3.4	The material referred to in 3.2 above must not be mulched or composted	Disposal to landfill of cleared problem plants	Proponent	Continuous
3.5	Records are to be kept of any campaign-, or *ad hoc*, removal of problem plants from the site.	Records of removal documented at least according to: • Species being targeted; • Area of clearance /removal/management; • Method employed; • Responsible party; • Date: • Results; and • Follow up action (if necessary).	Proponent	Continuous

5. PROCEDURES FOR ENVIRONMENTAL RELATED EMERGENCIES AND REMEDIATION

An effective, comprehensive, well-considered and tested environmental emergency preparedness and response plan has the potential to save lives, prevent unnecessary damage to the company and other property, as well as to manage environmental risk in the event of a large chemical spill, oil spill, fuel spill or explosives spill.

Emergency Preparedness and Response Plan included in Appendix 2.

Some specific legal requirements were identified for the emergency response activities in the specific industry. A number of SABS standards apply, such as the SANS10232 - the minimum requirements for emergency responses. Legislation requires that relevant government departments are kept informed of incidents and accidents that occur within the development area in terms of the following acts:

- Occupational Health & Safety Act (Act 85 of 1993) - EMPLOYEE REQUIREMENTS TO REPORT INCIDENTS WHERE ACTIVITY HAS OCCURRED.

5.1 OBJECTIVES OF AN ENVIRONMENTAL EMERGENCY RESPONSE PLAN

Environmental emergencies occur over the short-term and require an immediate response. As part of its management tools, especially if it is ISO 9000 and ISO 14001 compliant, site managers should have an Emergency Response Plan. If one does not exist then one should be compiled and disseminated to all employees and contractors and in the event of an emergency, the emergency response plan should be consulted.

This plan should be placed on site where it will be easily viewed. The plan should contain a list of procedures, evacuation routes and a list of emergency contact numbers. It is advisable that the facility tests the emergency response plan in order to identify any areas for improvement.

If the emergency has the potential to affect surrounding communities, they should be alerted via alarm signals or contacted in person. The surrounding community will be informed, prior to development taking place, of the potential dangers and emergencies that exist, and the actions to be taken in such emergencies.

Communication is vital in an emergency and thus communication devices, such as mobile phones, two-way radios or telephones must be placed on site. A checklist of emergency response units must be consulted and the relevant units notified.

The checklist includes:

- Fire department;
- Police;
- Emergency health services such as ambulances, paramedic teams, poisons centres;
- Hospitals, both local and further afield, for specialist care;
- Public health authorities;
- Environmental agencies, especially those responsible for air, water and waste issues;
- Other industrial facilities in the vicinity with emergency response facilities;
- Public works and highways departments; and
- Public information authorities and media organisations.

5.1.1 EMERGENCY PROCEDURES

The following is an Accident Handling Procedure (AHP) for Duty Officials:

1. Take down details from reportee including the following:
   (a) Telephone number of reportee;
   (b) Nature of injuries to accident victim;
   (c) If assistance is required from the paramedic;
   (d) Where the accident victim is located;
   (e) If transport is required to case vac patient; and
   (f) Instruct reportee to leave a messenger by the phone.

2. If the injuries are serious contact the relevant emergency services who will notify the paramedics.

3. Await paramedics and instruct them to proceed to the accident site.

4. Notify security and inform them of ambulance arrangements and where the said vehicle must go to.

5. Inform the paramedic called out on the following:
   (a) Telephone number of reportee;
   (b) Nature of injuries to accident victim or victims;
   (c) Where is the injury, part of body (arm, leg, head, etc.);
   (d) Where the accident victim is presently;
   (e) What is the condition of victim (breathing, stable, etc); and
   (f) If an ambulance is required to case vac victim from surface location to hospital.

6. If necessary provide a guide, at security gate, to escort the ambulance or paramedics to the required location.

7. Inform manager of the accident.

NOTE:
The procedure does not change because there is more than one accident victim. One victim or 20 victims must be handled in the same manner.

First Phase:
1. Take down the following details of the incident from the reportee:
   (a) Nature of the incident, explosion, fire etc;
   (b) Location of the incident, explosion, fire etc;
   (c) If there are casualties and the nature and extent of their injuries;
   (d) Ask if the reportee requires assistance (rescue team, doctor, paramedic, Transport etc);
   (e) If the reportee and his team are going to, or are in the rescue chamber;
   (f) The phone number of the reportee; and
   (g) Name of person reporting the incident.

2. Based on the above-mentioned information, the official on duty will take a decision whether to evacuate any or all other work areas of the facility, making use of the current escape plan for the section or area.

3. Report the incident to the site manager and the sub-ordinate manager.

4. If the site manager is unobtainable then report the incident to the next lowest level of official (engineer, overseer, etc).

5. Contact and call out the following personnel:
(a) The closest doctor and paramedics;
(b) Occupational hygienist
(c) The engineer; and
(d) The safety manager.

6. Begin a logbook or record of events putting in detail of times and who said what, where and when, going back to the original reportee.

NOTE:
(i) The official will assume the position of the incident controller until relieved of that position by the newly appointed incident controller, i.e. (manager, engineer, etc).
(ii) It is important to ensure that all phone messages are kept to a minimum duration throughout the incident period.

Second Phase:
1. Appoint lamp room attendant as required in terms of this emergency standard procedure to conduct shaft clearance of evacuates.

2. If necessary send for emergency service, fire brigade, police, etc.

3. Give feedback to newly appointed incident coordinator once he is present on the plant and hand over role to new incident coordinator.

4. Follow instructions of relevant manager.

5. Refer all media enquiries to head office legal department.

6. Remain in position at control room until relieved.

7. Brief official on current situation.

NOTE:
Remember to maintain the logbook at all times throughout the duration of the incident.

5.2 EMERGENCIES, PROCEDURES AND REMEDIAL ACTION

The following define the most likely potential environmental emergencies

5.2.1 FIRES

Veld fires and fires resulting from other sources must be handled with extreme caution. Fire extinguishers should be placed at feasible and easily accessible locations around the site.

Procedure:

- In the event of a fire, an alarm should be activated to alert all employees and contractors;
- Identify the type of fire and the appropriate extinguishing material. For example water for a grass fire, and mono ammonium phosphate-based fire extinguisher for chemical and electrical fires.
- In the event of a small fire the fire extinguishers should be placed where feasible and used to contain and extinguish the fire.
- In the event of a large fire, the local area council's fire department will be notified and should react timeously.
- All staff will receive training in response to a fire emergency on site.
- A Fire Association should be set up with the facility and surrounding land owners to facilitate communication during fire events and assist in fighting fires, where necessary.
- In case of a chemical or petroleum fire, run-off from the area should be contained as far as possible using the most appropriate measures e.g. spill absorbent cushions, sand or a physical barrier.
- Contaminated run-off must be diverted into an oil sump, or cleaned up.

6. ENVIRONMENTAL AWARENESS PLAN

6.1 INTRODUCTION

The environmental awareness plan:

- Outlines how employees will be informed of environmental risks; and
- States how employees will be able to prevent, reduce or remediate risks.

6.1.1 SCOPE

This environmental awareness plan sets out the facility's training procedures and objectives regarding environmental awareness. It is a stand-alone procedure, which serves to improve awareness, training and competency in the environmental field. It contains no detail on the actual training initiatives but rather serves to ensure that a responsible person is appointed to deal with and increase environmental awareness on the site.

6.1.2 RESPONSIBILITIES

It should be the responsibility of the environmental manager, to implement the environmental awareness plan. If necessary, assistance from others at the facility, or external support, will be used to conduct the training.

6.1.3 OBJECTIVES

The objectives as defined by ISO14001 are as follows:

Competence, Training and Awareness:

1. The organisation shall ensure that any person(s) performing tasks for it or on its behalf that have the potential to cause a significant environmental impact(s) identified by the organisation is (are) competent on the basis of appropriate education, training or experience, and shall retain associated records.

2. The organisation shall identify training needs associated with its environmental aspects and its environmental management system. It shall provide training or take other action to meet these needs, and shall retain associated records.

3. The organisation shall establish, implement and maintain a procedure(s) to make persons working for it or on its behalf aware of:

- *The importance of conformity with the environmental policy and procedures and with the requirements of the environmental management system.*
- *The significant environmental aspects and related actual or potential impacts associated with their work, and the environmental benefits of improved personal performance.*
- *Their roles and responsibilities in achieving conformity with the requirements of the environmental management system.*
- *The potential consequences of departure from specified procedures.*

6.1.4 REVISION

The responsible person will revise these environmental awareness procedures from time to time. The date of commencement of the revised procedure will always be indicated to prevent confusion.

6.2 ENVIRONMENTAL RISKS AND PRIORITIES

6.2.1 OBJECTIVES

The following requirements of ISO14001 have bearing:

1. The organisation shall establish, implement and maintain a procedure(s) to identify potential emergency situations and potential accidents that can have an impact(s) on the environment and how it will respond to them.

2. The organisation shall respond to actual emergency situations and accidents and prevent or mitigate associated adverse environmental impacts.

3. The organisation shall periodically review and, where necessary, revise its emergency preparedness and response procedures, in particular, after the occurrence of accidents or emergency situations.

4. The organisation shall also periodically test such procedures where practicable.

6.2.2 IDENTIFYING ENVIRONMENTAL RISKS

Environmental risks must be identified and procedures must be set in place to deal with risks, which could include:

- Fires;
- Spills of hazardous substances,
- Accidents, especially during adverse weather;
- Slow environmental degradation related to continuous poor housekeeping;
- Damage to heritage or environment; and
- Social issues, either complaints about poor environmental management, or direct employment type issues.

Many of these environmental risks have been identified in the EIA Report associated with the development of this EMPr and therefore the risk assessment exercise will not be repeated here. Once the mitigation measures have been read in the EMPr chapter, it will be clear what training will assist with the prevention or reduction of each environmental risk.

6.3 INCREASING ENVIRONMENTAL AWARENESS

6.3.1 TRAINING NEEDS

These shall be identified by:

- Management or staff through performance appraisal;
- At time of recruitment;
- In-task observation of performance;
- Additions to scope of work; and
- Changes to working procedures.

Training programmes and environmental awareness programmes will include:

- Environmental legislation and the site's EMS;
- Resource conservation, including recycling and cleaner production methods;
- Pollution prevention, including emergency procedures;
- General good house-keeping, storage and handling of chemicals;
- Spill prevention, clean-up and remediation;
- Ecological protection and nature conservation, including alien vegetation, protected trees; and
- Administrative procedures, such as reporting, data collection and input.

The level of detail on these topics will depend upon the exposure of that person to the natural environment and the nature of their job. The contractor is required to brief and train all its employees on the site's environmental procedures prior to commencing with work. Training records must be available and auditable for auditing purposes.

Several different types of training programmes can be developed, as follows:

- Induction training: for all new employees, aimed to acquaint the employee with the company, its rules and their new job; no employee may start work until they have completed the induction training;
- On-the-Job training: offered as needs be, but particularly as part of mentoring junior staff; to be largely conducted by supervisors and other senior staff;
- Internal training: may be similar to On-the-Job training, for topics such as machinery operation, but will be conducted as a discrete training event; other courses may also be offered such as First Aid. Outside service providers may be used, but training will take place on site;
- External training: can cover any topic, including leadership, life skills, management, etc. and should be aligned with the National Skills Strategy of the Department of Labour;
- Educational assistance: this will encourage staff to study further, by possibly paying tuition towards study materials, or allowing study leave; some payback system may be used for staff who fail, in order to provide motivation to pass and excel;
- Once training needs have been established it is up to the supervisor to notify the training department of the requirements. The training department will then identify pertinent and relevant courses (if not already done so by employee/supervisor) and schedule training accordingly. Identified and agreed training needs shall be included in budgets and processed as described below. Course attendance (other than at the internal induction courses) shall be scheduled on the basis of the scale of environmental risk; and

- Training expenses, including conferences and symposia should be checked and approved by the management. The training department shall complete a course authorisation form and ensure that the procedures are followed regarding course bookings, confirmations and payments. Planning of training for job specific training (done through training needs analysis) will be coordinated between the Training Superintendent and the relevant section heads. This will result in a training schedule for job specific training.

The trainee shall:

- Obtain approval from management;
- Request the training department to make official booking for him/her; and
- External training courses shall be assessed through:
  - reports and recommendations of staff;
  - recommendation by known competent external personnel; and
  - review of course content, presenters, location and facilities by knowledgeable personnel.

6.3.2 EMS TRAINING

All employees, current and new, and contractors will undergo induction, a part of which is environmental awareness training and includes the environmental policy of the facility. At the end of this training, personnel will be required to complete an awareness test and the level of awareness assessed by the training department. Re-testing, or re-induction, may be required. Computer Based Assessments can form part of this process.

All personnel performing tasks, which can cause significant or major environmental impacts, shall be competent on the basis of training, education and/or experience. This applies to, but is not limited to, supervisor level and above - i.e. operators, artisans.

Type

Awareness training must include the potential consequences of departure from specified operating procedures as well as significant environmental impacts, actual or potential, of their work activities. Training will be appropriate to the actual activity of individual employees.

Evaluation

Evaluation of awareness and competency training (implementation of training in the work place) will be carried out by the environmental officers, section managers and staff in the training department. Senior management if required can also supplement the evaluation.

Records

The following records shall be maintained by the Training Department when relevant:

- Personnel qualifications;
- Training needs;
- Certificates;
- Licences;
- Training programmes/courses attended;
- Staff induction; and

- Performance appraisals (confidential).

6.4 ENVIRONMENTAL NON-COMPLIANCE

Non-conformance is a term used for the ISO14001 EMS, whilst non-compliance typically relates to environmental law. Either way, these situations do occur and need to be dealt with suitably.

6.4.1 RESPONSE TO ENVIRONMENTAL NON-COMPLIANCE

ISO14001 states that:

> "The organisation shall establish, implement and maintain a procedure(s) for dealing with actual and potential non-conformity(ies) and for taking corrective action and preventative action".

All employees and contractors must report non-compliances according to the EMS, which generally involves:

- Reporting to the supervisor of that area;
- Investigating the cause of the incident;
- Recording the incident;
- Reporting to authorities, if necessary;
- Ensuring remediation is done;
- Identifying corrective actions;
- Follow-up on corrective actions; and
- Drafting progress reports and keeping all records.

7. CONCLUSION

This EMPr and associated Environmental Impact Assessment have been compiled in terms of the provisions to meet regulatory requirements under the National Environmental Management Act (Act No. 107 of 1998)[NEMA] and its associated 2010 EIA Regulations.

This EMPr comprehensively addresses potential environmental impacts on all relevant aspects related to activities on the site and allows for continuous improvement through regular monitoring and reporting to IAPs and relevant spheres of Local, Provincial and National Government.

The development of this EMPr was also subject to a comprehensive Stakeholder Engagement process and consideration of the views and concerns of those parties either directly or indirectly affected by the facility. The EMPr is deemed effective in ensuring that no significant direct, indirect, cumulative or residual adverse impacts result from the project.

8. UNDERTAKING

I, _____

the undersigned, and duly authorised thereto by BioTherm Energy (Pty) Ltd have studied and understand the contents of this document in its entirety and hereby duly undertake to adhere to the conditions as set out therein.

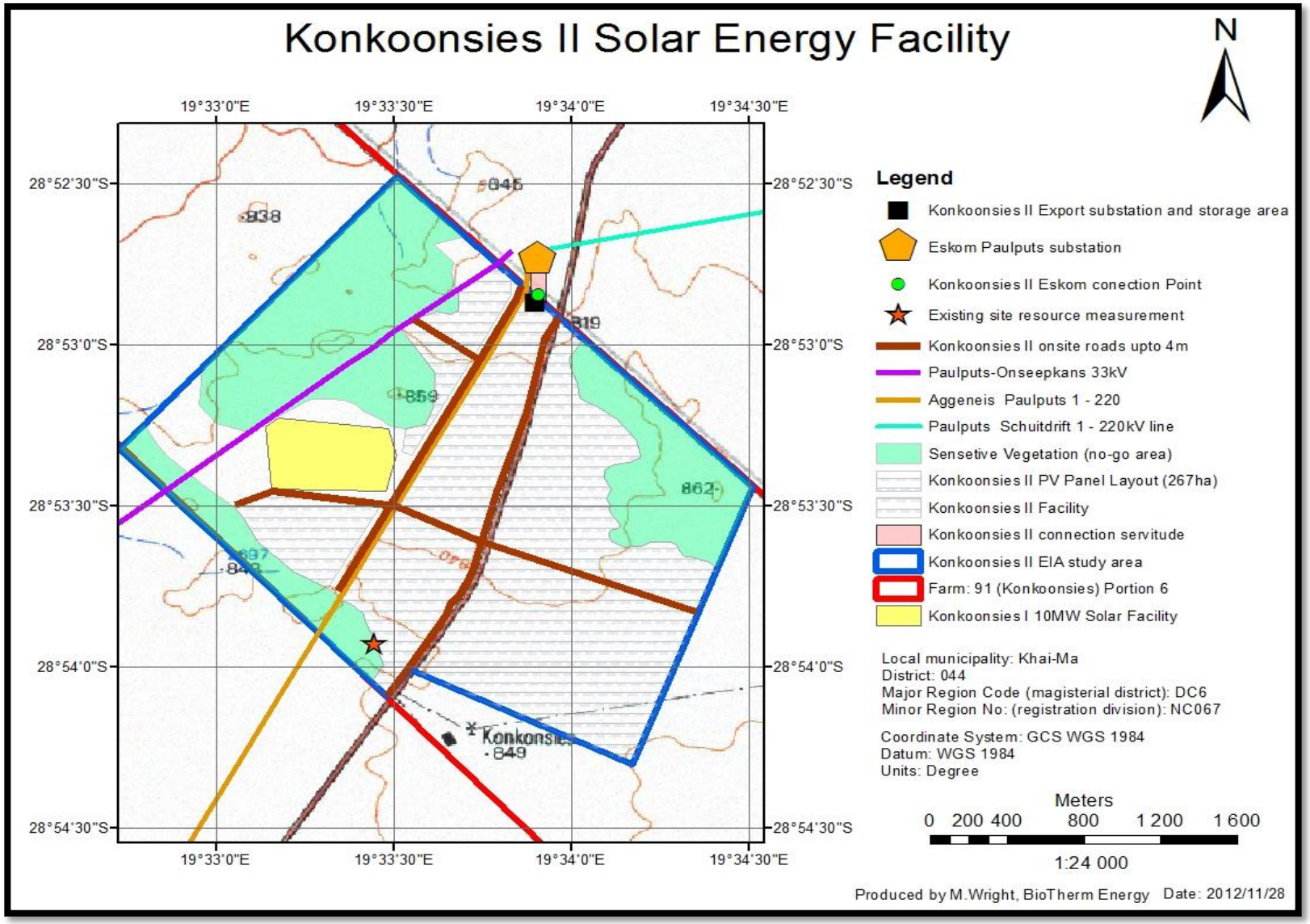
Signed at _____

this _____ day of _____, 2013

Applicant's name:

Designation:

APPENDIX 1: PRELIMINARY DEVELOPMENT LAYOUT PLAN



APPENDIX 2: INCIDENT REGISTER

This is record of incidents as defined in NEMA and the NWA. Incidents must be recorded and reported to the applicable authorities.

Date of Incident	Details of Incident	Responsible party/ies	Corrective action taken	Date action completed.

APPENDIX 3: TRAINING RECORD

Date of Training	Name of Attendee	Signature	Details of Training Course	Training provided by (Name)

APPENDIX 4: NON CONFORMANCE RECORD

This is record of non-compliances with the EMPr, i.e. any action taken that is in violation of the EMPR must be recorded e.g. mixing concrete directly on soil, site staff using neighbouring properties as toilet facilities, dumping of material outside demarcated areas etc.

Date of non-conformance	Details of non-conformance	Party/ies responsible	Corrective action taken	Date action completed

APPENDIX 9: CV OF EAPS

Curriculum Vitae Hanré Crous

Personal Details

Full Name:	Hanré Pieter Crous
Date of Birth:	15 August 1973
Nationality:	South African
Identity Number:	730815 5136 088
Sex:	Male
Marital Status:	Married (2 children)
Language Proficiency:	English, Afrikaans (Speak, Read, Write – Excellent)

Qualifications & Professional Membership

- Bachelor of Science – Biochemistry & Zoology: University of the Free State, 1996.
- Bachelor of Science (Honours) – Zoology: University of the Free State, 1997.
- Master of Science (*cum laude*) – Zoology: University of the Free State, 1999.
- Member: Institute of Waste Management SA (IWMSA).
- Member: National Association for Clean Air (NACA).

Key Experience

Eleven years experience in Integrated Environmental, Waste and Pollution Management (Strategic planning, EIA's, EMP's, monitoring, auditing, pollution abatement, rehabilitation, policy development etc.), including:

- **Integrated environmental management for the establishment, expansion, upgrade, rehabilitation and optimisation of light and heavy industrial processes** including the metallurgical, paper, mining and power generation industries.
- **Integrated environmental management studies for the establishment, operation, auditing, closure and rehabilitation** of general waste landfills and transfer stations, industrial/hazardous waste landfills, incinerators, and hazardous effluent dams, as well as integrated waste management planning, waste classification, cleaner technology and waste management alternatives etc.
- **Mining permit and licence applications** in terms of the Mineral and Petroleum Resources Development Act, 2002.
- **Environmental impact assessments, environmental management plans and public participation programmes** for small, medium and large linear and site specific infrastructure and land developments.
- **Environmental management plans (EMP)** for the construction, operational and decommissioning/closure phases of infrastructure and land developments, waste management facilities and heavy industrial processes.
- **Environmental advisory services and strategic environmental management** including policy and procedures development, legal enforcement and compliance management, strategic planning, enviro-legal procedures, litigation and specialist peer reviews.

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- **Specialist training** including training material development and training in environmental compliance and enforcement.
- **Environmental auditing** including due-diligence, ISO 14001, legal compliance and waste audits.
- **Project management** of numerous environmental and strategic projects.
- **Business management** including human resource and financial management, strategic business planning, mentoring, human resource management, quality management, marketing, drafting proposals, project review and administration.

Employment History & Project Experience

EScience Associates (Pty) Ltd **February 2007 – Current**

Position: Director / Project Management & Development Manager

KEY PROJECTS:

- *National Department of Environmental Affairs (DEA):* DANIDA funded development of a Revised Waste Classification and Management System for SA, formalised into Regulations and Standards under the National Environmental Management Waste Act (NEMWA), including responsibility for –
  - literature review of local and international hazardous waste and chemicals classification systems, and waste management related legislation;
  - peer review of reports and deliverables generated by international consultants;
  - development of waste categories for reporting to SA Waste Information System;
  - drafting Waste Classification & Management Regulations, and supporting Standards for Assessment and Disposal of Waste to Landfill;
  - developments of a guideline for assessment of beneficial waste re-use and recycling activities;
  - stakeholder consultation process (facilitating meetings & workshops, presentations, minutes, comments & response report etc.);
  - Project management, client liaison and support to other waste related initiatives.

- *National Department of Environmental Affairs (DEA):* DANIDA funded development of a National Policy on the Thermal Treatment of General and Hazardous Waste, including –
  - peer review of reports generated by international consultants and associated support (local project leader & contact for client);
  - stakeholder consultation (workshops, presentations, minutes, comments & response report etc.);
  - evaluation of international emission standards, and develop standards and monitoring requirements for SA within the provisions of existing legislation;
  - develop detailed conditions for inclusion in environmental authorisations for waste incineration and AFR co-processing in cement production;
  - technical support to government officials in the EIA review process, including capacity building and development of an EIA review guideline;

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- capacity building of Environmental Management Inspectors on cement production, and alternative fuels and raw materials co-processing in cement kilns;
- develop a detailed national policy stating governments support to incorporate waste incineration and co-processing into the country's waste management system;
- technical support on all aspects to senior government level during the policy review and ministerial approval process.

- *National Department of Environmental Affairs (DEA):* World Bank (ASP Programme) funded Hazardous Waste Treatment Technology Assessment, including –
  - assess the availability and acceptability of treatment and other management technologies for hazardous wastes generated in the country, specifically organic hazardous waste;
  - identify best practicable environmental options (BPEO) for the management of these wastes based on international best practice;
  - develop technical, operational, management and monitoring specifications or standards as appropriate / required for specific technologies;
  - identify barriers to implementation of waste management option higher up in the waste hierarchy, specifically barriers posed by current permitting and licensing requirements for these activities, and develop recommendations on how these can be addressed;
  - ultimately provide an information document (research report) to the DEA that will enable the identification of gaps in technology and particular waste streams that require attention, identify areas for improvement and inform the development of standards under the National Environmental Management: Waste Act.

- *National Department of Environmental Affairs (DEA):* Specialised training courses, including development of training material, practical training / course presentation and delegate competency assessment, for –
  - EIA Review and Administration, including development of an EIA Review Manual, theoretical and practical training material, and training of provincial and national government officials responsible for EIA Review.
  - Training of Environmental Management Inspectors (EMIs; 'Green Scorpions'), including development of Routine Inspections & Investigations manual and support to other components, as well as practical training of EMIs in inspections, sampling, procedures etc. (IAIAsa Premium Project finalist in 2006).

- *Assmang Chrome, Machadodorp / African Rainbow Minerals (ARM):* Legal advice and compliance support on operations, as well as several environmental impact assessment processes and applications for authorisation / licensing, including –
  - EIA the alternate production of ferrochrome (FeCr) and ferromanganese (FeMn) production in three existing open furnaces;
  - EIA for the establishment of a new closed, submerged arc furnace for production;
  - EIA for the establishment of a new ferro-alloy smelter complex, including four closed furnaces, waste management, water treatment and other infrastructure;
  - Integrated Waste Management Licence EIA for several on-site waste management activities, including extension of slag disposal site, reverse osmosis water treatment plant, metal recovery plant, sewage treatment plant etc.

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OTHER PROJECTS:

- Environmental authorisation legal advice and compliance support for proposed boiler fuel switch from coal to gas (CDM project).
- ClinX Health Care Waste Incineration Facility: Air Emission Licence and Waste Management Licence applications, as well as comprehensive EIA for the expansion / increased capacity of the existing facility.
- SABS ISO14001 Legal Training: Practical application of NEMA Air Quality Act and NEMA EIA Regulations.
- IMPLEX Legal Training Seminar: Proposed amendments to NEMA EIA Regulations and Minerals & Petroleum Resources Development Act and Regulations.
- Transalloys due diligence audit update.
- Department of Environmental Affairs' "Project Ferro": Specialist technical advisor to EMI team for compliance inspection of Mittal Steel Vereeniging, forming part of a national compliance and enforcement drive.
- Hazardous Chemicals Risk Assessment training (B.Sc. Chemistry Honours students & lecturers, WITS).
- Extrupet PET and HDPE recycling facility: Section 20 Waste Permit application, annual environmental legal compliance audits and general legal and compliance advisory services.
- Section 24G Application and Rehabilitation Plan for an illegal property development in Meyerton.
- Rietfontein Golf Academy Illegal Development: S31A, Rehabilitation and S24G Application.
- Kanhym Pig Manure Anaerobic Digester & Biogas Recovery System (CDM Project): Environmental Impact Assessment and EMP.
- Turfontein Racecourse Night-time Illumination Basic Assessment: ROD and Appeal procedure.
- Van Eeden Holding Trust Borrow Pit: Development of EMP for Permit Application to DME.

ARCUS GIBB (Pty) Ltd **July 2005 – January 2007**

Position: Senior Environmental Scientist, Associate & Head- Rivonia Environmental Division.
Duties include environmental consulting services, HR support and business management.

KEY PROJECTS:

Environmental Impact Assessments:

- EIA and EMP for the proposed construction of a conventional nuclear power station and associated infrastructure in the Western Cape.
- EIA and Public Consultation Process for the 260 km 765kV transmission power line from the Hydra to Perseus substations (Northern Cape and Free State).
- Extrupet PET and HDPE waste recycling facility in Germiston, Gauteng.
- EIAs for four housing developments in Gauteng.

Strategic Environmental Assessments:

- Strategic Environmental Assessment of the one million ha Heritage Park. This ecologically sensitive, socio-economically complex Park will encompass Pilansberg

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and Madikwe Nature Reserve and cross the border between South Africa and Botswana.
- Strategic Environmental Assessment of the Vaalkop Dam Provincial Nature Reserve. This proposed nature reserve will encompass the Vaalkop Dam and surrounding area and link up with the Pilansberg Nature Reserve.

Environmental Audits:
- Pre-acquisition due-diligence audits of four distribution facilities for an international soft-drink company
- Waste disposal site audits of the Linbro and Marie-Louise waste sites, Johannesburg

Integrated Environmental Management and Permitting:
- R 32 million upgrade to Kelvin Power Station water-use and effluent management system in order to comply with relevant environmental and other regulations and legislation
- DEAT Compliance Monitoring Strategy
- Department of Mineral and Energy Affairs Applications for the R10 billion Eskom Braamhoek Pumped Storage Scheme in the Drakensberg

Strategic Environmental Focus (Pty) Ltd September 2004 – June 2005

Project Manager: EIA Unit, and Unit Manager: Mining and Industrial Unit.

KEY PROJECTS:

Land Development Environmental Impact Assessments (EIA):
- EIA and public participation process for the Nietgedacht filling station (Johannesburg, Gauteng), located in a ecologically sensitive area
- EIA and public participation process for the change in land-use of the Heidelburg showground (Gauteng) for the establishment of a light industrial area
- Exemption, stormwater management plan, EMP and public participation process for the Midridge Park X13 (Midrand, Gauteng) housing development
- EIA for the Alberton Dam (Gauteng) dredging and upgrade, and disposal of waste material
- Five EIAs and public participation processes for the Pomona X75, Pomona X77, Bonaero Park X13 and Hughes X59 (Kempton Park, Gauteng) housing development
- Two EIAs and public participation processes for the Delmas housing and shopping mall developments (Delmas, Mpumalanga)
- EIA for the Rustenburg shopping mall development (North West Province)
- EIA, EMP and public participation process for the BBQ Downs (Midrand, Gauteng) housing development
- EIA, EMP and public participation process for the extension of a link road (Midrand, Gauteng)
- EMP for the Van Riebeeck Park housing development (Kempton Park, Gauteng)
- EIA for the Raslouw housing development (Centurion, Gauteng)
- EIA, public participation and appeal process for the Hans Strydom Road filling station (Tshwane, Gauteng)
- EIA, public participation and appeal process for the Rubenstein filling station (Tshwane, Gauteng)

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- EIA and public participation process for the upgrade of the Union filling station (Northam, Limpopo)
- EIA and public participation process for the Belfast highway filling station on the N4 (Belfast, Mpumalanga)
- EIA and public participation process for the Waltloo filling station (Tshwane, Gauteng)

Industrial/Waste Environmental Impact Assessments (EIA):

- EIA (including air quality, health risk and process engineering review specialist studies) and public participation process for the Mittal Steel (ISCOR) Sinterplant upgrade project (Vanderbijlpark, Gauteng)
- EIA for the Mittal Steel (ISCOR) new hazardous waste (metal slag) disposal site (Vanderbijlpark, Gauteng)
- EIA (including air quality and health risk specialist studies) and public participation process for the Mittal Steel (ISCOR) new Galvanising Line (Vanderbijlpark, Gauteng)
- EIA (*incomplete*) for the Highveld Steel power generation plant (Witbank, Mpumalanga)
- EIA for the William Tell particle board manufacturing plant (Johannesburg, Gauteng)
- EIA (including air quality, health risk and process engineering review specialist studies) and public participation process for the CFT Brick manufacturing plant (Vanderbijlpark, Gauteng) using slag waste from Mittal Steel (ISCOR)
- CEMP and OEMP for the Nigel waste transfer station (Nigel, Gauteng)
- Monitoring plan and public participation for the closure and rehabilitation of the Alberton North waste landfill (Gauteng)
- EIA (including air quality, health risk, traffic, geotechnical etc. specialist studies) and public participation process for the new Zesfontein regional waste disposal site (Benoni, Gauteng)
- Environmental exemption studies and public participation process for the Afrox PMP facility expansion and upgrade (Germiston, Gauteng)
- Environmental exemption studies (including risk assessments) and public participation processes for twelve Afrox LPG storage facilities (Johannesburg & Tshwane, Gauteng)
- Environmental exemption studies (including risk assessments) and public participation processes for two Afrox bulk (industrial) LPG storage facilities (Johannesburg, Gauteng)

Mining Applications:

- Ten prospecting permit applications and public participation processes for Impala Platinum (Mpumalanga, Limpopo & North West provinces)
- Mining permit applications for borrow pits associated with the TCTA water pipeline between the Vaal Dam and Secunda (Gauteng & Mpumalanga)
- Mining right applications (EIA) for two new Lonmin Platinum mines (Rustenburg area, North West)
- Mining right application (EIA) for the new Boynton Platinum mine (Pilanesburg area, North West)
- Mining right application (EIA) for the new Kumba Resources iron ore mine (Kathu, Northern Cape)
- Mining permit applications for borrow pits associated with the N11 upgrade (Witbank, Mpumalanga)

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Environmental Advisory Services:
- EIA and authorisation peer review and enviro-legal support for the Heilbron filling station (Free State) appeal and High Court review procedures
- EIA peer review and enviro-legal support for the illegal Vaalwater bonemeal facility (Limpopo)
- Peer review and appeal against denied authorisation for the Capital Park filling station, including specialist air quality and health risk assessments (Tshwane, Gauteng)
- Pre-acquisition due diligence assessment for international cigarette manufacturing company (Germiston, Johannesburg)

Gauteng Department of Agriculture, Conservation & Environment
November 1999 – August 2004

Assistant Director: Integrated Waste Management & Pollution Abatement.

Duties included:

- Implementation of the EIA Regulations, Environment Conservation Act and NEMA
- Review of EIA applications for authorisation, Environmental Management Plans and Mining EMPR's
- Focus on IEM and strategic planning in large industries, with specific reference to air quality and solid waste management
- Environmental performance auditing of waste landfills and monitoring of compliance with conditions of authorisations, and provisions of legislation
- Identifying needs for, and development of, legislation, policies, strategies and guidelines
- Responsibility for all HR issues as the first line manager of Environment Officers.
- Various managerial responsibilities (budget, business planning, performance reviews, interviews)

Project review, regulation and development included:

Integrated Waste Management:
- Establishment, operation, auditing, closure and rehabilitation of general waste landfills and transfer stations, industrial/hazardous waste landfills, and hazardous effluent dams
- General and hazardous waste, industrial effluent and sewage characterisation, reduction, recycling, treatment and re-use
- Hazardous and medical waste treatment and incineration

Industrial Scheduled Processes:
- Establishment, expansion and upgrade of various large industry processes, mostly metallurgical
- Air quality impact assessments, process & technology review, cleaner technology, dispersion modelling & health risk assessments, and HAZOP assessments
- Air pollution control equipment installation, upgrade and technology review

Energy Generation and Supply:
- Coal fired power station due diligence assessment, environmental audit, air quality impact assessment and waste management

- Power generation from industrial process emissions
- Large scale electricity transmission lines
- Township electrification and distribution networks
- Energy efficiency and alternative energy use

Hazardous Chemicals Management:
- Manufacture, storage, handling and distribution of hazardous chemicals including gas, as well as petroleum products, including filling stations
- Product safety review, product substitution and major hazard installation risk assessments

Mining:
- EMPR's, rehabilitation, environmental and waste management for various types of mining, mostly sand, clay, rock, diamond and gold mining

Land-use Planning:
- Change in land-use (rezoning), and related urban and rural development projects

Other Activities:
- Water and sewage treatment, infrastructure, storage (reservoirs) and distribution (pipelines)
- Abattoirs, rendering plants, cemeteries and crematoria

Strategic Environmental Management:
- Large industry strategic environmental management plan development, prioritisation and implementation
- Regional strategic environmental assessment & local authority IDP
- Cleaner technology review and implementation
- Integrated waste management strategy and planning
- State of environment reporting, indicators and environmental information databases
- National law reform – NEMA EIA Regulations, Waste Management Bill, Air Quality Bill, and Tyre, Beverage Container and Plastic Bag Regulations
- Independent EIA review
- General legislation – interpretation, development, appeals and court cases

Industrial projects [Metalloys Meyerton (Samancor), Mittal Steel (ISCOR), MMC Krugersdorp, SAPPI, EnviroServ, ZINCOR, Kelvin Power Station etc.] included:

- Integrated Waste Management: Establishment, operation, auditing, closure and rehabilitation of general waste landfills and transfer stations, industrial/hazardous waste landfills, and hazardous effluent dams. General and hazardous waste, industrial effluent and sewage characterisation, reduction, recycling, treatment and re-use. Hazardous and medical waste treatment and incineration.
- Industrial Scheduled Processes: Establishment, expansion and upgrade of various large industry processes, mostly metallurgical. Air quality impact assessments, process & technology review, cleaner technology, dispersion modelling & health risk assessments, and HAZOP assessments. Air pollution control equipment installation, upgrade and technology review.

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- Energy Generation and Supply: Coal fired power station due diligence assessment, environmental audit, air quality impact assessment and waste management.
- Hazardous Chemicals Management: Manufacture, storage, handling and distribution of hazardous chemicals including gas, as well as petroleum products, including filling stations. Product safety review, product substitution and major hazard installation risk assessments.
- Mining: EMPR's, rehabilitation, environmental and waste management for various types of mining, mostly sand, clay, rock, diamond and gold mining.
- Strategic Environmental Management: Large industry strategic environmental management plan development, prioritisation and implementation, regional SEA, cleaner technology review and implementation, Integrated waste management strategy and planning, state of environment reporting, indicators and environmental information databases, and legislation interpretation, development, appeals and court cases.

Courses

- Foundation Environmental Auditor Course (ISO 14001): Aspects International UK / Crystal Clear; IEMA UK (Institute of Environmental Management and Assessment) approved course
- Supervision Training: Management and training of staff, performance assessments, disciplinary actions
- Covey Training - The 7 Habits of Highly Effective People: Time Management, Personal Development, Management Skills and Prioritisation
- Conflict Resolution: Conflict Management in terms of the National Environmental Management Act; Department of Environmental Affairs & Tourism
- Public Finance Management Act: Internal
- Logical Framework Approach (LFA) to Project Preparation: Project Development, Problem Statements, Objective Setting, Measures to Achieve Objectives, Funding, Project Management etc; DANCED-Danish Co-operation for Environment and Development
- Principles of EIA Review: Methodology of Environmental Impact Assessment Review; Department of Environmental Affairs & Tourism, and the U.S. Environmental Protection Agency
- Personnel Performance Management System (PPMS) Training: Department of Agriculture, Conservation, Environment & Land Affairs
- Entrepreneurship and Business Management: Unit for Small Business Development; University of the Orange Free State
- Environmental Educators Training: Wildlife and Environment Society of South Africa

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CURRICULUM VITAE

Bradley Thorpe

Full Name:	Bradley Kevin Thorpe
Date of Birth:	27 March 1980
Nationality:	South African
Identity Number:	8003275043087
Sex:	Male
Marital Status:	Married
Language:	English, Afrikaans

Qualifications & Professional Membership

- Bachelor of Science – Animal Sciences: University of Pretoria, 2002;
- Bachelor of Science (Honours) in Wildlife Management: University of the Pretoria, 2003;
- Master of Science – Environmental Management: University of Johannesburg, in progress;
- Member: Institute of Waste Management, South Africa (IWMSA); and
- Member: International Association of Impact Assessors (IAIA), South Africa branch.

Key Experience

Five (5) years experience in Integrated Environmental Management (Strategic planning, legislation, Waste Management, EIA's, EMP's, monitoring, auditing, pollution abatement, rehabilitation etc.), including:

- **Integrated environmental management for the establishment, expansion, upgrade, rehabilitation and optimisation of light and heavy industrial processes** including the metallurgical, paper, mining and power generation industries
- **Integrated environmental management studies for the establishment, operation, auditing, closure and rehabilitation** of general waste landfills and transfer stations, industrial/hazardous waste landfills, incinerators, and hazardous effluent dams
- **Mining / prospecting permit and licence applications,** in terms of the Mineral and Petroleum Resources Development Act (MPRDA) –as amended, 2002
- **Environmental impact assessments, environmental management plans and public participation programmes** for small, medium and large linear and site specific infrastructure and land developments
- **Environmental management plans (EMP)** for the construction, operational and decommissioning/closure phases of infrastructure and land developments, waste management facilities and heavy industrial processes
- **Environmental advisory services,** including policy and procedures development, legal enforcement and compliance management, strategic planning, enviro-legal procedures and peer reviews
- **Specialist training,** including training of Provincial Environmental Authorities / EIA administrators in the review and administration of EIA's and Basic Assessments.
- **Project management** of numerous environmental and strategic projects

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Employment History & Project Experience

EScience Associates (Pty) Ltd. **January 2010 - Current**
Senior Environmental Project Manager

Key Projects:

Waste Management:
- Interwaste: Scoping and EIA process for the establishment of an integrated waste management/treatment and transfer facility, Germiston, Gauteng (current);
- Reclamation Group (Reclam): Development of industry norm and standards for the operation of scrap metal recovery and processing facilities;
- Department of Environmental Affairs & Tourism (DEAT): Development of a Revised Hazardous Waste Classification System for South Africa;
- ClinX Waste Management: Scoping and EIA process relating to Waste License application for proposed Healthcare Risk Waste Incinerator, Wadeville, Gauteng;
- SE Solutions, on behalf of Reclamation Group: Specialist Waste Impact Assessment for a proposed ferrous scrap metal shredder facility in Waltloo, Pretoria, Gauteng; and
- Rand Water, Panfontein Water Treatment Residue Disposal Facility: Environmental risk assessment, rehabilitation planning and associated determination of closure and rehabilitation costs, Vereeniging, Gauteng (current).

I*ndustry*:
- ArcelorMittal, Vanderbijlpark Works: EIA and Environmental Management Plan for decommissioning of coke oven effluent maturation ponds, Vanderbijlpark, Gauteng;
- Assmang Chrome: Environmental Control Officer (ECO) for implementation and operational phases of ferromanganese production switch ('swing capacity') at Assmang Machadodorp-Ferroalloy Works, Machadodorp, Mpumalanga; and
- Assmang Chrome: Development of an Integrated Water and Waste Management Plan for the Machadodorp-Ferroalloy Works, Machadodorp, Mpumalanga.

Mining:
- Assmang Black Rock Mine Operations (BRMO): EIA and EMPR addendum for Sinter Plant and Mine Expansion, Hotazel, Northern Cape (current);
- Assmang Black Rock Mining Operations (BRMO): Development and subsequent implementation of the BRMO Environmental Management Master Plan, Hotazel, Northern Cape (inclusive of total revision to the Mine's EMPR);
- Assmang Chrome, Machadodorp: Waste Licensing EIA process for the proposed establishment of a proposed Reverse Osmosis Plant at Assmang, Machadadorp operations, Machadodorp, Mpumalanga; and
- Assmang Chrome, Dwarsriver Mine: Waste Licensing EIA process for the proposed establishment of a proposed Reverse Osmosis Plant at Assmang, as well as total revision to EMPR, Dwarsriver Mine, Steelpoort valley, Limpopo.

Specialist Training Course Development & Presentation:
- 2010: Training of Government Officials in the Review of EIAs and applications for environmental authorisation - Responsible for training of Government Officials

responsible for EIA Review at the Gauteng, Eastern Cape, Western Cape and KZN Provincial Environmental Authorities.

Strategic Environmental Focus (Pty) Ltd. August 2007 – January 2010
Senior Environmental Project Manager

Duties include environmental consulting services, project management (technical and financial), mentoring, internal training on Integrated Environmental Management (IEM) and leading a small internal team of environmental managers.

Key Projects:

Environmental Impact Assessments:
- Rainbow Junction Development Company: EIA and Public Consultation Process for the Rainbow Junction Mixed-use Development Node (500 000m^2 of bulk infrastructure), Pretoria North, Gauteng;
- Lonmin Platinum: EIA, Public Participation Process and EMPR development for the proposed Pandora Platinum Mine, Marikana, North West Province;
- Umthombo Resources: EIA, Public Participation Process and EMPR development for the proposed Brummersheim open-cast coal mine, Middelburg, Mpumalanga; and
- Afrisam: Environmental Assessment for proposed Section 20 waste permit applications for proposed closure of general landfill site, Dudfield, North West Province.

Integrated Waste Management Planning:
- West Rand District Municipality (WRDM): Compilation of Integrated Waste Management Plan (IWMP), incl. stakeholder engagement, for the WRDM, in terms of the requirements of the National Environmental Management: Waste Act 2008 (Act No. 59 of 2008)[NEMWA]; and
- Urban Dynamics: Compilation of site specific Waste Management Plan for the proposed Palm Ridge Mixed-Use Development, Ekurhuleni Metropolitan Municipality, Gauteng.

Due- diligence / Feasibility Assessments:
- Exxaro / Promethium Carbon JV: Environmental Feasibility Assessments for establishment of proposed power generation (co-generation) projects at numerous (17) mining and industrial sites throughout South Africa; and
- Illovo Sugar: Environmental Feasibility Assessment for proposed establishment of power generation (co-generation) plant at the Ubombo Sugar Mill, Swaziland.

Environmental Compliance Monitoring (ECO):
- Abland: Environmental Compliance Monitoring for the construction of the Wonderboom Junction Shopping Centre, Wonderboom, Gauteng;
- TCTA: Environmental Compliance Monitoring for the construction of the TCTA Vaal-Secunda Water Pipeline Project; and
- Gauteng Department of Education: Environmental Compliance Monitoring for construction of the Katlehong Secondary School, Katlehong, Gauteng.

Rock Environmental Consulting (Pty) Ltd. (REC) **April 2006 – August 2007**
Environmental Manager

Key Projects:

Environmental Impact Assessments (EIA):
- Driefontein Development Company: EIA and public participation process for the proposed Driefontein Eco-Estate, Wakkerstroom, KZN Province; and
- Acu-group: EIA and public participation for the Serengeti Golf and Wildlife Estate, Kempton Park, Gauteng.

Environmental Compliance Monitoring (ECO):
- Acu-group: Environmental Compliance Monitoring for the construction of the Serengeti Golf and Wildlife Estate, Kempton Park, Gauteng; and
- Bigen Africa Consulting Engineers: Environmental Compliance Monitoring for the implementation of the Bapong Water Reticulation Project, Bapong, North West Province.

Courses

- Practical Training and Capacity Building Workshop on the Globally Harmonised System of Classification and Labelling of Chemicals (GHS): Presented by Orange House Partnership, with assistance from UNITAR (March 2011). Certificate received;
- Introduction to Integrated Waste Management: Centre for Environmental Management, Potchefstroom University (April 2009). Certificate received;
- Waste Reduction and Management: Melrose Advanced Training, Glenhove Conference Centre (September 2008);
- Integrated Environmental Management and Reporting: SEF internal training offered by Andrew Woghiren / Reuben Heydenrych (July 2008); and
- EIA Report Writing: Strategic Environmental Focus (2007).

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CURRICULUM VITAE **Roelof Letter**

Name	Roelof Letter
Date of Birth	10 March 1988
Identity Number	8803105055080
Sex	Male
Marital Status	Unmarried
Languages	Fluent Spoken & Written English & Afrikaans
Extra Info	-

Qualifications

- Bachelor of Science (Geography and Environmental Management): University of Johannesburg, 2007 – 2009)
- Bachelor of Science (Honours) in Environmental Management (University of the South Africa, 2010)

Key Experience

1 year of environmental management and impact assessment experience. . Major focus includes:

- Environmental Impact Assessment: Basic Assessment, Scoping and EIA application in terms of the National Environmental Management Act (NEMA)
- Environmental Management Plans
- Public Participation Management
- Environmental Control Officer (ECO)

Employment History & Project Experience

Escience Associates (Pty) Ltd **May 2011 – present**

Environmental Impact Practitioner

Responsibilities include the preparation of Basic Assessment, scoping and EIA reports. Public Participation, Environmental Management Plans, site visits and assessment of Specialist studies.

Key Environmental Impact Assessment and management projects experience

- Assmang Black Rock Mine, Northern Cape – Junior environmental assistance in compilation of waste management licences, water use licencing and reporting
- Sylvania Resources Volspruit Mine EIA project – junior environmental assistant (Including reporting within EIA project, Public Participation etc…)
- Environmental Control Officer – FFS Refinery Evander

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- Assmang Chrome Machadodorp – Proposed new sinter plant complex in junior environmental assistant in compilation of the EIR.
- Biotherm Energy Solar Projects – Water use licence applications
- Rand Water Panfontein sludge GHS classification of transport and labelling of chemicals

Education

1994-2001 Fontainebleau Primary school (Randburg, Gauteng)
2001-2006 Hoërskool Randburg
2007-2009 University of Johannesburg (BSc)
2010-2011 University of South Africa (B.Sc. Honours (Cum Laude))

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CURRICULUM VITAE

Bradley Thorpe

Full Name:	Bradley Kevin Thorpe
Date of Birth:	27 March 1980
Nationality:	South African
Identity Number:	8003275043087
Sex:	Male
Marital Status:	Married
Language:	English, Afrikaans

Qualifications & Professional Membership

- Bachelor of Science – Animal Sciences: University of Pretoria, 2002;
- Bachelor of Science (Honours) in Wildlife Management: University of the Pretoria, 2003;
- Master of Science – Environmental Management: University of Johannesburg, in progress;
- Member: Institute of Waste Management, South Africa (IWMSA); and
- Member: International Association of Impact Assessors (IAIA), South Africa branch.

Key Experience

Five (5) years experience in Integrated Environmental Management (Strategic planning, legislation, Waste Management, EIA's, EMP's, monitoring, auditing, pollution abatement, rehabilitation etc.), including:

- **Integrated environmental management for the establishment, expansion, upgrade, rehabilitation and optimisation of light and heavy industrial processes** including the metallurgical, paper, mining and power generation industries
- **Integrated environmental management studies for the establishment, operation, auditing, closure and rehabilitation** of general waste landfills and transfer stations, industrial/hazardous waste landfills, incinerators, and hazardous effluent dams
- **Mining / prospecting permit and licence applications,** in terms of the Mineral and Petroleum Resources Development Act (MPRDA) –as amended, 2002
- **Environmental impact assessments, environmental management plans and public participation programmes** for small, medium and large linear and site specific infrastructure and land developments
- **Environmental management plans (EMP)** for the construction, operational and decommissioning/closure phases of infrastructure and land developments, waste management facilities and heavy industrial processes
- **Environmental advisory services,** including policy and procedures development, legal enforcement and compliance management, strategic planning, enviro-legal procedures and peer reviews
- **Specialist training,** including training of Provincial Environmental Authorities / EIA administrators in the review and administration of EIA's and Basic Assessments.
- **Project management** of numerous environmental and strategic projects

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Employment History & Project Experience

EScience Associates (Pty) Ltd. **January 2010 - Current**
Senior Environmental Project Manager

Key Projects:

Waste Management:
- Interwaste: Scoping and EIA process for the establishment of an integrated waste management/treatment and transfer facility, Germiston, Gauteng (current);
- Reclamation Group (Reclam): Development of industry norm and standards for the operation of scrap metal recovery and processing facilities;
- Department of Environmental Affairs & Tourism (DEAT): Development of a Revised Hazardous Waste Classification System for South Africa;
- ClinX Waste Management: Scoping and EIA process relating to Waste License application for proposed Healthcare Risk Waste Incinerator, Wadeville, Gauteng;
- SE Solutions, on behalf of Reclamation Group: Specialist Waste Impact Assessment for a proposed ferrous scrap metal shredder facility in Waltloo, Pretoria, Gauteng; and
- Rand Water, Panfontein Water Treatment Residue Disposal Facility: Environmental risk assessment, rehabilitation planning and associated determination of closure and rehabilitation costs, Vereeniging, Gauteng (current).

I*ndustry*:
- ArcelorMittal, Vanderbijlpark Works: EIA and Environmental Management Plan for decommissioning of coke oven effluent maturation ponds, Vanderbijlpark, Gauteng;
- Assmang Chrome: Environmental Control Officer (ECO) for implementation and operational phases of ferromanganese production switch ('swing capacity') at Assmang Machadodorp-Ferroalloy Works, Machadodorp, Mpumalanga; and
- Assmang Chrome: Development of an Integrated Water and Waste Management Plan for the Machadodorp-Ferroalloy Works, Machadodorp, Mpumalanga.

Mining:
- Assmang Black Rock Mine Operations (BRMO): EIA and EMPR addendum for Sinter Plant and Mine Expansion, Hotazel, Northern Cape (current);
- Assmang Black Rock Mining Operations (BRMO): Development and subsequent implementation of the BRMO Environmental Management Master Plan, Hotazel, Northern Cape (inclusive of total revision to the Mine's EMPR);
- Assmang Chrome, Machadodorp: Waste Licensing EIA process for the proposed establishment of a proposed Reverse Osmosis Plant at Assmang, Machadadorp operations, Machadodorp, Mpumalanga; and
- Assmang Chrome, Dwarsriver Mine: Waste Licensing EIA process for the proposed establishment of a proposed Reverse Osmosis Plant at Assmang, as well as total revision to EMPR, Dwarsriver Mine, Steelpoort valley, Limpopo.

Specialist Training Course Development & Presentation:
- 2010: Training of Government Officials in the Review of EIAs and applications for environmental authorisation - Responsible for training of Government Officials

responsible for EIA Review at the Gauteng, Eastern Cape, Western Cape and KZN Provincial Environmental Authorities.

Strategic Environmental Focus (Pty) Ltd. August 2007 – January 2010
Senior Environmental Project Manager

Duties include environmental consulting services, project management (technical and financial), mentoring, internal training on Integrated Environmental Management (IEM) and leading a small internal team of environmental managers.

Key Projects:

Environmental Impact Assessments:
- Rainbow Junction Development Company: EIA and Public Consultation Process for the Rainbow Junction Mixed-use Development Node (500 000m^2 of bulk infrastructure), Pretoria North, Gauteng;
- Lonmin Platinum: EIA, Public Participation Process and EMPR development for the proposed Pandora Platinum Mine, Marikana, North West Province;
- Umthombo Resources: EIA, Public Participation Process and EMPR development for the proposed Brummersheim open-cast coal mine, Middelburg, Mpumalanga; and
- Afrisam: Environmental Assessment for proposed Section 20 waste permit applications for proposed closure of general landfill site, Dudfield, North West Province.

Integrated Waste Management Planning:
- West Rand District Municipality (WRDM): Compilation of Integrated Waste Management Plan (IWMP), incl. stakeholder engagement, for the WRDM, in terms of the requirements of the National Environmental Management: Waste Act 2008 (Act No. 59 of 2008)[NEMWA]; and
- Urban Dynamics: Compilation of site specific Waste Management Plan for the proposed Palm Ridge Mixed-Use Development, Ekurhuleni Metropolitan Municipality, Gauteng.

Due- diligence / Feasibility Assessments:
- Exxaro / Promethium Carbon JV: Environmental Feasibility Assessments for establishment of proposed power generation (co-generation) projects at numerous (17) mining and industrial sites throughout South Africa; and
- Illovo Sugar: Environmental Feasibility Assessment for proposed establishment of power generation (co-generation) plant at the Ubombo Sugar Mill, Swaziland.

Environmental Compliance Monitoring (ECO):
- Abland: Environmental Compliance Monitoring for the construction of the Wonderboom Junction Shopping Centre, Wonderboom, Gauteng;
- TCTA: Environmental Compliance Monitoring for the construction of the TCTA Vaal-Secunda Water Pipeline Project; and
- Gauteng Department of Education: Environmental Compliance Monitoring for construction of the Katlehong Secondary School, Katlehong, Gauteng.

Rock Environmental Consulting (Pty) Ltd. (REC) **April 2006 – August 2007**
Environmental Manager

Key Projects:

Environmental Impact Assessments (EIA):
- Driefontein Development Company: EIA and public participation process for the proposed Driefontein Eco-Estate, Wakkerstroom, KZN Province; and
- Acu-group: EIA and public participation for the Serengeti Golf and Wildlife Estate, Kempton Park, Gauteng.

Environmental Compliance Monitoring (ECO):
- Acu-group: Environmental Compliance Monitoring for the construction of the Serengeti Golf and Wildlife Estate, Kempton Park, Gauteng; and
- Bigen Africa Consulting Engineers: Environmental Compliance Monitoring for the implementation of the Bapong Water Reticulation Project, Bapong, North West Province.

Courses

- Practical Training and Capacity Building Workshop on the Globally Harmonised System of Classification and Labelling of Chemicals (GHS): Presented by Orange House Partnership, with assistance from UNITAR (March 2011). Certificate received;
- Introduction to Integrated Waste Management: Centre for Environmental Management, Potchefstroom University (April 2009). Certificate received;
- Waste Reduction and Management: Melrose Advanced Training, Glenhove Conference Centre (September 2008);
- Integrated Environmental Management and Reporting: SEF internal training offered by Andrew Woghiren / Reuben Heydenrych (July 2008); and
- EIA Report Writing: Strategic Environmental Focus (2007).

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APPENDIX 10: SPECIALIST DECLARATIONS

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environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

	(For official use only):
File Reference Number:	12/12/20/
NEAS Reference Number:	DEAT/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2010

PROJECT TITLE

Photo-voltaic solar power generation plant on the farm Klein Zwart Bast close to Kenhardt in the Northern Cape Province

Specialist Name:	AS Claassens (Soil and plant nutrition consultant)		
Name of company (If any):			
Postal address:	1438 Cunningham Ave, Waverley, Pretoria		
Postal code:	0186	Cell	084 581 6488
Telephone:	012 332 3063	Telephone:	0167164556
E-mail:	claassensa@telkomsa.net		
Professional affiliation(s) (if any)			

Environmental Assessment Practitioner (EAP):	Mr. Brian Gardner		
Name of company:	EScience Associates (Pty) Ltd		
Postal address:	P.O. Box 2950, Saxonwold, Johannesburg		
Postal code:	2132	Cell:	083 564 9445
Telephone:	011 728 2683	Fax:	086 512 2366

E-mail: brian@escience.co.za

Professional affiliation(s) (if any): International Association of Impact Assessment SA Chapter (IAIAsa)

4.2 The specialist appointed in terms of the Regulations_

I, B.S. Claassen, declare that --

General declaration:

- I act as the independent specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.

Signature of the specialist:

Name of company (if applicable):

24-04-12

Date:

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

	(For official use only)
File Reference Number:	12/12/20/
NEAS Reference Number:	DEAT/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2010

PROJECT TITLE

Photo-voltaic solar power generation plant on the farm Klein Zwart Bast close to Kenhardt in the Northern Cape Province

Specialist Name:	ANTON PELSER		
Name of company (If any):	ARCHAETNOS CC		
Postal address:	P.O.BOX 55, GROENKLOOF		
Postal code:	0027	Cell:	083 459 3091
Telephone:	012 348 2202	Fax:	086 520 0376
E-mail:	antonp21@yahoo.com		
Professional affiliation(s) (if any)	Association of Southern African Professional Archaeologists (ASAPA) Accredited at ASAPA's CRM Section South African Society of Cultural Historians		

Environmental Assessment Practitioner (EAP):	Mr. Brian Gardner		
Name of company:	EScience Associates (Pty) Ltd		
Postal address:	P.O. Box 2950, Saxonwold, Johannesburg		
Postal code:	2132	Cell:	083 564 9445

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Mar 21, 2019 11:02

Telephone:	011 728 2683	Fax:	086 512 2366
E-mail:	brian@escience.co.za		
Professional affiliation(s) (if any)	International Association of Impact Assessment SA Chapter (IAIAsa)		

4.2 The specialist appointed in terms of the Regulations_

I, **ANTON JOHAN PELSER** , declare that --

General declaration:

- I act as the independent specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.

Signature of the specialist:

ARCHAETNOS CC

Name of company (if applicable):

2012-03-15

Date:

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

	(For official use only)
File Reference Number:	12/12/20/
NEAS Reference Number:	DEAT/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2010

PROJECT TITLE

Photo-voltaic solar power generation plant on the farm Klein Zwart Bast close to Kenhardt in the Northern Cape Province

Specialist Name:	Jacobus Adriaan Geldenhuys		
Name of company (If any):	Propaganda Studios cc		
Postal address:	11 Landau Terrace, Richmond, Johannesburg		
Postal code:	2092	Cell	082 574 5002
Telephone:		Telephone:	
E-mail:	kotie@propagandastudios.co.za		
Professional affiliation(s) (if any)	International Association of Impact Assessment SA Chapter (IAIAsa)		

Environmental Assessment Practitioner (EAP):	Mr. Brian Gardner		
Name of company:	EScience Associates (Pty) Ltd		
Postal address:	P.O. Box 2950, Saxonwold, Johannesburg		
Postal code:	2132	Cell:	083 564 9445
Telephone:	011 728 2683	Fax:	086 512 2366

E-mail:	brian@escience.co.za
Professional affiliation(s) (if any)	International Association of Impact Assessment SA Chapter (IAIAsa)

4.2 The specialist appointed in terms of the Regulations_

I, Jacobus Adriaan Geldenhuys , declare that --

General declaration:

- I act as the independent specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.

Signature of the specialist:

Propaganda Studios cc

Name of company (if applicable):

25 April 2012

Date:

APPENDIX 11: KONKOONSIES II SOLAR ENERGY FACILITY ECONOMIC DEVELOPMENT PLAN



Konkoonsies II Solar Energy Facility

Economic Development Plan

Prepared by

BioTherm Energy (Pty) Limited ("Project Developer")

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Kilpatrick Archer
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Mar 21, 2019 11:02

Disclaimer

This report has been prepared for the above named site for the purposes of the Environmental Impact Assessment and preliminary investigation into the socio-economic needs of the area. Whilst every effort has been made to ensure the accuracy and suitability of the information contained in this report, the contents should not be used as the basis for implementation. As this is a preliminary report, it will need to be updated prior to bid submission of the project to the REIPP Procurement Program.

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Mar 21, 2019 11:02

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Preface

The Project Developer has approached the issue of economic development from the twin perspectives of:

i. project compliance with the economic development goals established within the Request For Qualification And Proposals For New Generation Capacity under the IPP Procurement Programme RFP ("RFP"), issued on 3 August 2011. (Tender No: DOE/001/2011/2012); and
ii. an overarching commitment to contribute to the economic development of South Africa and the economic upliftment of and skills transfer to the communities that are within close proximity to the Project.

Renewable energy is a high growth global growth industry and is viewed as an integral part of the future energy mix in countries throughout Africa. The RFP is a unique opportunity for South Africa to establish the building blocks towards becoming a leader in renewable energy global industry. It is the South African Government's aim to become the centre of excellence and to act as the gateway for the supply of green energy goods and services to the rest of Africa. This creates the opportunity to develop a localized manufacturing hub that could lead to significant job creation and sustainable economic development. In short, the emergence of the renewable energy sector aligns itself with the Government Growth Plan.

The Bidder has developed its Proposal within this context and has adopted the following:

- the local community (the "Local Community") within 50km of the Konkoonsies II Solar Energy Facility (the "Project") will own 5% of the Project Company through a Local Community Trust, with the shareholding funded by the a local financing institution;
- the Project Company will sponsor unique training programmes, with bursaries, for local people to train them in renewable energy engineering and environmental monitoring with two leading Further Education Colleges[1];
-
- the balance of plant work, civil and electrical will be performed by South African construction companies with extensive experience employing and transferring skills and know-how to Black People in South Africa as well as within the Local Community. As such people are trained, they can also be employed to build-out the renewable energy industry throughout Africa;
- every member of the workforce will have his or her employment related skills enhanced and qualified in relation to this new industry;
- the Project Company's economic development programmes focuses on the economic empowerment and skills development of women; and
- promotes social programmes targeting pressing local needs in housing and health.

[1] *Boland College and False Bay College*

Approach and Audit

The overall approach to the Economic Development Plan for the Project is to implement the Economic and Socio Economic goals as prescribed in the RFP. The aim is to deliver employment and training, as well as, meaningful enhancements to the lives and prospects of the local community, as well as, the lives of Black People in South Africa. This document sets out to report on the structures, processes and techniques that will be implemented in order to achieve these goals. In particular, the document evaluates how the Project achieves the following goals:

- Determine and evaluate the scoring of the Project according to the Economic Development Scorecard ("Scorecard") and Economic Development Matrix ("Matrix") as prescribed under the RFP;
- Ensure that the Scorecard Thresholds are achieved;
- Evaluate where Scorecard Thresholds are exceeded and where Scorecard Targets are met;
- Determine the degree to which Scorecard Thresholds are exceeded and the scores achieved; and
- Present an audit trail to evidence compliance.

1. Job Creation

The Project will create jobs during two distinct phases, namely construction phase (the "Construction Phase") and operations phase (the "Operations Phase"). During the Construction Phase, the primary employer will be the engineering, procurement and construction contractor (the "Contractor"). The Facility will be built by a company specializing in the construction and operations of PV solar facilities ("Contractor"). The Contractor will be owned by at least 8% Black People. The Contractor will engineer, procure and construct the Facility on a fixed price, turnkey basis and on other terms agreed to with the Project Company. The Contractor, as maintenance provider ("Maintenance Provider"), will also provide maintenance services pursuant to the terms agreed to with the Project Company.

In addition to direct job creation, the Project will support local economic development and job creation through:

- Implementing the objectives of the Local Community Trust which focuses on the economic empowerment of farm workers, particularly Black women, education, and sustainable rural development in the Local Community;
- Enhancing the employment prospects of the Local Community by establishing training programmes in renewable energy engineering (3 years NQF Level 4) and environmental monitoring (1 year NQF Level 2) through a bursary program and partnering with leading South African Technical Colleges;
- Committing 0.25% of revenue to Enterprise Development within the Local Community; and
- Committing 1.25% of the Project's revenue to Socio Economic Development of the Local Community.

1.1. Job Creation during Construction Phase

During the Construction Phase, which is expected to be approximately 12-24 months, the Project will impose obligations on the Contractor and its subcontractors to meet the job creation thresholds set out in the RFP. The Contractor, as well its subcontractors, will also be obliged to offer training and skills development programmes to equip construction workers with the necessary construction industry skills required to engineer and construct projects similar to this Project.

The Contractor will meet the Scorecard Threshold levels during the construction phase. The Project Company will sign an agreement with the Contractor where the Contractor will be required to keep accurate monthly and quarterly records of the employees active in the project, including their skill level, training undertaken, citizenship, ethnicity and place of residence and compile monthly and quarterly reports that will be provided to the Project Company as well as the Project Developer

1.2. Job Creation in Operations and Maintenance Phase

During the five-year term of the Operations and Maintenance Agreement, the Contractor, as operator ("Operator"), will perform scheduled and unscheduled maintenance and repairs, and remotely monitor the performance of the Facility. Pursuant to the Operations and Maintenance Term Sheet between the Project Company and Operator, the Operator will be contractually bound to meet the Economic Development Threshold as required under the RFP with respect to job creation, local spend, Black ownership and Top Management. The Contractor will also be required to provide job placements for students who have completed the Project Developer's NQF Level 4 training programme in Renewable Energy.

During the Operations and Maintenance Phase, the Contractor will be required to keep accurate records of the employees active in the Project, including their skill level, training undertaken, citizenship, ethnicity and place of residence and compile a monthly report. These reports will be used in determining whether the Project Company has met the targets set forth by the RFP process.

Table 3: Job Creation in Operations Phase

Operations and Maintenance Jobs	Number FTEs	Local %	Black %	Citizens %
Supervisor	1	0	0	0
Workers	6	50	50	50

Typically and historically throughout the world, while there are more jobs created by the Contractor during the Construction Phase, these jobs are relatively short-term (up to two-years depending on the size of the Project). Jobs created in the Operations Phase results in longer-term employment typically throughout the life of the PPA (average of 20 years), and while there are fewer permanent jobs created, there is greater economic impact from jobs created in the Operations Phase.

Furthermore, due to the fact that some of the RFP first round solar projects will have created a new industry in South Africa, the skills required developed to supervise such projects can be transferred to the 3rd round projects ensuring sustainability if the industry.. As part of its corporate goals, the Bidder will ensure that skills transfer is actively adopted and monitored such that Supervisors for future solar projects or after the five-year period will be Black South Africans.

1.3. Direct and Indirect Employment by Project

In the operations phase, the Project will contract with two locally-owned companies to perform operations and services functions respectively, each of which will have 10% Black ownership. The respective companies are BioTherm Operations and Maintenance Company (Pty) Ltd, ("BioTherm O&M"), and BioTherm Services Company ("BioTherm Services").

While BioTherm O&M has been in operation since July 2009 and is an O&M company focused on managing and operating independent power projects in South Africa, BioTherm Services is a recently created company that will be specifically used to perform functions associated with all renewable projects that the Project Developer will be involved in. Both Companies will be headquartered in Johannesburg, South Africa.

1.3.1. BioTherm O&M

BioTherm O&M will be responsible for all onsite operations that do not form part of the Operations and Maintenance contract with the Consortium. The tasks performed will be:

- Onsite Operations and Maintenance
- Security
- Environmental Monitoring ("EM")

Table 5: BioTherm O&M Konkoonsies Job Creation during Operations Phase

Role	Number (FTEs)	Local[2] %	Black %	Citizens %
O&M Supervisor	0.5	0	100	100
O&M Workers	6.0	100	100	100
Security Supervisor	1.0	100	100	100
Security Workers	8.0	100	100	100
E M Supervisor	0.5	0	100	100
E M Workers	1.0	100	100	100
Total	**17.0**			

Operations and Maintenance

These tasks will be performed by 6.5 full time equivalents ("FTEs") in these roles including one supervisory role[3]. It is anticipated that the O&M Supervisor will be a black South African that will be trained by the O&M contractor. Additionally, these tasks will also provide job placements for students following the NQF Level 4 training programme in Renewable

[2] *Local refers to the 50km radius area of the Solar Project.*
[3] *50% of the Supervisor's time will be spent on another solar project*

Energy. Each employee will be offered training opportunities to increase their skills and awareness in the following areas:

- Solar Energy Facility Operations and Operations Management
- Solar Energy Facility Maintenance
- Oral and Written Communication Skills
- Health and Safety
- Machine and vehicle operation and management

Site Security

This work will be provided by a local contractor. There will be nine FTE's, including one supervisor, all of whom will come from the local area. Furthermore, each employee will be offered training opportunities to increase their skills and awareness in the following areas:

- Oral and Written Communication Skills;
- Health and Safety
- Machine and vehicle operation and management

In order to effectively report on the job creation aspect of Economic Development initiatives, BioTherm O&M will keep accurate records of the employees active in the Project Company, including their skill level, training undertaken, citizenship, ethnicity and place of residence and compile a monthly report.

Environmental Monitoring

Environmental monitoring is a requirement in the stipulated project Environmental Impact Assessment Report ("EIA") and has to be performed in the pre-construction, construction and post construction phases of the Project. In all instances, all employees will be black South Africans.

BioTherm O&M will employ an Environmental Monitoring Supervisor and an Environmental Monitoring Worker to ensure that these requirements are met and the construction and operations adhere to the requirements stipulated in the EIA monitoring and mitigation measures. Additionally the Project will also be required to provide job placements for students following the NQF Level 2 training programme in Environmental Monitoring.

The Project will keep accurate records of the employees active in the environmental monitoring aspects of the project, including their skill level, training undertaken, citizenship, ethnicity and place of residence and compile a monthly report.

1.3.2. BioTherm Services Company

BioTherm Services will provide and be responsible for all service functions required by the Bidder. The tasks performed will include:

- contract administration and Forecasting ("CA&F")
- accounting and forecasting requirements
- transport services
- economic and socio economic development workers ("SED")

- Trust support

Contract Administration and Forecasting

These tasks are required to ensure that the Project is compliant with the terms and conditions as stipulated in the EPC, Operations and Maintenance and PPA contracts. In all instances, all employees will be black South Africans.

Accounting and Administration

Accounting and Administration tasks are required for compliance and reporting purposes. Activities will include financial monitoring, budgeting and forecasting for the Project Company. BioTherm Services will employ a management accountant and an accounting administrator.

Transport Services

As the project is based in a rural part of South Africa, it has been determined that there will be a need for commercial and private transport requirements. Such transport services will include the transportation of employees, contractors and other service providers on an as needed basis. BioTherm Services will locate these services at the Projects site office and will employ a local coordinator as well as a driver.

Enterprise and Socio Economic Development Initiatives

The enterprise and socio economic development goals as prescribed under the RFP are aligned with the corporate values of the Project Developer as well as the Bidding Entity. To ensure that these goals are met, it will be necessary for the plan to be actively managed and monitored. As such, the Services Company will employ both a locally based field worker and a coordinator.

Local Community Trust Management

The Local Community Trust is a core element of the Project. The Trust will own 5 % of the Project Company and is fully aligned to the corporate values of both the Project Developer and its largest investor. To ensure its effective operation and implementation of Trust objectives, it will require the employment of a dedicated Trust worker to support trustees and to ensure compliance and transparency, associated with the disbursement of any funds and the implementation of any projects.

The BioTherm Services Company will deliver this support by employing a professional Trust Support Worker. This employee will be a Black South African citizen.

It should be noted that the total direct jobs created during the operations phase will be black South African citizens, and 84% of these employees will come from the local community. The economic impact of these jobs is significant. Based on the South African standard job multiplier effect[4], each South African job created spawns a further 7.9 jobs. As a result, this Project may create more than 100 additional jobs in the local area.

[4] *SAB Miller Job Creation Multiplier effect impact*

1.4. **Conclusion**

The Project meets the targets set for job creation for the Economic Development Scorecard through the direct employment of staff by the Consortium in the Construction Phase and through its contracts with BioTherm O&M and BioTherm Service in the Operations Phase.

While the Contractor will maintain the same threshold in the operations phase, it is expected that the BioTherm affiliate companies job creation and implementation strategy will significantly outpace that of the Contractor and it is therefore expected that to mirror the population mix of South Africa and the local community.

2. Local Content

The RFP documentation defines Local Content as the total cost spent on South Africans and South African products excluding finance charges, land mobilization fees and imported goods. This section of the Economic Development Plan, details how the project will meet the local content thresholds required by the Project Company.

2.1. Construction Phase

The Consortium's EPC contract value for a 75MW project is approximately ZAR 1 billion and the project will aim to achieve the 35% local content threshold as outlined in Appendix I. It is, however, expected that the Project Company will endeavor to create other ways to ensure that it could potentially exceed this threshold requirement. A 35% local content spend equates to ZAR 350 million during construction.

In discussions with module manufacturers, it is expected that local manufacturing can be viable based on securing a pipeline of more than 30MW of annual production. Some have committed to build assembly plants in South Africa, most likely in the Eastern Cape, provided that it achieves a foothold in the South African market through this RFP process. It also expected that once established, such companies will use their South African manufacturing bases to provide products to other African countries.

In addition to being required to source goods and services within South Africa, the EPC contractor will be required to maximize the volume of goods and services purchased within 50km of the site and will be required to develop a schedule of qualified local suppliers including EME[5]s and QSE[6]s.

The EPC contractor will be required to keep accurate records of all goods and services purchased in relation to the project and prepare and submit a monthly report detailing goods and services purchased, cost and origin. This report will be used to evaluate whether the Project Company is meeting its local content obligations on a monthly basis to ensure quarterly compliance.

[5] *EME refers to an exempt micro-enterprise.*
[6] *QSE refers to a qualifying small enterprises*

2.2. Operations Phase

2.2.1. The Consortium

In the Operations Phase, the Consortium will be contracted to perform scheduled and non-scheduled maintenance, as all major parts are covered by warranties. As a result, the majority of the local content during the operations phase will be consumables, fluids and minor repair materials.

2.2.2. Operations and Maintenance (non-Consortium related)

While the Consortium will be responsible for both scheduled and unscheduled maintenance for the Project Company, a substantial portion of non-technical related O&M will be performed by BioTherm O&M who will procure goods and services entirely from within South Africa.

BioTherm O&M will purchase goods and services to be used in the operations and maintenance of the Project but it will not be significant compared to the overall capital cost. Furthermore, given that a significant portion of local spend will be through the BioTherm O&M company, it is expected to add significantly to the overall spend within South Africa's borders.

2.3. Conclusion

Based on the initial analysis conducted by the Project Developer, the EPC contractor will be able to meet the Threshold for local content and although in the Operations Phase, the Bidder is able to meet the Targets for goods and services it procures directly.

3. Ownership

One of the key objectives for the Department of Energy's RFP is ownership, which requires ownership by Black People and Local Communities in the Project Company as well as ownership by Black People in both the Construction Contractor and the Operations Contractor. The Bidder is of the opinion that this is an integral step to ensure broad economic impact from renewable energy projects being built in South Africa. To the greatest extent possible, the Bidder has taken active steps to ensure that these objectives are met.

The RFP is concerned with the ownership as follows

- The shareholding by black people in:
    I. The Project
    II. The Contractor
    III. The Operations Contractor
- The shareholding by local communities
- The shareholding by Black People

3.1. Black Shareholding

3.1.1. The Project Company

It was always the intention of the Project Developer to ensure that all Projects aim to achieve the 30% black ownership with the majority of that Black Ownership in the hands of broad-based groups.

3.1.2. The Contractor

The Project Company will ensure that the Contractor will commit black ownership. This shareholding will be secured once the Contractor and the Project Company have reached preferred bidder status.

3.1.3. The Operations Contractor

BioTherm O&M has committed to the threshold of 10% ownership by black shareholders.

3.2. Shareholding by Local Communities

Through the Local Community Trust, the communities that live within 50km of the project site, will own 5.0% of the Project. This investment will be made through a ring-fenced entity created specifically to fund the BBBEE allocation in the Project Company. The funding for this investment will be provided by a local finance institution.

4. Preferential Procurement

In 2000, the South African Government promulgated into legislation the Preferential Procurement Policy Framework, Act 5 of 2000. As a result, preferential procurement is one of six key objectives that the Department of Energy is trying to achieve through the RFP. Preferential procurement focuses on subcontracting to empowered enterprises, black enterprises and enterprises owned by women.

The developer's approach to preferential procurement is under continuous review to ensure that emerging EMES, QSEs and woman owned businesses can be included in the qualified supplier lists. It will be one of the core functions of the economic and socio economic development worker to be aware of potential new suppliers and to invite them to seek qualified suppler status.

5. Enterprise Development

Enterprise Development focuses on the development of emerging enterprises within the Local Communities (within 50KM of the Project Facility).

The Project will employ a fieldworker and a coordinator to assist embryonic and existing local enterprises to develop and expand by providing feasibility, planning, grants, loans, advice and negotiation support to enable these organisations to flourish both locally and in the wider markets of South Africa and internationally.

The Project will commit 0.25% of revenue to Enterprise Development initiatives focused on efforts to enable local people, and black women in particular, to create enterprises which supply goods and services for sale.

Based on the Socio Economic needs analysis conducted by BioTherm, following areas are considered to be top priorities from the community's perspective:

- Economic-related activities with a particular focus on job creation.
- Education-related activities, focusing particularly on development of schools;
- People-related needs, with the need for training opportunities;
- High needs for social services, including better care of the elders in the community.

The focus on enterprise development would be to encourage the setting up of the initiatives after thorough research to determine the scale of the market opportunity and the preparation of a detailed implementation plan. Other examples of enterprise development initiatives include the support of the growing of specialist high value agricultural crops, craft and manufacturing initiatives.

As the expenditure is all local, the amount spent can be grossed up by 135% to give an adjusted spend of 0.34%.

Conclusion

As part of the project development process, the Bidder undertook research into the economic activity within the local area to more effectively evaluate some of the potential opportunities around

enterprise development in order to determine what could be viewed as long-term sustainable economic development enterprises.

6. Socio-Economic Development

Socio-economic development, attempts to address the pressing socio-economic needs of the Local Communities. Whilst the predominant need is for employment opportunities, the project developer recognises that economic well being and financial independence are the most significant benefits which can be created for an individual or a community there are significant social, educational, health and welfare needs which could be addressed.

The Project will contribute **1.25% of revenue** to Socio Economic Development initiatives focused on deliverable projects established to meet the needs within the community, as well as focusing spend in the Province in which the project is located. The IDP is typically a five year plan which details the community needs and projects which could be funded.

The Project will provide a fieldworker and a coordinator to perform the detailed investigation and assessment of alternatives in conjunction with local stakeholders. Based on this primary research, priorities will be established and implementation plans will be developed that will adhere to international best practice. These implementation plans will help in the deployment of funds made available from the Project and also be leveraging in further funding by way of grants and subsidies.