ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

DRAFT SCOPING REPORT

PROPOSED 75 MW PV SOLAR ENERGY FACILITY, KLIPDAM, FARM 134/7, SPRINGBOK (NORTHERN CAPE).

Phase 1 & 2

(DEA REFERENCE Phase 1 : 14/12/16/3/3/2/561)

(DEA REFERENCE Phase 2 : 14/12/16/3/3/2/562)

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PURPOSE OF THE SCOPING REPORT

An application was lodged by NK Energie (Pty) Ltd, with the National Department of Environmental Affairs (DEA) for the proposed establishment of a 150 MWPhotovoltaic (PV) Solar Energy Facilities at Klipdam, Farm 134/17, Springbok in the Northern Cape. The proposed development will be constructed in two phases of 75 MW each, totalling 150 MW on completion.

The proposed PV solar energy facility will have an electricity generation capacity of up to 150 MW and will occupy and area greater that 20 hectares. Therefore in terms of the Environmental Impact Assessment (EIA) Regulations published in terms of Section 24(5) of the National Environmental Act (NEMA, Act 107 of 1998), NK Energie (Pty) Ltd, requires authorisationfrom the DEA for the construction and operation of this proposed 2 x 75 MW Solar energy facility.

To furthermore adhere to DEA requirements in terms of this application it will be undertaken in consultation with the Northern Cape Department of Environment and Nature Conservation (NC DENC). The proposed PV Solar Energy facility has been registered with the National DEA under Application References(DEA REFERENCE Phase 1 : 14/12/16/3/3/2/561 & DEA REFERENCE Phase 2 : 14/12/16/3/3/2/562) NK Energie (Pty) Ltd, hasappointed FOOTPRINT Environmental Services (Registered as Cederberg Conservation Services CC – No 2009/056651/23), as the independent environmental consulting company, to undertake the EIA, in accordance with the requirements of the National Environmental Management Act (Act No.107 of 1998).

The Scoping Phase describes the environmental values and factors that may be impacted on by the proposed solar energy facility and in an intrinsic portion of the EIA process.

The primary objectives of the Scoping Phase are:

- *To ensure early stakeholders engagement for the express purpose of collecting and collating their views, comments and inputs regarding the proposed development;*
- *The early detection and identification of potential environmental risks and impacts associated with the proposed development;*
- *To define the scope of work and the methodology to be followed in the EIA and*
- *To propose a plan of study for the EIA.*

In terms of NEMA, the Scoping Report must be submitted to the competent authority, in this instance The National Department of Environmental Affairs, as part of the decision making process for the proposed solar energy facility. The Scoping Report requires that the EAP provides a background information document with sufficient information for government departments, the general public, organizations and communities to provide meaningful inputs and comments on the proposed development. The Scoping Report also identifies and describes issues associated with the proposed development and identifies and describes the extent to which specialist studies will be required during the EIA Phase.

The content of this Scoping Report is comprised of 8 sections,

- *Section 1, provides a brief background to the PV solar energy facility and the EIA process;*
- *Section 2, provides an overview and scope of the proposed PV Facility;*
- *Section 3; outlines the legal framework and context within which the EIA process operates;*
- *Section 4; describes the biophysical, ecological, heritage, agricultural, visual and the socio environment profile of the site, surrounding landscape and communities;*
- *Section 5; evaluates the potential impacts associated with the proposed development;*
- *Section 6; contains the discussion and concluding remarks derived from the scoping process;*
- *Section 7; provides the Plan of study for the EIA and*
- *Section 8; containsliterary references used to compile the Scoping Report.*

INVITATION TO COMMENT ON THE DRAFT SCOPING REPORT

This Draft Scoping Report has been made available for public review at the Springbok Public Library (next to the Springbok Post Office) and at the NamaKhoi Municipality (Nababeep) from 3 March 2014 – 14 April 2014

Please submit all comments to:
FOOTPRINT Environmental Services PO Box 454, Porterville, 6810 Fax : 086 608 8304 Email : charlduplessis2@afrihost.co.za
The closing date for comments on this Draft Scoping Report is 14 April, 2013

EXECUTIVE SUMMARY

The project proponent, NK Energie (Pty) Ltd, proposes to develop a 2 x 75 MW Photovoltaic (PV) Solar Energy Facilities on Klipdam, Farm 134/17, Springbok in the Northern Cape. On receipt of approval, this project will be implemented in a two phased approach, each phase of construction comprising 75 MW – thus a total electricity output from the facility of 150MW. The property itself falls within the NamaKhoi Municipality which is one of the municipalities within the Namakwa District Municipality. Currently the property is zoned as Agriculture I and is used for extensive grazing by small stock. Historically the site was a golf course and is thus much of the natural vegetation has been fully transformed and artificially landscaped for fairways, bunkers, greens and exotic trees planted along the borders of each of the holes.

On completion the proposed 150MW PV Solar Energy Facility will occupy and area greater than 20 hectares. In terms of the Environmental Impact Assessment (EIA) Regulations published in terms of Section 24(5) of the National Environmental Act (NEMA, Act 107 of 1998), NK Energie (Pty) Ltd, requires authorisation from DEA for the construction and operation of the proposed PV Solar Energy Facility.

APPENDICES

TABLES

1. INTRODUCTION

1.1 Project overview

The project proponent, NK Energie (Pty) Ltd, proposes to develop a 2 x 75 MW Photovoltaic (PV) Solar Energy Facilities on Klipdam, Farm 134/17,Springbok in the Northern Cape. On receipt of approval, this project will be implemented in a two phased approach, each phase of construction comprising 75 MW – thus a total electricity output from the facility of 150MW. The property itself falls within the NamaKhoiMunicipality which is one of the municipalities within the Namakwa District Municipality. Currently the property is zoned as Agriculture I and is used for extensive grazing by small stock. Historically the site was a golf course and is thus much of the natural vegetation has been fully transformed and artificially landscaped for fairways, bunkers, greens and exotic trees planted along the borders of each of the holes.

On completion the proposed 150MW PV Solar Energy Facility will occupy and area greater than 20 hectares. In terms of the Environmental Impact Assessment (EIA) Regulations published in terms of Section 24(5) of the National Environmental Act (NEMA, Act 107 of 1998), NK Energie (Pty) Ltd, requires authorisationfrom DEA for the construction and operation of the proposed PV Solar Energy Facility.

The facility would include the following infrastructure;

- *An array of photovoltaic (PV) panels;*
- *Mounting structures to be either rammed steel pipes or piles with pre-manufactured concrete footings;*
- *Inverters and transformers;*
- *Cabling between the different components will be lain underground where practically possible;*
- *Internal roads and boundary fences;*
- *Workshop area that will cater for storage, offices, security and ablution facilities;*
- *A power line from the facility to the substation;*
- *Connection to a substation to evacuate the power from the facility into the ESKOM grid.*

Lay down areas will be accommodated within the proposed site and will therefore not increase the area that will be impacted. The above mentioned activities require a full Environmental Impact Assessment (EIA) study in line with the 2010 Regulations in terms of the National Environmental Management Act, 1998 (Act 107 of 1998)(NEMA).

1.2 Requirement of an Environmental Impact Assessment process

As this development is a proposed electricity generation project, it is considered to be of national importance. The National Department of Environmental Affairs (DEA) is the competent authority for the environmental authorisation.The Northern Cape Department of Environment and Nature Conservation (NC DENC) in this instance is a key stakeholder and commenting authority.

According to Sections 24 and 24D of NEMA, as read with the EIA Regulations (GNR 543, GNR 544 and GNR 546) the listed activities, in Table 1,may be triggered by the proposed PV Solar Energy Facility. See Table 1: Listed Activities Triggered.

Table 1: Listed Activities Triggered.

Activity No	Description of Listed Activity	FOOTPRINT description of the listed facility
GN 544,18 June 2010		
1	The construction of facilities / infrastructure for the generation of electricity where: (i) the electricity output is >10 MW but less than 20 MW or (ii) the output is <10MW or less but the total extent exceeds 1 ha in size.	Proposed development will be constructed in two phases. Phase 1& 2 will each be a 75MW PV plant that, together with associated infrastructure will cover an estimated area of 112.5ha's/ 75MW, thus a total area of 225 ha's.
10	The construction of facilities or infrastructure for the transmission and distribution of electricity – (i) outside the urban edge or industrial complexes with a capacity of more than 33 but less than 275 kilovolts(kVa).	Two options are being considered (1) the solar facility will require a connecting power line to the Nama Substation or (2) the connection line will cut directly into the Municipal power line that crosses the property. This is less preferred as it is more complex. The capacity of the connecting power line will be 132 kVa.
11	The construction of (x) buildings exceeding 50 square metres in size, or (xi) infrastructure or structures covering 50 square metres or more where such construction occurs within a watercourse or within 32m of the watercourse.	The construction of the PV solar facility and or the associated infrastructure may impact on the drainage lines on site.
13	The construction of facilities or infrastructure for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 but not exceeding 500 cubic metres.	The construction of a facility such as this may require the storage of hazardous material with a combined capacity of 80 cubic metres but <500 cubic metres.
18	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, removal of soil,	The construction of the proposed sites may impact on a drainage lines on the site through requiring infilling or

	sand, or rock from (i) watercourses.	depositing or removal of material from a watercourse above this threshold. This could be from the solar array itself or from the road infrastructure required for the construction and maintenance of the site.
GN 545, 18 June 2010		
1	The construction of facilities or infrastructure for the generation of electricity where the electricity output is 20MW or more	As stated above this facility will, on completion of phase 2, generate 150MW of energy thus above this threshold.
8	The construction of facilities or infrastructure for the transmission or distribution of electricity with a capacity of 275 kV, outside and urban or industrial complex.	The distribution transformers (75) that will be installed to service a 75MW solar facility such as this are rated at 1200 (kVA) each at peak.
15	Physical alternation of undeveloped, vacant or derelict land for residential, retail, commercial, recreation, industrial or institutional use where the total area to be transformed is 20 ha or more.	The proposed development for Klipdam, at 225 ha's will exceed this threshold.
GN 546, 18 June 2010		
14	The clearance of 5 ha's or more of vegetation where 75% or more of the vegetation cover constitutes indigenous vegetation	While every effort is being made to locate the solar facility on olddisturbed or transformed land, this listed activity may be triggered due to the unavoidable need to transform areas of extant natural vegetation to meet the capacity requirement for a viable development.

The required Scoping and EIA Phase will be undertaken in the following way:

- Scoping Phase – Potential issues associated with the proposed PV Solar Energy Facility will be identified through; a desktop study, a field survey and consultation with affected parties, specialists and key stakeholders. After an initial public review process, the Final Scoping Report with a Plan of Study for the EIA will be submitted to the DEA for their consideration and decision;
- EIA Phase – during this phase the detail assessment of environmental (positive, negative, direct, indirect and cumulative impacts)as identified in the Scoping Phase will be undertaken. These assessments will be undertaken through specialist studies, sensitivity analyses and public participation. On conclusion of the required public participation process the Final EIA Report and the Environmental Programme (EMPr) will be submitted to DEA for consideration and authorisation.

1.3 Details of the Environmental impact Assessment Practitioners

NK Energie (Pty) Ltd has appointed FOOTPRINT Environmental Services (FES), as the independent environmental consultants, to undertake the EIA, in accordance with the requirements of the National Environmental Management Act (Act No.107 of 1998).Neither FES nor any of the specialist sub-consultants are subsidiaries of / or affiliated to NK Energie(Pty) Ltd and or have any interest in secondary developments that may arise out of the authorization of the development.

FES offers a broad range of professional biodiversity and environmental management related services and products. Our aim is to deliver quality service that is aligned to legislative &certification requirements and sets the standard for biodiversity & environmental best practice. FES has a diversified business offering in this sector. Under the ENVIRONMENTAL IMPACT ASSESSMENT portfolio FES provides environmental consulting services to ensure adherence to the requirements of the National Environmental Management Act (NEMA), NEMA Waste Act and in accordance with the NEMA Listed Activity regulations, the assessment, avoidance and mitigation of potential environmental impact resulting from development.

The FES EAP's for the proposed Klipdam 75MW, PV Solar Energy Facility will be Sean Ranger and Charl du Plessis;

Sean Ranger - Holds an MSc in Sustainable Environmental Management his first eight years were spent in Research& Development for Bayer (Pty) Ltd. Thereafter he embarked on a short career as a freelance writer andguided a number of eco-tours in wilderness areas of Southern Africa. Following this he was contracted to CapeNature and gained experience in conservation initiatives & strategic planning, project management and implementation.While contracted to CapeNaturehewasinvolved in developing new and innovativeways to encourage conservation within civil society, particularly the agricultural sector. Included here would be the development and piloting of theCapeNature Stewardship Program, strategic planning of the Greater Cederberg Biodiversity Corridorand project conceptualisation, design and implementation as a Senior Project Manager and landnegotiator. During this period he designed and developed the Biodiversity Best Practice Projects forPotatoes South Africa and the South African Rooibos Council.

Charl du Plessis - Holds National Higher Diploma in Nature Conservation and has 17 years' experience in conservationmanagement on statutory conservation areas as well as on private and communal properties.Hewasthe manager of

the Cederberg Wilderness, a World Heritage Site for 12 years.He compiled variousstrategic policies and management plans for the Wilderness Area, private land and conservancies,while responsible for the management of staff, contractors, ecological systems and processes (aliens,fire and erosion) and tourism development and infrastructure maintenance.During his involvement in the establishment of the Greater Cederberg Biodiversity, he was activelyinvolved during the strategic planning, project conceptualisation and implementation phase.

As a Directors of FOOTPRINT Environmental Services (FES) a broad range of projects have been undertaken including:, Biodiversity Report for the Bergrivier Municipality, Operational Management Plan for the Cederberg Conservancy, Rehabilitation and Erosion Management Plan for the Grootwinterhoek Wilderness Area, Facilitation of the Public Participation Process for various CapeNature Protected Areas, a number of Integrated Fire and Alien Clearing Plans, Integrated Environmental Management Plans aligned to international certification organisations in the agricultural sector, GIS based Area-wide Planning for the Nieuwoudtville Plateau. Capacity Audit of Resource Departments in the Western Cape, GIS Planning for the WWF, 2x Environmental Application for the construction of a weir in the Krom River and another in the Rondegat River to prevent the upstream movement of alien fish, Environmental Authorisation of Rooibos Cultivation in Clanwilliam, Environmental of Agricultural Developments in Paleisheuwel, Clanwilliam and the Cederberg, Environmental Authorisation for Bulk Water Supply with the Dept of Public Works, Environmental Authorisation for Hospital at Saldanha, Environmental Assessments for Ecotourism Developments, among others.

Please see Appendix F-Details of EAP's or refer to www.footprintservices.co.za to view the business profile and projects completed by FOOTPRINT Environmental Services.

2. OVERVIEW OF THE PROPOSED PV SOLAR ENERGY FACILITY

2.1 Photovoltaic Solar Energy Technology and the Generation of Electricity

Photovoltaic'sarea method for generating electric power by using solar cells to convert energy from the sun into a flow of electrons. The photovoltaic effect refers to incoming photons of light from the sun exciting electrons into a higher state of energy, allowing them to act as charge carriers for an electric current. Photovoltaic power generation employs solar panels composed of a number of solar cellswhich are made from silicone and which act as semiconductors that produce the photovoltaic effect.

The cells are protected from the environment and are packaged tightly behind a protecting framed glass sheet and affixed to support structures. The generation of more power is achieved by electrically connecting numerous photovoltaic modules / arrays together. PV cells arepositively charged on one side and negatively on the other and electronic conductors are attached to either end thereby creating aelectrical circuit. The circuit captures the higher energy state electrons which are released in the form of an electric current (direct current). An in inventor then converts the direct current into alternating current. Thereafter a transformer steps up the power from the solar energy array so that it can be delivered into the electrical grid, in this instance the national ESKOM power grid at an existing sub-station.

2.2 Description of the proposed PV solar array

2.2.1 Locality

The proposed solar array may be reached by travelling to Springbok in the Northern Cape. From the town of Springbok take the N7 northwards towards Okiep, follow the N7 for 6.38 km to the off ramp just south of the town of Okiep, take the off-ramp and at the T-junction turn left on the secondary road towards the town of Nababeep, follow the road for 6.26 km. On the left hand side of the road look for a sign for the old golf course, this is the access point to the site, here turn left and travel down the gravel road, cross the cattle grid and proceed to the old clubhouse.

2.2.2 Project component and associated infrastructure

The extent of the proposed site is estimated at 250 ha's. As stated above access to the site will be made possible via a gravel road from the tarred road that links Okiep to Nababeep. The proposed technology that will be used will be a fixed PV constructed in two phases with a total export capacity of 150MW. The framework will be mounted to rammed steel piles or pre-manufactured concrete footings. The PV panels will be mounted on the steel framework at an orientation that would maximise exposure to solar radiation throughout the day.Cabling for the solar array would run in trays mounted on the framework and thereafter underground wherever this is practically achievable. The cabling would pass through a power inverter which would convert the power generated by the solar array from Direct Current (DC) to Alternating Current (AC). Thereafter the electricity would feed into a 132KvA line that would run parallel to an existing municipal powerline(see Appendix A – Locality Map) and pass through a step up transformer and into the ESKOM sub-station which is located directly east of the N7. Access to the site will be along

existing gravel roads and the old service roads of the golf course. Internal maintenance and repairs will require small access roads between the array rows. A small building housing the office and storage areas for security, operational supervision and maintenance will also be built. During construction lay down areas will be required but these would be housed within the proposed site itself, would be temporary in nature and would therefore not increase the extent of impact in any meaningful way.

2.3 The need and desirability for the proposed Klipdam PV Solar Array

Klipdam is currently zoned as Agriculture 1. If successful the application will require a consent use application as the activity does not require rezoning to an alternative landuse i.e. the proposed development can be reconciled with the current landuse and therefore does not constitute a permanent change of agricultural landuse for the property.

The proposed development is supported and aligned with the aims and objectives of the Provincial Spatial Development Framework (PSDF), in particular Section B14 of the Northern Cape Provincial Spatial Development Framework (NCPSDF) makes mention of the fact that the province has the lowest contribution to National GDP of any of the provinces. This is contrasted by the fact that the province has the highest solar resource nationally and that it is an area that is highly suitable for the provision of renewable energy to South Africa. Section B14.4 is therefore aligned with the proposed development of a solar array on Klipdam and through this aligned with the national objective to generate income and contribute to Local Economic Development of the province as a whole.

The proposed development is aligned with the NCPSDF. Section C6.2 of this planning document makes provision for partnerships between government and the private sector where these partnerships have the potential to return significant socio economic returns and where they contribute to the provision of basic human needs programmes. In Section 6.2.3.1 and Map C5 the NCPSDF makes mention of the fact that the area being considered for the proposed development is additionally identified as an area that has high potential for development based on its available resources. The proposed development would additionally be aligned with the desired investment as articulated in Section 6.2.3.3. In particular the desired infrastructural capital investment which should use “technologies and processes in an efficient manner”, have “zero waste and zero emissions production systems” and provide “improvements in product systems (eco-efficiency and eco-innovation)”. This is an area with high potential as noted above, thus the desired investment would be in infrastructure as articulated in Section 6.2.4. which shows additional alignment between the proposed development and the desired investment for the area.

The proposed development however is primarily aligned to the desired objectives stated in Section 8.2.3. Energy Objectives of the NCPSDF including:

- Promote the development of renewable energy supply schemes. Large-scale renewable energy supply schemes are strategically important for increasing the diversity of domestic energy supplies and avoiding energy imports while minimizing detrimental environmental impacts.
- There is a national electricity supply shortage and the country is now in a position where it needs to commission additional plants urgently. Consequently, renewable energy projects are a high priority.

- Develop and institute innovative new energy technologies to improve access to reliable, sustainable and affordable energy services with the objective to realize sustainable economic growth and development. The goals of securing supply, providing energy services, tackling climate change, avoiding air pollution and reaching sustainable development in the province offer both opportunities and synergies which require joint planning between local and provincial government as well as the private sector.
- Develop and institute energy supply schemes with the aim to contribute to theachievement of the targets set by the White Paper on Renewable Energy (2003). This target relates to the delivery of 10 000 GWh of energy from renewable energy sources (mainly biomass, wind, solar, and small-scale hydro) by 2013.

The overarching planning contained in the NCPSDF appears to be the only plan available at the present time, consultation with the mayor and planner of the NamaKhoi municipality revealed that an SDF is not available at present. The NCPSDF makes provision for the integration of environmental spatial planning categories with other developmental needs in the local authorities within its jurisdiction. The areas assessed fall outside Critical Biodiversity Areas (Namaqua District Municipality Biodiversity Sector Plan) and National Freshwater Ecosystem Areas (SANBI GIS data layer).

The proposed development is located outside the urban edge and is currently used for extensive grazing of small livestock. The bulk of the property will remain suitable for this form of landuse, the proposed development will therefore not preclude the owner from continuing this landuse in parallel with the generation of electricity.

The proposed development Plan would not compromise the integrity of the existing approved and credible municipal IDP. In fact the proposed development would be contributing and directly aligned with the following objectives of the NamaKhoi Municipality Integrated Development Plan (2013 – 2014):

- Provide services that are sustainable
- Promote social and economic development
- Promote a safe and healthy environment

Additionally in the SWOT analysis undertaken for the NKM IDP 2013-2014 the municipality has identified the development of solar power plants as a key opportunity. The proposed development is finally aligned with the articulated summary of needs in terms of infrastructure development within the NamaKhoi jurisdictional area these include the provision of electricity, the upgrade of electricity supply and under economic needs, the facilitation of job creation, improved infrastructure provision, the promotion of business development, support to existing government projects, the promotion of private / public partnerships to achieve these outcomes.

The Biodiversity Sector Plan for the Namaqua District Municipality has been compiled. The proposed areas identified for the development fall outside all areas identified as Critical Biodiversity Areas. The areas identified for development do overlap with the National Freshwater Ecosystem Priority Areas but the single drainage line identified will be buffered and avoided. Additionally the site does not have any gazetted endangered ecosystems in terms of the Gazetted Notice 1477 of 2009. The site therefore has a suitable ecosystem profile for the proposed development.

The White Paper on Energy Policy for the RSA (1998) gives recognition to "renewable sources" in their own right; are not limited to small scale and remote applications, and that they have medium to long term commercial potential". Furthermore that "Renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long term sustainable energy future for South Africa". It is self evident that the proposed facility is aligned with these requirements and aims.

Alignment with the White Paper on Renewable Energy (2003) is effected by the South African Governments status as a signatory to the Kyoto Protocol. Government is determined to establish a renewable energy industry that will offer sustainable, fully non-subsidised alternatives to fossil fuels by:

a) making good the country's commitment to reduce greenhouse gas emissions, and

b) ensuring energy security through diversification of supply (National Energy Act). Government's long-term goal is to

The medium-term (10-year) target set in the White Paper is 10 000 GWh renewable energy contribution to final energy consumption by 2013, to be produced mainly from biomass, wind, solar and small-scale hydro electrical plants. This target constitutes 4% of the total projected demand. The proposed Klipdam Solar PV Facility supports government's medium and long term renewable energy goals as it will assist to make good the country's greenhouse gas emissions and ensure energy security.

The Strategic Integrated Projects (SIPS) address the provision of bulk infrastructure for electricity to support and stimulate Local Economic Development (LED) in particular SIP 8 : Green Energy in Support of the South African Economy, SIP 9 : Electricity transmission and distribution for all and SIP 10: Electricity development to support LED. PV Solar is fed directly into the grid and therefore is immediately available for distribution via the national grid. As one of the preferred bidders the proponent would be contributing directly to the same outcomes, namely:

- Add about 1.667MW new renewable energy capacity, with a net impact on GDP as high as R1.071-billion a year;
- Create additional government revenue of R299-million;
- Stimulate additional income that will flow to low-income households by as much as R128-million,
- Creating just over 20 000 new jobs; and
- Contribute to water savings of 16.5-million kilolitres, which translates into a R26.6-million saving.

Furthermore a target of 17.8 GW has been set for energy provision from renewable sources by 2030. This target has been included in the Integrated resource Plan 2010 and the IPP Procurement Programme.

The National Energy Act (2008) promotes diversification of energy sources and supply including renewable resources, i.e. solar and wind. The diversified energy resources have to be available in sustainable quantities at affordable prices and should support economic growth, poverty alleviation and consider the preservation of the environment. The proposed development is fully aligned with this objective and the need it articulates.

The National Alternative Energy Strategy (2009) - South Africa's government has identified around 20GW of pure renewable energy capacity and 4GW of cogeneration technologies that may form part of its renewable energy procurement plan under the

region's feed-in tariff programme. The proposed development is fully aligned with this objective and the need it articulates and would directly contribute to this capacity.

The National Spatial Development Framework (2006) serves as instrument to coordinate all government action and to align social, economic and environmental goals. The National Spatial Development Framework provides the basis to maximize the overall social and economic impact of government development investment through interpreting the strategic direction, policy coordination and combining government action into a continuous spatial framework of reference. The ultimate goal is to provide basic services, to ameliorate poverty and undo uneven and ineffective spatial patterns and address the additional burden on poor people. The proposed Klipdam Solar Facility complies with the normative principles of the National Spatial Development Framework in the following ways:

- Economic growth is a pre-requisite to achieve policy objectives – the site will contribute to the GDP of the country
- Government spending on fixed investment should be focussed on localities of economic growth or economic potential – the Northern Cape has been identified as a key area for renewable energy development
- Effort to address past and current social inequalities should focus on people not places – the creation of jobs and skills development is an outcome.
- To overcome spatial distortions of apartheid, future settlement and economic development opportunities should be channelled into corridors and nodes that are adjacent to or link the main economic growth centres – there is clear alignment with the growth corridor and centres identified in the Northern Cape.

In terms of the National Development Plan for 2030 the project would contribute directly to the vision expressed in Chapter 4: Economic Infrastructure and in particular the vision which speaks to the Energy Sector. The vision articulated at the beginning of this chapter is the following:

By 2030, South Africa will have an energy sector that promotes:

- Economic growth and development through adequate investment in energy infrastructure and the provision of quality energy services that are competitively priced, reliable and efficient.
- Social equity through expanded access to energy services, with affordable tariffs and well targeted and sustainable subsidies for households.
- Environmental sustainability through efforts to reduce pollution and mitigate the effects of climate change.

Clearly this proposed project is aligned with and has the ability to deliver on this vision.

Future urban and rural development in the province should change the current pattern of resource application and investment significantly to ensure a sustainable environment for the future. Infrastructure investment and development spending should primarily support localities that will become major growth nodes in South Africa - The resource application and investment are aligned with national energy strategies and enhance the resource base of the Nama-Khoi Municipality.

In summary and from a planning perspective a development such as this speaks directly to the guiding principles of sustainability in development in particular the current challenge of climatic change. It addresses all three pillars of sustainability in development. It directly impacts on the economic leg of sustainability through the provision of sustainable green energy and the economic efficiency (in terms of total cost of all downstream impacts) that this form of energy will deliver once mainstreamed. Particularly it contributes to the current challenges ESKOM is experiencing in providing sufficient energy to South Africa. Indirectly it contributes to ecological sustainability through the avoidance of impacts resulting from the consumption of fossil fuels and through the provision of clean energy contributes to social equity through the provision of a physical and moral space where the continuity of a complex society and ecology is sought to be maintained and enhanced, and its health attained.

The proposed development is aligned with the Normative Principles of the National Spatial Development Perspective in that it represents a rural development that changes the current pattern of resource use and in so doing reduces in a meaningful way the consumption of fossil fuels and when interpreted in light of climate change benefits future generations through the switch to sustainable green energy.

The proposed development will respond to a key planning issue related to the integration of uses as it represents an opportunity to promote mixed use landuse management and in particular the stated aim to maximize the utilization of resources for economic gain in this instance the resource sustainable green energy.

This development is responding to an international, national, provincial and local authority priority. At an international level the switch to a green economy is seen as a strategic response to climate change and escalating atmospheric concentrations of CO_2 from the combustion of fossil fuels. At a provincial level the proposed development is aligned with the Growth and Development Strategy as it promotes growth, diversification and transformation of the provincial economy and through social development is able to address poverty reduction. To achieve these will require that human and social capital is developed, improving efficiencies in governance and importantly development management, improvement, expansion and enhancement of required infrastructure to facilitate social and economic growth. As outlined above the proposed project is a case of diversification of the economy in a low potential extensive agricultural landscape and a necessary and required infrastructural development. In particular the project would contribute directly to energy sector related infrastructure and consequent strengthening and promotion of the green economy. At all scales from National to local level the Achilles heel for development is the provision of inexpensive energy to service and expand development. This development would directly contribute to addressing this key constraint through the provision of green energy.

In terms addressing socio-economic needs at a local scale seventy three percent (72.9%) of the population are of employable age (between 15 and 65) (Census 2001). Fourty seven percent (47% or 12269 persons) of the employable population are employed, whilst 9.3% (or 2428 persons) are unemployed and discouraged work-seekers. Fourty four percent (43.7% or 11408 persons) of the population is not economically active. The proposed development will provide an opportunity for temporary and permanent employment, thus addressing this critical concern. This is supported by the findings of the Social Scoping Study.

Additionally the development of renewable energy will grow organically and in a spatially decentralised manner throughout the country which will contribute to the stabilisation and strengthening of electricity supply to consumers while reducing costs associated with the transmission of electricity over significant distances.

The farms in this area are low to marginal agricultural concerns, this due to the low returns associated with the husbandry of small stock on veld with a low carrying capacity. This is a mountainous property that has no commercially viable agricultural soils thus characteristically focussed on extensive agriculture. The site is highly suited for the generation of energy from PV Solar as shown by the irradiation yields measured. Considering the limited agriculturally based economic opportunities available to people within this landscape this proposed development represents a viable diversification of the income streams into these businesses, it is based on a "green" technology that in this instance will not impact on the sense of place, will not cause noise or other forms of pollution, which is located in an area particularly suited to energy generation from solar power and in a unthreatened ecosystem where unavoidable impacts are highly localised and due to the "intactness" of the surrounding vegetation probably reversible. Key here is that the current landuse on the site can continue in parallel i.e. the bulk of the site remains viable for utilisation by small stock.

From a practical perspective the site is easily accessed from well-developed road infrastructure from the town of Springbok and the N7 and the tar road to the town of Nababeep. The site is for the most part flat to gently undulating which will not require extensive earthworks and associated environmental impacts. Finally the site is located close to an existing ESKOM substation, connectivity to the grid is therefore an additional advantage for this site.

From an ecosystem point of view the proposed development will be located in a non-threatened ecosystem, well away from any important terrestrial or sensitive aquatic ecosystems, it is the type of development that if decommissioned can be fully dismantled and removed, it supplies and alternative and more viable economic opportunity to people who live and work in a marginal agricultural area, the site has low sensitivity visually once mitigation has been implemented, produces no noise or pollutants and supplements energy provision in line with national strategies to provide energy to civil society in South Africa. Additionally the loss of biodiversity in this instance is further mitigated by the inherent character of the property itself. This is a property which has large areas of the same ecosystem that is well connected and well connected to the very large areas of the same on neighbouring farms. The areas assessed have been impacted by the development of a now defunct golf course and agriculture and is fully transformed and degraded over a large area. Much of the natural areas regionally have limited to no potential for intensive agricultural production and will remain natural for the foreseeable future if not overgrazed and for all intents and purposes would fulfil the function of Ecological Support Areas. The loss of natural vegetation versus the benefit of establishing a sustainable income from a low potential agricultural farm from a renewable source with the livelihoods that it would support and be beneficial too, points to an opportunity cost that would favour the proposed development.

The proposed development would not be setting a precedent as similar projects have already been authorised by the competent authority in the area, see NEAS Ref : DEA/EIA/000130/2012, DEA Ref : 14/12/16/3/3/511.

The proposed development is located on private land and with the full consent of the landowner and will thus not infringe on any rights from this perspective. The site will not produce any waste or pollution and will therefore should not have a physical effect beyond the boundaries of the property.

2.4 Project alternatives

2.4.1 Site alternatives

The property is the only one owned by the landowner and as such property alternatives in this regard are not possible. Alternatives in terms of correctly locating the array on the site were determined through the relative sensitivity and practical suitability of areas on the property. This was done through an initial site audit based on a field visit by the EAP's and an investigation of the ecological and conservation status of the property as well as topographical and physical features. In common with the general landscape the farm Klipdam is for the most part a mountainous property. The topography of the property is for the most part highly irregular and steep granitic rock domes, with boulders and stony ground.Clearly the areas where the granite extrudes above the alluvial soils is unsuitable for the proposed development as it would require engineering works that would result in unacceptably high and irreversible environmental impacts. The only portions of the entire property that have potential for development are the flat to gently undulating areas of alluvial soils around the bases of the granite outcrops, on the northern portion of the property, see Appendix A: Site Plans. These are the only portions of the property that fulfil the key requirements of a suitable site for the development of a PV Solar installation. These key requirements are, (1) topographically a site that has a flat to gently undulating sandy substrate, (2) receiving the maximum number of hours of sunlight/ irradiation possible, (3) with existing access roads and supporting infrastructure, (4) in an area that has low to medium sensitivity in terms of potential visual impact, (5) in an area that has low to medium sensitivity in terms of the threat status to the ecosystem type, (6) in an area where the ecological services of the identified Critical Biodiversity Areas and Ecological Support Area can be buffered to avoid and / or mitigated and finally, (7) in an area that will not impact on sensitive archaeological or heritage assets. A hierarchical process of determining the sensitivity of the site took cognisance of all of these features to select the proposed sites for development, from this it became apparent that the location of the proposed PV Solar Array is the only site available on the property Klipdam which meets all these criteria and therefore represents the only site alternative available to the proponent that is able to house a proposed PV array of 150MW, this because:

1.) Only areas of deeper sand that were flat to gently undulating were selected these are indicated in Appendix A – Site Plans.
2.) The area is identified nationally as an area of high solar irradiation, furthermore the proponent, at a local scale selected the specific property for the increased suitability of northern aspect of the slopes which would maximise the solar harvest from an array even further.
3.) The site is connected via a tarred road to the national artery of the N7 which allows for easy and efficient transportation of construction materials to the site. There is therefore no need to build costly road infrastructure and in so doing increase the significance of the environmental impact of the proposed development. The site is located close to an existing sub-station which has the capacity to accommodate the power generated from the proposed PV solar array.
4.) The site is located in a mountainous area and while the northern slopes are not shaded significantly they appear to be visually less sensitive from the initial visual scoping assessment which has been undertaken. Furthermore the site has a municipal power line which traverses the site, the powerline from the proposed PV array could follow this existing line to further reduce visual impact.

5.) The vegetation type (ecosystem type) is regarded as least threatened and in the areas where the proposed development will be located the ecological sensitivity appears to be low to medium (ecological scoping report) and as such suitable for a development such as this. Sensitive areas such as the drainage line (Ecological Support Area) through the property can be effectively buffered which should ensure that impacts on this ecological support area are avoided.
6.) The site lends itself to a situation where Critical Biodiversity Areas and Ecological Support Areas can be avoided thus avoiding impact on these important ecological features.
7.) Scoping of the site has revealed that the site has a low sensitivity from an archaeological perspective, the sites that have been identified are highly localised and can be avoided by fencing these areas out and avoiding them.

2.4.2 Activity Alternatives

Intensive use of the land for agricultural purposes is entirely unfeasible for this property. Historically Klipdam has been used as a golf course and as an extensive agricultural area i.e. grazing land for small stock. Farms within this area are limited to the husbandry of small stock and the small scale production of cereals along the valley floor in some parts but this is a highly marginal area for this agricultural landuse. The erection of a PV Solar Array on the property represents an opportunity to increase the productivity of the property dramatically from a relatively small footprint on a large property covered in natural vegetation. The activity will not hinder the owner to continue to use the bulk of the property for extensive grazing, the activity proposed is therefore compatible with the existing landuse. The diversification of the business to include the generation of energy supplies the owner with a unique opportunity to turn a currently marginal agricultural area into an important and economically viable proposition which is, aligned to, and addresses a key resource challenge (i.e. energy supply to grow the economy) being faced by South Africa. The proposed development contributes directly to meeting the national target for the generation of energy from renewable sources. Furthermore, properties such as this require significant amounts of money to manage and maintain on an annual basis. The generation of energy from the land surface area of the property supplies the proponent with a potentially sustainable income stream (over a minimum of 20 years) that could both cover the expense of retaining, managing and maintaining the property and provides a landuse opportunity that is profitable enough to provide an additional income. Seen from this perspective the proposed landuse does translate into the most practicable and economically sustainable landuse activity for this locality. Therefore on evaluation as an activity we believe it to be the only feasible alternative currently available.

2.4.3. Layout and design alternatives

The most important impact associated with this activity will be the loss of natural vegetation. To a lesser extent impacts on more sensitive areas within the site should also be avoided. The clearance of natural vegetation should be restricted to flat to gently undulating areas to ensure that cumulative impacts from erosion in particular in this mountainous landscape are avoided. Furthermore that the more sensitive and unsuitable rocky areas are avoided.

To further reduce impact which would result from the construction of associated infrastructure layout recommendations include that the proposed PV Array is located adjacent to existing access roads, that storage areas for maintenance equipment be located within the developed site, that a 30m buffer is retained to either side of any important drainage lines, in particular the Ecological Support Area drainage line identified in Appendix A - Maps. Additionally that cabling be housed in underground

trenches and that these follow the existing access roads as far as practicably possible. Consultation with the proponent to date has indicated that cabling from the PV Array will connect to the ESKOM grid at the existing substation, see also Appendix A - Maps. The choice of the layout has incorporated the recommendations from the visual scoping assessment, agricultural scoping assessment and the heritage specialist studies. Additionally the property does contain areas that have been identified as Critical Biodiversity Areas, these areas have been avoided and the proposed layout is located outside of these areas. A proposed layout for the PV Array is shown in Appendix C- Facility layout.

2.4.4 The no go option

While the no go option will be fully assessed during the EIA portion of the assessment process, there are a number of facts evident at this stage which may indicate that the no go option could in fact prove to be unfeasible in this instance.

Scenario planning at a national scale indicates the South Africa requires additional energy from renewable energy sources such as solar for power provision. Solar PV is a suitable technology as it is able to provide significant volumes of energy, can be relatively easily deployed in a decentralised manner close to consumers and as such is able to stabilise and improve the quality of the national grid at local to regional scales, while reducing expensive transmission and distribution losses. The diversification of the power supply through the establishment of a new economic sector, away from the lopsided dependency on energy generation from coal power, would further enhance the stability in power supply to the nation.

The generation of electricity from solar power is furthermore a water saving initiative in a water stressed country. It is estimated that 16.5 million kilolitres of water per annum will be saved if the targets in the Renewable Energy White Paper are met, translating into an annual saving of R 26.6 million. Additional to this is the fact that power supply from this renewable resource is pollution free in terms of emissions which is a significant improvement on the high emissions and pollution from fossil fuel plants, with their concomitant human and ecological health hazards.

From an socio-political and economic perspective this landuse option is aligned with international agreements (contribution to climate mitigation through reduced Green House Gas (GHG) emissions), national, provincial, local and fine scale forward planning - the intensive use of land for the generation of renewable energy does translate into the most economically sustainable landuse for this marginal agricultural locality. Job creation is a tangible return from this energy supply sector, initially this will be restricted to construction and maintenance opportunities but as the sector grows operations from producing the technology locally should materialise thus expanding the scope of employment opportunity over time.

At a more local scale our sense is that the opportunity cost weighs in favour of the proposed development due to the suitability of the site for the proposed development from a heritage and visual impact perspective, conservation status of the ecosystem type, low potential impact of the development the land surface of the property can supply enough additional income to “carry” the property and the fact that the transformation of 250 ha’s of vegetation would not impair the quality of biodiversity pattern or process assets on the site.

The area is economically active due to its suitability for the extensive grazing of small stock, however returns from this landuse are marginal at best particularly for single property owners. Sustainable landuse options for people in this location are therefore

very limited and in our consultation appear to be closely linked to the ability of a landowner to diversify the income streams into the property to attain a position where the property becomes a viable business that can function independently of outside subsidy from other income streams as is currently the case. Alternatively additional properties would need to be purchased to attain an economic unit for this marginal area.

Fundamentally it appears that it would be at odds with international commitments in terms of the use of renewable energy, the forward planning of National Government, the PSDF and IDP. For these reasons the no-go alternative is considered unfeasible.

2.4.5 Technology Alternatives

Currently two technology alternatives could be considered in this locality for the generation of renewable electricity. These are (1) Photo Voltaic Solar Power (PV), (2) and Concentrated Solar Power (CSP). Concentrated Solar power requires large volumes of water for the generation of energy from a steam turbine, these resources are currently not available on site and the plant is larger and has the potential to cause visual pollution at elevation in this mountainous area thus this technology alterative is considered unfeasible. PV feeds directly in to the grid from the array through an inverter and step up transformer. It is a low profile development that is suited to the proposed location and is therefore considered to be the appropriate technology alternative for this site. PV Solar may be deployed in two ways either on a fixed mounting or on mountings that track the sun throughout the day.

Tracking systems are devices that orientate the PV payloads towards the sun to maximise the irradiation received i.e. optimise the capacity of the PV array to receive incoming radiation. In flat panel PV applications, tracking devices are used to minimize the angle of incidence between the incoming sunlight and the photovoltaic panel to increase the energy generating capacity. The primary benefit of a solar tracking system is that it is able to collect solar energy for the longest period of the day and additionally it is able to track the sun as it shifts seasonally. Active trackers use motors and gear trains to direct the tracker as commanded by a controller which responds to the solar direction.

Installing solar tracking systems on the PV array adds a significant number of moving parts which require regular maintenance and increased costs for repairs to broken parts. Additionally tracking systems are sometimes complex and electronically driven; if a breakdown occurs these systems do not have manual overrides with the result that the system may remain out of commission until repair is effected. The greater complexity of the system additionally increases the set up time and cost of the PV Array. The trade off between the efficiency gained and the total costs show a cost benefit that does not favour a tracking system.

It is estimated that the overall efficiency of the system is increased by 23-30% through tracking, but this is accomplished through a setup and maintenance cost increase of 31-35%. Additionally tracking systems are more “hungry” in terms of area as the modules need to be spaced out further apart to ensure that they do not shade each other, especially when the sun is at a low angle to the horizon. Space constrained areas are therefore less attractive for tracking systems. Advances are being made with single pivot tracking systems that may become feasible in future.

By comparison fixed tilt mounted systems have the benefit that they are simple structures with no moving parts, robust and easier to maintain and repair in a rural setting, take less time to install, are more cost effective, have lower maintenance and

repair costs during operation and are less "hungry" in terms of land surface area used. For these reasons they are considered to be the preferred alternative in terms of technology used.

2.4.6 Operational Alternatives

Accepting that the fixed tilt system is the system of choice, once operational the site should be characterised by a low disturbance regime associated with the occasional repair to the array resulting from equipment failure and ongoing maintenance of the array over its expected 20 year lifetime.

Annual maintenance is relatively simple and requires that the panel surfaces of the array are cleaned with water twice a year to remove accumulated dust and ensure that the efficiency of the panel remains high. It is estimated that the array would require 1200 litres per MW or 180 000 litres per annum for operational maintenance.

Impacts would therefore primarily be associated with edge effects from the movement of vehicles along the access roads and the potential impacts of maintenance crews being on site. Other than that edge effects can be controlled to a great extent by ensuring that vehicles stick strictly to the access roads, that all equipment is stored safely in lockable sheds, that the perimeter is fenced off which will further restrict movement beyond the array itself and that drainage lines are well buffered to keep the hydrology of the site stable and ensure the site does not become prone to the effects of erosion.

The vegetation type here is primarily succulent and sparse by nature and is not considered high risk fire prone ecosystem.

Maintenance crews will require supervision to ensure that impacts such as hunting of indigenous animals or the ignition of uncontrolled fires is avoided. Adherence to recommendations made in an EMPrthat will be prepared as part of the Final EIA reports will avoid these impacts. The net benefit to the proponent and his dependents and to the country as whole in terms of energy provision in our estimation point to a cost benefit that favours the development.

2.5 Overview of the construction phase

2.5.1 Conduct Surveys

Geotechnical surveys and site surveys for the array and the routing to the substation will be required if the application is approved and the bid accepted.

2.5.2 Transport of equipment and components

As mentioned above the site can be accessed directly from the N7 and the secondary tarred road that passes the property, directly adjacent and to the north connecting the town of Okiep to Nababeep. There is an existing gravel road that has been used as an access point to the now disused golf course that provides adequate access to the site itself. The most northerly portion of the site has gravel road access to the site itself as well. The transformer may require a truck and horse able to transport an abnormal payload (the transformer may qualify as an abnormal load due to its weight and / or dimensions according the Road Traffic Act (Act 29 of 1989), the site of the sub-station is directly adjacent to the N7 and would be adequate to get this component on site.

2.5.3 Establishment of internal road network

Within the site itself small construction and maintenance roads will be required between the rows of the array itself. These roads would require compacting of the surface, the exact layout and specifications for the road infrastructure and surface would be determine through the geotechnical survey and the micro-scale surveys.

2.5.4 Site preparation

Site preparation would require the clearing of vegetation and the localised levelling of more irregular areas, topsoil would be stripped when preparing the concrete foundations which would anchor the metal framework to which the panels would be attached. This soils would have to be stockpiled and backfilled. As such typical civil engineering equipment would be required on site.

2.5.5 Establishment of laydown areas

Lay down areas would be required for construction material these would be housed within the site itself and would require approximately 1 ha. As such separate lay down areas outside of the construction footprint are, at this stage, not foreseen.

2.5.6 Erection of solar panels

As indicated above concrete foundations will be sunk to which a metal framework will be attached. The flat PV panels will then be attached to the framework. The framework would have a vertical height of not more than 4m. The fact that the entire framework can be connected to the concrete foundations will allow for it to be fully dismantled and removed should the plant be decommissioned for some reason. The array will require the installation of inverters to convert DC to AC, the placement of these will be guided by the micro-scale layout of the facility, within the identified site, in the pre-construction phase. Cable connections would be located in underground trenches wherever practicably possible.

2.5.7. Construction of sub-station and/ or routing of the power line to the substation

In this instance the site identified is close to an existing ESKOM substation. As such it will require a 132 kVA power line connection to the sub-station. This will require the identification of the route in this instance probably in parallel to the existing municipal power line the transects the property, the surveying of the route that the line will follow informed by the sensitivity identified in the EIA process, the design and layout of the line and the placement of the towers/ poles to carry the line and the appointment of a construction crew to build the line.

As this line will probably be parallel to the existing line conceivably no access road for the construction and maintenance will be required as the existing access to the municipal line could be used.

Thereafter the towers would be erected, the isolators attached and the conductor lines strung between the towers All areas disturbed during the construction process would be rehabilitated and finally the line would be tested.

2.5.8 Construction of buildings

Building infrastructure i.e. storage areas, office and temporary encampment for the contractor and the equipment would require the clearance and levelling of the chosen site, the excavation of foundations and lay down areas for the construction equipment.

2.5.9 Rehabilitation

The primary disturbance in a construction process such as this would be the excavation of foundations for the array and the ancillary infrastructure, trenching activities for cable reticulation from the array and potentially the localised levelling within the site itself. This would require the stripping of the vegetated cover and topsoil which would be stockpiled and on completion of the construction would be backfilled immediately and / or spread on site. The process should be integrated with the construction as it proceeds, each phase of the construction would be rehabilitated before proceeding with the next.

2.6 Operational phase

The operational phase would require on site security, maintenance and control room staff that would be housed in the above mentioned ancillary buildings on site. It is conceivable that maintenance crews could be housed off-site in the neighbouring towns of Okiep, Nababeep or Springbok and only be on site to undertake routine and scheduled maintenance during the year. Security for the facility could be outsourced to existing security firms and staff could operate on site on a shift basis.

2.7 Decommissioning phase

With the current technology available at the present time a facility such as this should have a lifespan of about 20 years. More probably the site would be refitted with more up to date and appropriate technology once the economic lifespan had been reached. In the event that the facility is no longer feasible and would require full decommissioning, then the following would apply.

2.7.1 Site preparation

Preparation would require the appointment of a decommissioning contractor who would be responsible for mobilising the staff and equipment needed for the decommissioning phase. Conceivably no laydown areas would be required as the array could be dismantled and loaded on to waiting vehicles and transported directly off site.

2.7.2 Disassembly

The framework would be dismantled and laid down along the row, components would be loaded on to and transported from the site and delivered to a permitted waste treatment site.

3. ENVIRONMENTAL AUTHORISATION PROCESS

The Environmental Impact Assessment Process (EIA) referred to that process that is aligned with the requirements of the EIA Regulations and which involves the identification and assessment of all direct, indirect and cumulative environmental aspects of a proposed development.

This EIA process is comprised of two phases, the *Scoping Phase* and the *EIA Phase.* The EIA process is concluded when the EIA Report with an Environmental Programme is submitted to the competent authority for decision-making and environmental authorisation.

3.1 Regulatory and Legislative Context

3.1.1 Regulatory Agencies - National level

- Department of Environmental Affairs (DEA) – is responsible for the environmental policies and enforcement of the NEMA and the EIA Regulations. DEA is the competent authority and is responsible for granting environmental authorisation for this proposed solar energy facility.

- South African Heritage Resource Agency (SAHRA) – is responsible for the National Heritage Resources Act (Act 25 of 1999) as well as provincial regulations that protect various listed and proclaimed heritage resources and values.

- The National Energy Regulator of South Africa (NERSA) – is the regulating institution involved in all aspects of the electricity sector in South-Africa and the body which will issue the licence for this solar energy facility.

- The Department of Energy – is responsible for the implementation of the Electricity Act (Act 41 of 1987) and for the implementation of policies relating to generation of all forms of energy including renewable energy.

3.1.2 Regulatory Agencies - Provincial Level

- The Northern Cape Department of Environmental and Nature Conservation (DENC) is the main regulatory Department and will be a commenting authority for this proposed development.

3.1.3 Regulatory Agencies - Local level

At a local regulatory level, planning, land-use and environmental concerns are the responsibility of the Local and District Municipalities, in this case the NamaKhoiMunicipality and the Namakwa District Municipality. These responsibilities include aspects such as the legislative mandatory Integrated Development Plans (IDP's), Spatial Development Frameworks (SDF's) and enforcement of by-laws and policies.

3.2 Legislative guidelines

This section describes all the legislation and guidelines that are used to inform the scope and content of this Draft Scoping Report:.

- National Environmental Management Act (Act 107 of 1998) (NEMA);
- EIA Regulations, published in Chapter 5 of NEMA (GNR R545 & GNR 546 in Government Gazette 33306 dated 18 June 2010) as amended;
- Relevant guidelines, published in terms of NEMA, such as the Guideline on Public Participation (DEA, 2010)

Various other Acts, guidelines and standards will be used in addition to those mentioned above to inform the assessment process of the proposed development, the scope of issues to be addressed in the Scoping Report and which will in turn be addressed in the EIA. The applicability of these acts, guidelines and standards and the competent authority responsible for their implementation are summarised in Table 2. See Table 2 - Review of applicable legislation, policies and guidelines applicable to the proposed Klipdam PV Solar Energy Facility.

Table 2: Review of applicable legislation, policies and guidelines applicable to the proposed Klidam PV Solar Energy Facility.

Legislation	Applicable Sections	Responsible authority
The Constitution of the Republic of South Africa (Act 108 of 1996)	(S2) Bill of Rights (S24) Environmental rights - the right to an environment that is not harmful to their health or well-being; and 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;	
The National Environmental Management Act (NEMA) (Act 107 of 1998)	Environmental Impact Assessment (EIA) Regulations have been promulgated in terms of Chapter 5 of the Act. Everyone wishing to undertake an activity listed in these EIA Regulations (GN 385. 386 & 387 of 2006) needs an environmental authorization. S24(1) of the Act stipulates that the potential impact on the environment associated with these listed activities must be assessed and reported to the competent authority. According to S28(1) – the Duty of Care Provision – the project proponent must ensure that reasonable measures are in place to ensure that pollution and or degradation of the environment are avoided, stopped and or minimised. This is applicable for the entire life cycle of the proposed solar energy facility.	Department of Environmental Affairs
The National Environmental Management : Biodiversity Act (Act 10 of 2004)	In terms of S 56(1) a list of threatened &protected species has been published in Government Gazette 29657; Additionally to this; GN R 150 (Commencement of Threatened and Protected Species Regulations, 2007), GN R 151 (list of critically endangered, vulnerable and protected species) and GN R 152 (Threatened or protected Species Regulations) has been published. Under this Act, a permit is required for any activity which may negatively impact on the survival of a listed protected species.	Department of Environmental Affairs
Environmental Conservation Act (Act 73 of 1989)	National Noise Control Regulations (GN R154 – 10th January 1992)	Department of Environmental Affairs, NC Department of Environment and Nature Conservation as well as the Local Authorities

National Water Act No 36 of 1998	S19 – Duty of Care that stipulates that the project proponent must ensure that reasonable measures are in place to prevent and mitigate to effect of pollution of water resources. S20 – describes the procedures to be followed in an emergency situation which may impact water resource. S21 – Definition of water use. S22 – Any water use that is not Schedule 1 as stipulated in terms of this Section must be authorised. S151 - unlawfully and intentionally or negligently commit any act or omission which detrimentally affects or is likely to affect a water resource.". A "water resource includes "a water course, surface water, estuary or aquifer".	Department of Water Affairs
National Heritage Resources Act (Act No 25 of 1999)	S38 - Stipulates that any person who intends to undertake a development such as-(a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length; (b) the construction of a bridge or similar structure exceeding 50m in length; any development or other activity which will change the character of a site-(i) exceeding 5 000 m^2 in extent; or (ii) involving three or more existing erven or subdivisions thereof; (d) the re-zoning of a site exceeding 10 000 m^2 in extent; - must at the very earliest stages of initiating such a development inform the local resource authority of such development.	South African Heritage Resource Agency
Conservation of Agricultural Resources Act (Act 43 of 1983)	Regulation 15 has been promulgated and makes it unlawful to allow various species of weeds and invader plants to grow.	Department of Agriculture
White papers and Policies		
The White Paper on the Energy Policy (Dec 1998)	The policy addresses most of the elements of the energy sector. Investments into renewable energy initiatives such as this proposed facility is supported by this White paper.	
The White Paper on Renewable Energy (Nov 2003)	Describes Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in the Republic.	Department of Minerals and Energy

3.3 Aims and Objectives of the Scoping Phase

The Scoping Phase for this proposed solar energy facility aims to:

- *Describe the existing environmental characteristics of the proposed development;*
- *Identify potential positive and negative environmental and social impacts (construction and operational phase);*
- *Make recommendations for detail studies required during the EIA phase;*
- *Engage with interested and affected parties in order for them to provide inputs and comments to the proposed develop - This is achieved by circulating and facilitating the review of the Draft Scoping Report;*
- *Provide sufficient information to authorities to make decision on the scope and extent of issues and specialist studies that are required for the EIA process;*

In achieving these aims the following objectives have been set for the Scoping phase:

- *To gather information (achieved by interaction and consultation via desktop reviews of existing baseline data and specialist studies, correspondence with scientists and local residents, Geographic Information Systems (GIS) and with authorities, key stakeholders and communities)*
- *To identify and evaluate potential environmental issues and impacts that require further investigation;*
- *To determine the sustainability of the project in terms of the biophysical, ecological and socio-economic environment;*
- *To consider alternatives in terms of site selection, layout, design. technology, processes and sustainability;*
- *To conduct an open, participatory and transparent public participation process and*
- *To outline the methodology and activities to be undertaken during the EIA phase of the assessment.*

3.4 Methodology to be used during the Scoping Phase

The Scoping Phase will be undertaken in accordance with the EIA Regulations as published in Government Notice 33306 (18th June 2010) of NEMA. The following key activities will be undertaken during this Scoping Phase:

3.4.1 Consultation with authorities and application for authorization

As the proposed development is an energy generation project – it is of national importance, therefore the National Department of Environmental Affairs is the competent authority. Additionally as this application falls within the Northern Cape, the Northern Cape's Department of Environment and Nature Conservation (NC DENC) is a key stakeholder and mandatory commenting authority.

The consultation process begins with the submission of an application for authorisationto the DEA. A copy of the application is simultaneously sent to the DENC.The DEA has 14 days to accept the application or request additional information, assign a case officerand allocate the case number before the process can proceed with the Scoping Phase.

3.4.2 Public Participation Process

The manner of undertaking a Public Participation Process (PPP) is governed by Chapter 6 of the Environmental Impact Assessment Regulations (GN No R543 of August 2010). The chapter requires that the PPP should be advertised on site and in the media, the requirement of maintaining a register of Interested and Affected Parties (I&AP) and the entitlement of the I&AP to comment via written submissions to the decision making authority.

The key stakeholder groups that were identified are comprised of the Government Departments (DEA, NC DENC, DWA, DAFF, NC DA&LA, ESKOM, NERSA, SKA), Municipalities (NamaKhoiLocal Municipality and the Namakwa District Municipality), Conservation Non-Governmental Organisations (NGO's) e.g. (WESSA), all adjacent neighbouring landowners, ward councillors that represent the communities in the Nababeep area. Information on these key-stakeholder groups as well as all additional registered I&AP's are collected, collated and maintained on a database that is updatedthroughout the process.

Two site notification boards, providing information of the proposed development, will be attached on the boundary fence of the site. Furthermore one site notification board will additionally be affixed to the notice boards at the NamaKhoi Municipal offices in Nababeep.

The project will be advertised in the "Die Kontrei", on the 27 February 2014, to inform the public of the proposed solar energy facility and to invite them the register as an I&AP's within a set timeframe. Please see Appendix E: Public Participation.

All key stakeholders will receive a registered letter containing information on the proposed project. Registered letters and Draft Scoping Reports will be posted to key-stakeholders. .The views, issues and concerns of stakeholders will be captured during consultation meetings, telephonic discussions and through written, faxed and e-mail correspondence. Please see Appendix E: Public Participation

3.4.3 Issues and Response Report

An issues and response report will form part of the Final Scoping Report that will be submitted to the DEA. This report will contain issues and concerns raised by I&AP's as well as the response to those issues by the EAP and / or the project proponent explaining how these issues will be addressed and /or to provide clarity on any point that may be unclear in the report.

3.4.4 Evaluation of issues identified by I&AP

Issues and concerns raised by I&AP's will be evaluated on the nature (the cause of the effect, what and how will it be affected) and the extent (site scale, local or regional) of the impact. This will result in a statement which will attend to the significance of the identified issues and provide recommendations for the studies required during the EIA.

3.4.5 Review of the Draft Scoping Report

The Draft Scoping Report (DSR) will be made available from 3 March 2014 to the 14 April 2014 for public review. The report will be available at the Springbok Library (alongside the Post office) and at the Nababeep office of the NamaKhoiMunicipality.

3.4.6 Final Scoping Report

This report will containresponses from I&AP's on the Draft Scoping Report in order to refine the DSR. On this report the DEA will provide comment, recommendations and acceptance to undertake the EIA Phase.

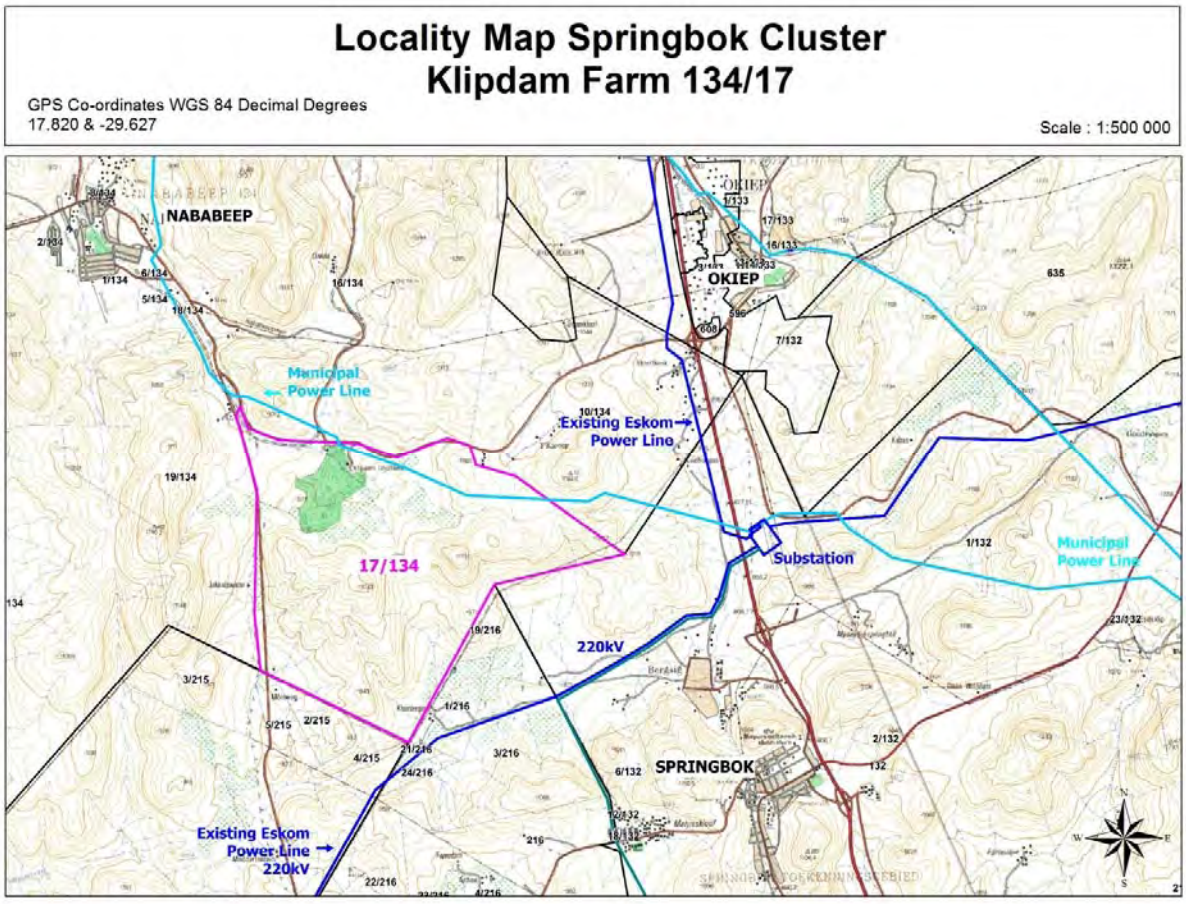
4. THE RECEIVING ENVIRONMENT

4.1 Regional Context

Regionally the proposed NK EnergieKlipdam site is located in the NamaKhoi Municipality one of the local authorities in the Namakwa District Municipality of the Northern Cape Province. The closest settlements to the proposed site are the town of Okiep to the east and Nababeep to the west.

4.2 Locality

The project site is located some 7km north-west of the town of Springbok via the N7. It can be reached by driving north along the N7 to Okiep and turning left to Nababeep, the site is located on the left at the old golf course. See Map 1.



Map 1: Site locality map

4.3 Access

The site may be accessed by following the N7 north from Springbok in the Northern Cape. At the intersection south of the town of Okiep take the offramp to the left. At the stop turn left towards the town of Nababeep. The turn off to the old golf course is located 6km down this road on the left. Access to the site from here is via gravel roads and service and management roads that were constructed for the golf course. The entrance leads to the old clubhouse and from there via numerous roads to various points within the site itself.

4.4 Topography and Geology

The farm is predominantly untransformed and mountainous Namaqualand veld with steep slopes and numerous exposed granite outcrops and domes. Lower lying areas are flat to gently undulating and are sandy well drained soils derived from the weathering of granitic and gneiss igneous rock. Elevation varies across the property between 800 m and 1,100 m above sea level. The geology of the site is granite and gneiss of the Namaqualand Metamorphic Complex.The northernportion of flatter land (average slope of approximately 5%) has been transformed and is the area identified for the proposed development.

4.5 Climatic conditions

The Springbok area has an average annual rainfall variously given as 150mm or 195 mm with a standard deviation of 66 mm according to the South African Rain Atlas. Most of which falls in winter, although there are occasional summer thunderstorms. The wettest months are June, July and August. Evaporation rates are high, especially in summer, when daily temperature maxima are regularly over 30^{0}C. Daily winter maxima are usually in the range of 10 to 20^{o}C, although this can drop to less than 10^{o}C in the days during or following the passage of a cold front. Winter minima are regularly below 10^{o}C, although frosts are fairly rare (8 to 30 days per year). The average monthly distribution of rainfall is shown in Table 3. In terms of the relationship between rainfall and evaporation the site is classified as arid, which is a serious limitation to agriculture. See Table 3 :Average monthly rainfall. Please see Appendix D: Specialist Reports.

Table 3. Average monthly rainfall for the site (29° 38' S 17° 50' E) in mm (Water Research Commission, undated)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Tot
6	7	12	18	27	31	31	25	16	10	7	6	195

4.6 Hydrology

There is a single seasonal stream in the northern part of the site which is in a fair to good condition, although it has been dammed at one point, and the stream is a designated aquatic CBA. All the drainage lines on site are seasonal, and hold surface water only for short periods after heavy rains. The main seasonal drainage line in the northern part of the site is generally less than 10m wide, with the actual channel being only about a meter wide and has three minor tributaries. At a point close to the

house the drainage line has been dammed, and the dam is surrounded by *Phragmitesaustralis* (reeds), which is not well represented elsewhere along this drainage line, presumably because there is not adequate available groundwater.

There are five other drainage lines throughout the greater site, but some of these are poorly developed when compared with the one flowing past the old golf course. Indigenous species associated with the drainage lines include *Acacia karoo*, *Salix mucronata*(willow), *Codon royenii, Zygophyllumfoetidum, Scirpoidesdioecus, Tapinanthusoleifolius*(partial parasite in *Acacia karoo*) and various annuals. No plant Species of Conservation Concern were recorded from within this habitat, and none are expected to occur, except possibly *Colchicum cruciatum*(Vulnerable). Please see Appendix D: Specialist Reports

4.7 Soils

There is only a single land type, Fc133, across the entire site and surrounding area. A summary detailing soil data for this land type is provided in Table 4. The land on site is classified as having class 4 susceptibility to erosion. This is land with moderate to high water or wind erosion hazard that has generally moderately to strongly. Table 4 Soil data.

Land type data for site. Erosion indicates the severity of the erosion hazard on an 8 class system, with 8 being most severe. The '% of terrain unit' column gives the percentages of soil forms for the terrain unit (foot slopes) that is proposed for the location of the solar development.See Table 4 Soil data. Please see Appendix D: Specialist Reports

Table 4 Soil data.

Land type	Land capability class	Dominant soil forms	Depth (cm)	Clay % A horizon	Clay % B horizon	Depth limiting layer	Erosion hazard class	% of land type	% of terrain unit
Fc133	7	Rock outcrops	0			R	4	48	15
		Hutton	15-30	2-4	3-8	R		17	40
		Mispah	5-15	1-3		R		8	10
		Sterkspruit	20-35	6-15	15-40	pr		8	15
		Swartland	10-25	3-6	20-40	vp		6	10
		Glenrosa	10-25	3-8	4-10	so		6	5

Land capability class 7 = non-arable, low potential grazing land. Depth limiting layers: R = hard bedrock; pr = dense, prismatic clay layer; vp = dense, structured clay layer; so = partially weathered bedrock.

4.8 Agricultural Profile

The site is located within a sheep farming agricultural region. There is no cultivation or evidence of past cultivation, apart from the old golf course. The land is used only for the grazing of small stock. The grazing capacity of the site is classified as between 26 and 30 hectares per large stock unit. There are however low numbers of introduced gemsbok and springbok in the area. There is no infrastructure on the site apart from the old golf course facility buildings and some other houses in the northern part of the site. Please see Appendix D: Specialist Reports

4.9 Ecological and Biodiversity Profile

The study area is located within what is now recognised as the Extra Cape Subregion (ECR) of the Greater Cape Floristic Region (GCFR; Snijman 2013), and is part of the Succulent Karoo biome. The GCFR is essentially defined by its predominantly winter rainfall, and a distinct flora. The GCFR is one of only six Floristic Regions in the world, and it is also by far the smallest floristic region. The Extra Cape Sub-region occupies only 0.1% of the world's land surface, and supports about 3720 plant species, almost 20% of all the plant species in southern Africa, and some 8% of the plant species in sub-Saharan Africa. About 40% of all the species in the Extra Cape Subregion do not occur outside this region (Snijman 2013), and many have very small home ranges (these are known as narrow endemics). Although land use pressures are relatively low in the region (apart perhaps from overgrazing and mining), and there are consequently far fewer threatened plants in the region than in the Core Cape Region (commonly referred to as the Fynbos), many of the range restricted species are vulnerable to intense local development due to their very small ranges and specific habitat requirements.

The study area is part of what has been called the Namaqualand Hardeveld bioregion (Mucina& Rutherford 2006; Snijman 2013). This bioregion has a fairly distinct flora, and a particularly high number of locally and regionally endemic plant species, as well as plant Species of Conservation Concern (Snijman 2013, Raimondo*et al* 2009). The region is also known to support a high diversity of reptiles (Bates *et al* - in press) and scorpions (Prendini 2005).

The study area is within the planning domain of the Namakwa District Biodiversity Sector Plan (Desmet& Marsh 2008), which has identified and mapped Critical Biodiversity Areas (CBAs) throughout the region. Critical Biodiversity Areas are regarded as essential areas for the achievement of regional conservation targets, and are designed to ensure minimum land take for maximum result. About 50% of the total site is a designated terrestrial CBA, mostly in the central and southern areas. These CBAs were selected primarily for habitat heterogeneity and the importance of steep south facing slopes as potential climate refugia (Desmet& Marsh 2008). Please see Appendix D: Specialist Reports

4.9.1 Vegetation

The SA Vegetation Map (Mucina& Rutherford 2006) indicates that a single vegetation type occurs throughout the study area – Namaqualand KlipkoppeShrubland (and hence no vegetation type map is provided for the site). This vegetation type is regarded as Least Threatened on a national basis, with some 95% of its original total extent still remaining, and about 6% protected

(Rouget*et al* 2004; DEA 2011). The vegetation type is widespread in the Bitterfontein to Springbok region, and is characterised by rocky granite (or gneiss) hills, separated by sandy slopes and valleys.

Three distinct habitats or plant communities occur within the study area (see Figure 3) - deeper sandy soils on the flats; shallow rocky soils, mostly on the hills; and the seasonal drainage lines in the valley bottoms. The vegetation on the sandy flats could in fact be better classified as Namaqualand Blomveld (Least Threatened; DEA 2011), but this interpretation has no real implications.

Sandy Flats

About 60ha in the northern part of the entire study area, within this habitat, has been heavily disturbed by the creation of a golf course (defunct as of about 8 years ago), which at one stage had irrigated greens and even fairways. The golf course area was levelled, although partly natural areas remain in the "rough" between the fairways. Alien *Eucalyptus* trees (blue gums) were planted along the fairways, and most of these large trees are still standing (Plate 1). There is a low diversity of indigenous plant species present in the golf course area, mostly in the form of resilient annuals and herbs, but the overall species diversity is now less than 25% of what it would have been prior to disturbance, and overall open space is as high as 70%. The ecological conservation value of these areas is Low at a site and regional scale. The dominant indigenous plant species in this area are widespread and resilient weedy species such as *Galeniaafricana*(kraalbos),*Dorotheanthusbellidiformis* (bokbaaivygie), *Helichrysumherniarioides, Heliophilavariabilis, Chrysocomaciliata*(bitterbos), *Adenogrammaglomerata, Conicosiapugioniformis* (vetkousie), *Hermanniaalthaeoides* and *Ursiniacakilefolia*.

In the sandy flats that were not part of the golfcourse development, but which were cultivated greater than 20 years ago (green hatched areas in Figure 1), plant species diversity and plant cover is significantly higher than in the old golf course area (Plate 2), and the botanical and ecological conservation value (or sensitivity) is correspondingly higher, being Low to Medium at a site and regional scale. In these areas the following additional species were recorded: *Gymnodiscuslinearis, Lotononis*sp., *Ehrhartacalycina* (rooisaadgras), *Oxalis flava, Leyseragnaphalodes, Pteroniaincana* (asbos), *Zygophyllumretrofractum, Ruschiarobusta*, *Drosanthemum* sp., *Zaluzianskya*sp.,*Cyanellahyacinthoides, Senecio*sp.,*Babianacurviscapa*, *Dideltaspinosa* (perdebos), *Calobotasericea* (fluitjiesbos), *Othonna floribunda*, *Ornithogalum* sp., *Eriocephaluspedicellaris, Monsoniaspinosa*(boesmankers), *Othonnaundulosa, Othonna*sp., *Zygophyllummorgsana, Lyciumcinereum, Pteroniaciliata* (biltongbos) and *Tripterissinuata*.

In undisturbed parts of the sandy flats habitat, and at the base of the rocky hills, species diversity and plant cover is at its highest (see Plate 3). Additional species include *Cheiridopsisrobusta, C. cigarettifera, Ficinialaevis, Ruschia sp., Berkheya* sp., *Cephalophyllumrigidum, Hermanniatrifurca, Arctotis*sp. nov,.*Searsiaincisa* (taaibos), *S. burchellii, Thesiumlineatum, Tylecodonwallichii* (krimpsiektebos), *Brunsvigiabosmaniae*(Maartlelie) and *Zygophyllumspinosum*.

No plant Species of Conservation Concern[1] (SCC) were recorded from within the sandy flats part of the study area, and but SCC that may occur in this habitat are *Colchicum cruciatum* (Vulnerable; Raimondo*et al* 2009), which is restricted to the Springbok to Steinkopf area, *Gladiolus salteri* (Rare; from Springbok towards Aggeneys), *Moraeaindecora* (Vulnerable; Nababeep to Goegab), *Oxalis exserta* (Rare; Concordia to Kamiesberg) and *Lachenaliaconcordiana* (Rare), which is more widespread. None of these are however likely to occur from within the more disturbed parts of this habitat.

Invasive alien plant species are not a major feature of this habitat, and the primary one is *Atriplexlindleyi*ssp*inflata* (blasiebrak). This is a very widespread small perennial, and is likely to dominate in any areas with disturbed soil. The planted invasives alien blue gums (*Eucalyptus*) that are present are not actively spreading, and are unlikely to do so. They are however, likely to be incompatible with a solar PV energy facility.

Arundodonax (Spaanseriet) is one of only two significant invasive alien plants in this habit, and it was observed only near the dam, and is not considered problematic on site. *Atriplexlindleyi* ssp. *inflata* (blasiebrak) is also present in some of the drainage lines, but it is never really problematic on site.

Rocky Hills

This habitat occupies the bulk (about 80%) of the study area, and is characterised by extensive exposed bedrock granite (or gneiss), boulders of various sizes, and intervening sandy areas with prominent heuweltjies (old termite mounds of higher fertility). The habitat was not extensively or exhaustively surveyed, as it is clearly unsuitable for the proposed development, due to the steep slopes and rocky ground.

Plant species diversity in this unit is high, and prominent species include *Aloe dichotoma*(kokerboom), *Aloe microstigma* ssp. *microstigma*, *Dyerophytumafricanum, Hermanniaamoena, H. cuneifolia, Pelargonium carnosum, Diospyrosramulosa, Tetragoniafruticosa, Euryopsdreganus*(vaalrapuis),*Pentziaincana*(ankerkaroo), *Seneciojunceus*, *Searsiaundulata, Ehrhartabarbinodis, Polygala leptophylla, Dideltaspinosa, Arctotisrevoluta, Hirpiciumalienatum, Adromischus*spp.,*Crassula*spp.,*Polymitaalbiflora, Othonnadaucifolia, O. macrophylla*and *Zygophyllumretrofractum*. Cryptic, dwarf succulents on the rocky domes include *Conophytumpageae, C. bilobum*, *C. breve* and *C. roodii*.

There is a possibility that a number of plant Species of Conservation Concern could be present in this habitat, and these include *Moraeafenestralis* (Rare), *Othonnaeuphorbioides* (Threatened), *Romuleanamaquensis* (Near Threatened), *Lachenaliaverticillata* (Rare), *Moraeaindecora* (Vulnerable) and *Eriospermumpusillum* (Rare).

No significant populations of invasive alien plant species were observed within this habitat on site. Please see Appendix D: Specialist Reports

[1]The recent Red List of South African Plants (Raimondo*et al* 2009) has assessed all plant species in South Africa, and all indigenous species are now technically Red Listed or Red Data Book species, and thus it is preferable to use the term Species of Conservation Concern to refer to species that are listed as either Threatened or Rare.

4.9.2 Terrestrial Fauna

Mammals

A total of 53 terrestrial mammals and ten bat species occur or potentially occur within the study area (Appendix 1). The proximity of the site to both Springbok and Nababeep and human activity is however likely to deter a number of shy species or species vulnerable to disturbance from the area, notably the larger species. The area is likely to experience some predation by feral and wandering dogs as well as poaching or harvesting by locals. The degraded nature of much of the sandy flats part of the area means that species able to tolerate relatively low plant cover are likely to predominate in these areas.

Species likely to be associated with the rocky parts of the site include the Namaqua Rock Mouse*Aethomysnamaquensis* and Western Rock Elephant Shrew*Elephantulusrupestris*. The plains are likely to be dominated by ubiquitous, nocturnal small mammals such as Pygmy Mouse*Musminutoides*, Cape Short-tailed Gerbil*Desmodillusauricularis* and Hairy-footed Gerbil*Gerbilluruspaeba*. Middle-sized mammals which were observed on site include Cape Porcupine (quills, scat and diggings), Aardvark (diggings), Cape Hare, Springbok (introduced) and Yellow Mongoose, and Gemsbok was the only large mammal seen (introduced). Two Red Listed species are known to occur in the general area, namely Leopard*Pantherapardus*(Near Threatened) and Black-footed Cat*Felisnigripes* (Vulnerable). However, given the proximity of the site to Nababeep and Springbok it is not likely that either occurs at the site.

The majority of bat species which occur in the area require caves or rock crevices for roosting sites. Such roosting sites are likely to occur within the large granite outcrops surrounding the site, as well as the mine adits and buildings of the abandoned mines nearby. Within the site itself, there are no likely bat roosting sites, and the development would result only in the potential loss of some low value bat foraging habitat as well as a very small risk of collision with the new powerline.

Overall, the study area is not likely to be an important area for terrestrial mammals or bats, and it is not likely that the development of a small portion of the site would result in a significant impact on the viability of the local populations of any mammal species. Please see Appendix D: Specialist Reports

Reptiles

The site lies in or near the distribution range of at least 57 reptile species (Appendix 2; Animal Demography Unit website; http://vmus.adu.org.za). This is a comparatively high total indicating that the area has a rich reptile assemblage. Based on distribution maps and habitat requirements, the composition of the reptile fauna is likely to comprise 3 tortoises, 20 snakes, 21 lizards and skinks, 12 geckos and 1 chameleon. Species observed at the site include the Spotted Desert Lizard *Merolessuborbitalis*, Variegated Skink *Mabuyavariegata* and Western Rock Skink *Mabuyasulcata*.

The reptiles which may occur in the area includes quite a large number of range restricted species and Namaqualand endemics. This includes the Speckled Padloper*Homopussignatus*,Namaqua Thick-toed Gecko*Pachydactylusnamaquensis*, Namaqua Leaf-toed Gecko*Goggiarupicola,* Namaqua Day Gecko*Phelsumaocellata* and Peers Girdled Lizard *Cordyluspeersi*. A large proportion of these restricted and specialized reptiles which occur in the area are associated with granitic outcrops which provide habitat in

the form of abundant cracks, fissures and exfoliating rock sheets. The many rocky outcrops in the study area would provide suitable habitat for at least some of these species, making it likely that many of these species occur in the study area, but not within the suggested development footprint (the flat, sandy areas). The majority of species which are associated with sandy lowlands are relatively widespread species. Exceptions which may occur at the site include the Thin-tailed Legless Skink *Acontiasgracilicaudanamaquensis,* which is a localized endemic (but not threatened) and Cape Whip Snake *Psammophisleightonii* (Vulnerable). Two other threatened species may occur in the study area, but are unlikely in the potential development area – the Speckled Padloper*Homopussignatus* (Vulnerable; Bates *et al* - in press) and Fisk's House Snake *Lamprophisfiskii* (Vulnerable).

Apart from a relatively small direct loss of habitat, the shading of the soil by the solar panels is likely to affect reptile composition on account of changes in soil temperature (presumably lower, due to more shading). Most reptiles are also sensitive to the amount of plant cover, which is also likely to be affected by site clearing as well as shading by the arrays. The presence of the arrays and electrical infrastructure would however create additional habitat for species which may utilize such structures (such as tubercled geckos (*Chondrodactylus* spp.) and agamas (*Agama*spp)). Depending on the management of the vegetation beneath the panels reptile abundance in the development area could increase as a result of increased habitat diversity as well as the protective effect of the panels on reptiles from avian predators. This would only benefit a small proportion of the species present and is not viewed as a positive outcome of the development. Please see Appendix D: Specialist Reports

Amphibians

The study area lies within or near the range of seven amphibian species (Please see Appendix D: Specialist Reports; Animal Demography Unit website; http://vmus.adu.org.za), including several Namaqualand endemics with moderately restricted ranges, including the Namaqua Stream Frog*Strongylopusspringbokensis*,NamaquaCaco*Cacosternumnamaquense* and Paradise Toad*Vandijkophrynusrobinsoni*. None of the likely species are however Red Listed as Species of Conservation Concern (Measy*et al* 2011). Many of the drainage lines in the study area are too small to provide regular breeding habitat for most of the potential species, which require water for breeding purposes, but at least three of the species are very likely to occur within the existing dam near the farmhouse, and three others are likely within the greater study area.

Given the lack of suitable habitat and the degraded nature of the proposed development area it is not likely that the actual site supports many amphibians.

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. Provided that suitable precautions are taken during the construction phase to reduce impacts such as pollution, then it is highly unlikely that the development would have a significant impact on amphibians.

4.9.3 Avifauna

According the SABAP checklist (Animal Demography Unit website http://vmus.adu.org.za), 130 bird species are known from the area, including five Red Listed species (Table 1). The Red Listed species are all wide-ranging species with a broad distribution across the semi-arid parts of South Africa, and are not specifically concentrated within the study area. The site also does not fall within an area listed as an Important Bird Area (BirdLife South Africa: www.birdlife.org.za). Overall the study area is not likely to have an exceptional or remarkable avifauna.

The proposed powerline to link the development to the substation would pose a small risk to certain birds. Although powerlines pose a significant collision risk to many medium and larger bird species, the length of the line would be fairly short (<6km), it would also not traverse areas which are likely to experience a large amount of activity from potentially affected species, and there is an existing powerline in the area. The potential avifaunal impact of the powerline is thus likely to be low, and loss of habitat very minor, and of no real consequence for any Red Listed bird species. Please see Appendix D: Specialist Reports

4.9.4Invertebrates

The Springbok area is part of an identified centre of scorpion diversity (Prendini 2005), which extends north into the Richtersveld. Scorpions may be present both in rocky areas and sandy areas, and may thus be present in significant numbers in all parts of the study area. As they are mostly burrowing, nocturnal creatures no observations were made, and they are also presumably most diverse in the areas that have not been previously disturbed, paralleling the plant diversity patterns. It is possible that a number of threatened or localised species occur within the study area, but further work would be needed to be done. No threatened butterfly species are known to occur in the area (Mecenero*et al* 2013), although this does not mean that none are present. Please see Appendix D: Specialist Reports

4.10 Heritage Resource Profile

On the whole, the heritage on the farm is primarily historical. This includes the golf clubhouse and associated infrastructure (e.g. garden and the fairways among the blue gum trees. Currently living on the farm are a caretaker, and a shepherd, the latter has a small house behind the clubhouse, and a small flock of sheep.

The most noteworthy finds were grave markers (Historical: Family Dixon), and possibly aboriginal one, and three more. Other historical material included a deadman ring, presumably for supporting a structure (but no structure is evident), and a stone trough located about 150m down slope from a current windmill.

It is noteworthy that very few prehistoric stone tools were seen on the farm, in spite of the information received that there were water seeps and springs below the high mountain which would have always been attractive for human occupation.

A narrow gauge railway in the northwest corner of the farm was present at one time. The sleepers from the tracks have been collected, and are stacked on the stoep of the clubhouse.

Although the golf course existed prior to WWII, the clubhouse is much younger, and is probably less than 60 years old, so has limited heritage value. Please see Appendix D: Specialist Reports

4.11 Socio-economic Profile

The early settlement of Springbok originated as a major commercial and administrative centre for copper mining operations in the region. Even though mining activities have dwindled, the town remains an important administrative capital in the region and due to its location a favourite stopover for tourists on their way to Namibia. Today the main income is generated from tourism, mining activities, commerce and farming.

All the regional government services are located here. Nababeep, Okiep, Concordia and Carolusberg were all established as towns to house the people working on the mines. People living in these towns used to receive subsidised housing and free water and electricity when the mines were operating. When the mines closed, 15 years ago, people who were renting mine accommodation had the properties transferred into their names at no cost. Many families have continued to live in these "free houses". There is now very little other work available in these towns and many young adults have sought work elsewhere, either in the big cities or in other mining towns in the Northern Cape, such as Kathu or Aggenys" (Thomas & Worthington-Smith, 2013).

The Northern Cape Town Study (2012) provides a context and methodology for municipalities on the development of towns in the Northern Cape. In terms of the study, Springbok ranks 4th on the overarching Development Potential scale (where position 1 represents the best situation), is characterised by a high profile and is well positioned for a favourable development niche as a regional urban centre in the western part of the Northern Cape and Namaqualand.

The Human Needs index has a strong low poverty level at rank 11 (rank 1 indicates the best situation), implying that the quality of life in Springbok compares relatively favourably in relation to the provincial average. When the town's specific Development Potential index is integrated with its Human Needs index, Springbok is a strong candidate for *Infrastructure Capital Investment*, supplemented by *Basic Services* upliftment if needed (as suggested by the National Spatial Development Plan). This is because of the town's position in the high development potential and low human needs quadrant (Northern Cape Provincial Spatial Development Framework, 2012).

The sectors of employment in the NamaKhoi Municipality, according to the 2001 Census, are general government (21.7%), community, social and personal services (17.3%), wholesale & retail trade, catering and accommodation (17.3%) and mining (16%). Seventy three percent (72.9%) are of employable age (between 15 and 65) (Census 2001). Fourty seven percent (47% or 12269 persons) of the employable population are employed, whilst 9.3% (or 2428 persons) are unemployed and discouraged work-seekers. Fourty four percent (43.7% or 11408 persons) of the population are not economically active. Household income overall is low as 51% of the population earns R38 400 (maximum R3 200 per month) and less, whilst 33.4% earns between R 38 401 and R 153 600 (maximum R12 800 per month) and 9% earn more than R12 800 per month. The high unemployment (9.3%) and economically not active (43.7%) rate together with low monthly household income necessitate economic growth and broadening and extending the skills base.

The majority of the NamaKhoi Local Municipality's population is employed in the following occupations:

- Elementary occupations (21.4%).
- Crafts and related trades (11.9%).
- Service workers, shop and market sales workers (11.4%).

There are five secondary schools in these towns of which one is in Okiep, one in Concordia and three in Springbok. In 2012 there were nearly seven thousand seven hundred (6699) learners in fourteen schools with two hundred and thirty one teachers. The 14 schools are made up of;

a) 6 primary schools
b) 2 intermediate schools
c) 1 combined school and
d) 5 secondary schools

Of note is the nearly one thousand and two hundred (1185) fewer learners that wrote in 2012 than in 2011 (9186 learners vs 10371). The numbers that passed with more than 40% in 2012 were:

- Life Sciences 1795 (33% of those who wrote the subject or 19% of matrics)
- Mathematics 1572 (36.5% of those who wrote the subject or 17% of matrics)
- Physical Science 1324 (36.5% of those who wrote the subject or 14% of matrics)

The numbers entering the above subjects is very low and the numbers passing with good grades is even lower. These low numbers are symptomatic of a lack of hope and a doubtful view of the future (Thomas & Worthington, 2013). According to Thomas and Worthington-Smith (2013) key initial insights of the social status of the receiving communities are that: "The communities have a strong sense of family with many out of town workers returning home for weekends and holidays.

These towns are losing their young people. The headmaster of the Okiep high school reported that grandparents were raising 65% of his learners as the learner's parents had moved away to find work.

Pupil numbers are declining. The Sacred Heart Primary School reported that their numbers enrolled had been steadily falling since the mine closed. At their heyday they had a staff of 26 but it has now dropped to only 9 staff.

Employment is a big problem for example Concordia has employment for a limited number of workers in their dressed stone quarry. Carolusberg has virtually no work opportunities and only 2 or 4 shops and a bottle store. Please see Appendix D: Specialist Reports

4.12 Visual Profile

Each place has a specific intrinsic, instrumental and systemic value and that such values need to be carefully considered when contemplating the current and future use of any particular place.

Broadly -speaking, two different philosophical perspectives are possible when considering the value of any place or object, namely what is it good for? andwhat is its own good? The first question relates to its instrumental value, while the second deals with intrinsic value. Instrumental value uses something as a '*means to an end*' while intrinsic value refers to being '*worthwhile in itself*' (Rolston,1994). Systemic value relates to the fact that '*things do not have their separate natures merely in, and for themselves, but they face outward and co-fit into broader natures. Value seeps out into the system and the individual lose its status as sole locus of value'* (Rolston, 1994:174). Systemic value refers to the relations that things have with other things, and to the role they play in larger wholes.

The value system of Namaqualand was determined in the various collaborative, participative processes undertaken during the drafting of forward planning documentation, policy and guidelines. As such, the intrinsic value of the Namaqualand is found in the agrarian landscape with strong linkages to the rural, natural landscape.

As described above, even though the intrinsic value of the Namaqualand is based on the agrarian characteristics, the values of the project site and its surroundings have to a large degree been lost. Please see Appendix D: Specialist Reports

5: SCOPING OF ISSUES ASSOCIATED WITH THE PROPOSED PV SOLAR ENERGY FACILITY

5.1 Methodology to be used for assessing impacts

It is expected that the largest environmental impacts will occur during the construction phase of this PV Solar Facility. It is noted though that environmental impacts may additionallyoccur during the operational and the decommissioning phases to a lesser extent.

The following methodology was applied in identifying and determining the potential impacts across all three phases of the proposed development.

1.) Site sensitivity – the determination of the sensitivity of the proposed sites was assessed by firstly spatially overlaying in ArcGIS10 the proposed areas for the development with all known and available spatial planning products which included SANBI conservation planning products such as the National Spatial Biodiversity Assessment, Critical Biodiversity Areas and Ecological Support Areas, the National Freshwater Ecosystem Priority Areas, landuse, agricultural and geological information. Thereafter terms of reference were drawn up for the appointment of specialists to further assess the site for sensitivity at sub-property scale in terms of direct, indirect and cumulative impacts that would be likely to occur on site.
2.) Both the EAP's and the specialists commissioned to undertake the assessments on site focussed on determining the nature and extent of the potential impacts on site across all phases of the proposed development.
3.) Through the sensitivity analysis provide and overview of the property in terms of those areas with low sensitivity, medium sensitivity and high sensitivity and those that constituted no-go areas.
4.) Provide a short concise summary of the potential impacts associated with the different phases of the proposed development.
5.) Identify issues that extend beyond the borders of the proposed site and that may impact key stakeholders or I&AP's beyond the property scale.

From the methodological approach alluded to above it is evident that the site was approached in a focused manner in terms of understanding its unique nature and the resultant uniqueness of the spatial pattern of impacts and the hierarchy of the impacts associated with it. This was done to ensure that the difference between sites in terms of their sensitivity and the significance of impacts between sites was considered in a robust manner.

The impacts for the different phases (construction, operation and decommissioning) may be summarised as follows:

- *Construction and decommissioning phases (impacts are similar during these phases)*, impacts may occur to - the ecosystem in terms of pattern and process due to the clearing of vegetation for site preparation and access to the site,

alerted hydrology, changes in land use, the soil profile during the excavation of foundations for the array and ancillary infrastructure and trenching for underground cabling and increased potential for erosion with the loss of ground cover, heritage resources, waste generation, visual and social aspects.

- *During the operational phase,* impacts on the ecosystem may occur in terms of visual impacts of the facility, physical barriers to localised faunal movement, positive or negative socio-economic impacts, loss of agricultural potential due to the altered landuse, increased potential for soil erosion from the denuded surface and altered hydrology.

The following sensitive environmental features or receptors may potentially be affected by a proposed facility such as this:

1.) Ecological pattern and process – the activity has the potential at a locality scale to impact on localised species populations through the transformation of natural vegetation and through the disturbance of faunal populations by construction and maintenance crews.
2.) Geology, Soils and hydrology – the activity has the potential to physically disturb the geology and soil profile and if incursions are allowed into buffer areas around drainage lines impacts on ecological support areas associated with the ecological functioning of riverine buffer areas e.g. flood attenuation and corridors for vertebrates who move through the landscape using the well developed structure associated with the vegetation along riparian areas.
3.) Impacts on land use would in this instance primarily be associated with the loss of agricultural potential, while spot pollution form construction crews and machinery is possible the greater impact would be associated with the loss of the area now covered by the solar array during its 20 year lifetime.
4.) Impacts on heritage could potentially result from the destruction of these resources through physical disturbance or destruction.
5.) Impacts on the social environment could result in positive spin-offs such as job creation and skills transfer to long terms employment. Negative impacts may result from the importation of construction staff from afar who may carry infectious diseases, be criminally minded or have a different moral and social order.
6.) Impacts on visual and aesthetic features have the potential to change the physical appearance of the landscape and the quality of life of those living in the landscape.

Cumulative impacts are related to the extent of the proposed development and the number and extent of other similar projects in the surrounding landscape. Consultation with the proponent has indicated that currently there are no projects in the area that have been approved through the DoE bidding process. This makes it difficult at this point in time to assess the cumulative impact of the combination of developments on the landscape as a whole. Cumulative impacts will however be investigated in the EIA phase as required under the regulations.

5.2 Assumptions

The only knowledge gap would be related to the unpredictability of natural systems as very dynamic entities. The regular monitoring of the effects of the development and appropriate reactive responses where applicable guided by experts should provide the means to respond effectively to this knowledge gap. Ample anecdotal evidence is available indicating that these systems are able to restore effectively after closure but actual robust scientific research has to the best of our knowledge not been undertaken.

The actual extent of edge effects from agricultural transformation has seen some recent research but results are still forthcoming. It is assumed that the spatial planning for the PSDF and Biodiversity Sector Plan in particular had sufficient expert input to be robust.

It is assumed that the anecdotal evidence of the restoration of diversity in old lands in the surrounding landscape show that these systems are able to regenerate once decommissioned.

Finally it was assumed that the content of supporting documentation and specialist inputs that were consulted in compiling this assessment were robust. It is uncertain how the natural system will in fact react and continual monitoring is a requisite for early detection of irreversible degradation.

It is uncertain how the local climate will respond in terms of the macro-climate. It is uncertain what the extent, spatial dimension of the edge effect is and how this will impact on the natural areas within and around the field border over the medium to long term. To address these uncertainties will require an expensive and long term research effort by well qualified scientists and is outside the scope of what the proponent should be held responsible for.

5.3 Evaluating potential impacts associated during the construction / decommissioning phase

5.3.1 Potential impacts on ecosystem pattern and process

Impacts on fauna: A total of 53 terrestrial mammals and ten bat species occur or potentially occur within the study area. The proximity of the site to both Springbok and Nababeep and human activity is however likely to deter a number of shy species or species vulnerable to disturbance from the area, notably the larger species. The area is likely to experience some predation by feral and wandering dogs as well as poaching or harvesting by locals. The degraded nature of much of the sandy flats part of the area means that species able to tolerate relatively low plant cover are likely to predominate in these areas.

Species likely to be associated with the rocky parts of the site include the Namaqua Rock Mouse *Aethomys namaquensis* and Western Rock Elephant Shrew *Elephantulus rupestris*. The plains are likely to be dominated by ubiquitous, nocturnal small mammals such as Pygmy Mouse *Mus minutoides*, Cape Short-tailed Gerbil *Desmodillus auricularis* and Hairy-footed Gerbil *Gerbillurus paeba*. Middle-sized mammals which were observed on site include Cape Porcupine (quills, scat and diggings), Aardvark (diggings), Cape Hare, Springbok (introduced) and Yellow Mongoose, and Gemsbok was the only large mammal seen

(introduced). Two Red Listed species are known to occur in the general area, namely Leopard *Panthera pardus* (Near Threatened) and Black-footed Cat *Felis nigripes* (Vulnerable). However, given the proximity of the site to Nababeep and Springbok it is not likely that either occurs at the site.

The majority of bat species which occur in the area require caves or rock crevices for roosting sites. Such roosting sites are likely to occur within the large granite outcrops surrounding the site, as well as the mine and buildings of the abandoned mines nearby. Within the site itself, there are no likely bat roosting sites, and the development would result only in the potential loss of some low value bat foraging habitat as well as a very small risk of collision with the new powerline.

According the SABAP checklist (Animal Demography Unit website http://vmus.adu.org.za), 130 bird species are known from the area, including five Red Listed species (Table 1). The Red Listed species are all wide-ranging species with a broad distribution across the semi-arid parts of South Africa, and are not specifically concentrated within the study area. The site also does not fall within an area listed as an Important Bird Area (BirdLife South Africa: www.birdlife.org.za). Overall the study area is not likely to have an exceptional or remarkable avifauna.

The proposed powerline to link the development to the substation would pose a small risk to certain birds. Although powerlines pose a significant collision risk to many medium and larger bird species, the length of the line would be fairly short (<6km), it would also not traverse areas which are likely to experience a large amount of activity from potentially affected species, and there is an existing powerline in the area. The potential avifaunal impact of the powerline is thus likely to be low, and loss of habitat very minor, and of no real consequence for any Red Listed bird species.

Overall, the study area is not likely to be an important area for terrestrial mammals or bats, and it is not likely that the development of a small portion of the site would result in a significant impact on the viability of the local populations of any mammal species.

The site lies in or near the distribution range of at least 57 reptile species. This is a comparatively high total indicating that the area has a rich reptile assemblage. Based on distribution maps and habitat requirements, the composition of the reptile fauna is likely to comprise 3 tortoises, 20 snakes, 21 lizards and skinks, 12 geckos and 1 chameleon. Species observed at the site include the Spotted Desert Lizard *Meroles suborbitalis*, Variegated Skink *Mabuya variegata* and Western Rock Skink *Mabuya sulcata*.

The reptiles which may occur in the area includes quite a large number of range restricted species and Namaqualand endemics. This includes the Speckled Padloper *Homopus signatus*, Namaqua Thick-toed Gecko *Pachydactylus namaquensis*, Namaqua Leaf-toed Gecko *Goggiaru picola,* Namaqua Day Gecko *Phelsumao cellata* and Peers Girdled Lizard *Cordylus peersi*. A large proportion of these restricted and specialized reptiles which occur in the area are associated with granitic outcrops which provide habitat in the form of abundant cracks, fissures and exfoliating rock sheets. The many rocky outcrops in the study area would provide suitable habitat for at least some of these species, making it likely that many of these species occur in the study area, but not within the suggested development footprint (the flat, sandy areas). The majority of species which are associated with sandy

lowlands are relatively widespread species. Exceptions which may occur at the site include the Thin-tailed Legless Skink *Acontias gracilicauda namaquensis,* which is a localized endemic (but not threatened) and Cape Whip Snake *Psammo phisleightonii* (Vulnerable). Two other threatened species may occur in the study area, but are unlikely in the potential development area – the Speckled Padloper *Homopus signatus* (Vulnerable; Bates *et al* - in press) and Fisk's House Snake *Lampro phisfiskii* (Vulnerable).

Apart from a relatively small direct loss of habitat, the shading of the soil by the solar panels is likely to affect reptile composition on account of changes in soil temperature (presumably lower, due to more shading). Most reptiles are also sensitive to the amount of plant cover, which is also likely to be affected by site clearing as well as shading by the arrays. The presence of the arrays and electrical infrastructure would however create additional habitat for species which may utilize such structures (such as tubercled geckos (*Chondrodactylus* spp.) and agamas (*Agama*spp)). Depending on the management of the vegetation beneath the panels reptile abundance in the development area could increase as a result of increased habitat diversity as well as the protective effect of the panels on reptiles from avian predators. This would only benefit a small proportion of the species present and is not viewed as a positive outcome of the development.

The study area lies within or near the range of seven amphibian species (Appendix 3; Animal Demography Unit website; http://vmus.adu.org.za), including several Namaqualand endemics with moderately restricted ranges, including the Namaqua Stream Frog *Strongylopus springbokensis*,Namaqua Caco *Caco sternumnamaquense* and Paradise Toad *Vandijkophrynus robinsoni*. None of the likely species are however Red Listed as Species of Conservation Concern (Measy *et al* 2011). Many of the drainage lines in the study area are too small to provide regular breeding habitat for most of the potential species, which require water for breeding purposes, but at least three of the species are very likely to occur within the existing dam near the farmhouse, and three others are likely within the greater study area.

Given the lack of suitable habitat and the degraded nature of the proposed development area it is not likely that the actual site supports many amphibians. 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. Provided that suitable precautions are taken during the construction phase to reduce impacts such as pollution, then it is highly unlikely that the development would have a significant impact on amphibians.

The Springbok area is part of an identified centre of scorpion diversity (Prendini 2005), which extends north into the Richtersveld. Scorpions may be present both in rocky areas and sandy areas, and may thus be present in significant numbers in all parts of the study area. As they are mostly burrowing, nocturnal creatures no observations were made, and they are also presumably most diverse in the areas that have not been previously disturbed, paralleling the plant diversity patterns. It is possible that a number of threatened or localised species occur within the study area, but further work would be needed to determine this.No threatened butterfly species are known to occur in the area (Mecenero*et al* 2013), although this does not mean that none are present.

Impacts on vegetation: The SA Vegetation Map (Mucina& Rutherford 2006) indicates that a single vegetation type occurs

throughout the study area – Namaqualand KlipkoppeShrubland (and hence no vegetation type map is provided for the site). This vegetation type is regarded as Least Threatened on a national basis, with some 95% of its original total extent still remaining, and about 6% protected (Rouget*et al* 2004; DEA 2011). The vegetation type is widespread in the Bitterfontein to Springbok region, and is characterised by rocky granite (or gneiss) hills, separated by sandy slopes and valleys. Three distinct habitats or plant communities occur within the study area - deeper sandy soils on the flats; shallow rocky soils, mostly on the hills; and the seasonal drainage lines in the valley bottoms. The vegetation on the sandy flats could in fact be better classified as Namaqualand Blomveld (Least Threatened; DEA 2011), but this interpretation has no real implications.

About 60ha in the northern part of the entire study area, within this habitat, has been heavily disturbed by the creation of a golf course (defunct as of about 8 years ago), which at one stage had irrigated greens and even fairways. The golf course area was levelled, although partly natural areas remain in the "rough" between the fairways. Alien *Eucalyptus* trees (blue gums) were planted along the fairways, and most of these large trees are still standing. There is a low diversity of indigenous plant species present in the golf course area, mostly in the form of resilient annuals and herbs, but the overall species diversity is now less than 25% of what it would have been prior to disturbance, and overall open space is as high as 70%. The ecological conservation value of these areas is Low at a site and regional scale.

In the sandy flats that were not part of the golf course development, but which were cultivated greater than 20 years ago, plant species diversity and plant cover is significantly higher than in the old golf course area, and the botanical and ecological conservation value (or sensitivity) is correspondingly higher, being Low to Medium at a site and regional scale. In undisturbed parts of the sandy flats habitat, and at the base of the rocky hills, species diversity and plant cover is at its highest.No plant Species of Conservation Concern[2] (SCC) were recorded from within the sandy flats part of the study area and while there are species of special concern that are associated with the area, none are likely to occur within the more disturbed portions of the property.

Invasive alien plant species are not a major feature of this habitat, and the primary one is *Atriplexlindleyi*ssp*inflata* (blasiebrak). This is a very widespread small perennial, and is likely to dominate in any areas with disturbed soil. The planted invasives alien blue gums (*Eucalyptus*) that are present are not actively spreading, and are unlikely to do so

Impact on processes: Ecological process impacts would be associated with connectivity between vegetation communities across the landscape, interruptions in this connectivity would over long time scale impede the ability of pollinators to fulfil their ecological function, impede genetic communication between plants populations and impede the ability of fauna to migrate across the landscape in response to climatic changes. An additional impact on process stems from the denuding of riparian and buffer areas around drainage lines and the loss of flood attenuations services and the connectivity through the landscape as corridors of floral and faunal migration.

Impact	Nature of Impact	Extent of Impact	No Go Areas
Loss of vegetation due to construction activities	Construction activities could result in significant loss of indigenous natural vegetation.	Impacts would be low in low and medium sensitivity vegetation communities and medium if	No go areas would comprise extensive use of

[2]The recent Red List of South African Plants (Raimondo*et al* 2009) has assessed all plant species in South Africa, and all indigenous species are now technically Red Listed or Red Data Book species, and thus it is preferable to use the term Species of Conservation Concern to refer to species that are listed as either Threatened or Rare.

	Impacts associated with the loss of vegetative cover and a localised loss of species diversity would include changes in hydrology over the denuded areas and increasing risk for erosion and an increasing risk associated with the alien invasive plants that are already on site. If the site remains denuded for the full 20 year life span then conceivably the area may be retarded in terms of its ability to regenerate. If the development was to result in a highly fragmented landscape where ecological connectivity is interrupted then loss of ecological goods and services are potential longer term impacts. Edge effects and loss of buffering of drainage lines are an additional ecological service that may be lost.	extensive areas of high sensitivity vegetation is impacted by the proposed development at a local scale. The high percentage of extant natural ecosystems types found on site and at regional scales would translate into a low impact regionally.	high sensitivity areas and areas within the 32m buffer areas along ecological support areas and drainage lines within the site.
The habitat of threatened plants lost or disturbed due construction	The impact does not appear to be relevant for areas of low to medium sensitivity throughout the site. However areas associated with high sensitivity may house significant populations of plant species of conservation concern. None of the areas being considered for the proposed development appear to be sensitive from a	Impacts would be low in low and medium sensitivity vegetation communities and medium if extensive areas of high sensitivity vegetation is impacted by the proposed development at a local scale. If significant populations of plant species of conservation concern were impacted the impacts would be significant at a regional scale due to the narrow	No go areas would comprise extensive use of high sensitivity areas and areas within the 32m buffer areas along ecological support areas and drainage lines.

	faunal species of conservation concern. Consequences such as the reduction in the distribution, loss and further fragmentation of rare plant and animal species and the loss of genetic variability in these populations is considered at this stage to be unlikely.	distribution ranges of some endemic species.	
Destruction of indigenous trees	Indigenous trees are associated with the elevated water and nutrient availability along drainage lines, loss of this ecological structure would impact on the functionality of the riparian and riverine buffer areas and thus their ability to function as ecological support areas.	Local impacts within the linear extent of the riparian area and the 32 m buffer areas and to some extent beyond the disturbed area downstream of the disturbance due to altered hydrology and increased sediment loading from the catchment.	No go areas would be associated with the drainage line itself and the 32m buffer to each side of the drainage line.
The habitat of threatened animals lost or disturbed due construction	These impacts are considered to be of low significance due to the transformed state of low sensitivity areas and the low diversity of the medium sensitivity areas together with the fact that no species of conservation concern are endemic to or recorded from the site. Additionally the ecosystem in surrounding landscape is at present 90% extant naturalvegetation thus there is ample habitat for faunal species to establish and retain	The extent of this impact is local. Species that are sensitive are associated with the rocky granite outcrops, sheets of granite peeled from the granitic domes and with caves and other similar sheltered areas. These sites are not being targeted at all for the proposed development.	No-go areas would be areas identified as high sensitivity and those that buffer drainage lines to retain ecological connectivity. In particular rocky outcrops and weathered granitic domes with their associated “onion skin” layers of rock split from the

	viable populations. Threats to these species over their full extent are not going to be significantly altered through the proposed development. Impacts would relate as for plants to a reduction in the distribution, loss of genetic variability and direct loss of local populations of these species.		dome.
Impacts on drainage lines	Denuding riparian areas and their buffer areas will alter the hydrology of the area as a whole reducing flood attenuation services. Furthermore these corridors allow for the migration of plant and animal species through the landscape and these could be interrupted if the vegetation diversity and structure were lost along the drainage lines.	The extent of this impact would be local along the drainage lines itself and within the 32m buffer to each side of the drainage line.	Ecological support areas and their buffers should be treated as no-go areas.
Establishment of alien invasive species	Invasive alien species are particularly well adapted to areas that have suffered from excessive levels of disturbance. These areas are then invaded and indigenous ecological communities are lost as a result. Areas with well developed vegetation cover and diversity are less prone to invasion by alien invasive species. The proposed development will	The types of alien invasive plants found on site are not particularly invasive, impacts associated with these species may however extend to regional scale in the case of *Atriplex* spp.	High sensitivity areas should be considered no-go areas.

	result in the removal of the alien eucalyptus trees as they are incompatible with the proposed development as they would shade the proposed array, thus a potential positive spin-off.		
Impacts on Wetlands	While seepage and wetland areas are mapped on the topographical maps these areas do not appear to exist on the site itself.	N/A	N/A

Gaps in knowledge and key recommendations for further studies needed:

1.) The layout and design of the proposed development has been guided by the sensitivity of the site to date, it is however not known at present if the development will possibly intrude into limited areas of high sensitivity to accommodate the required MW capacity to make the project economically viable.

2.) If areas of higher sensitivity are by necessity required then a detailed survey of those areas will be required to determine if any species of special concern are present and recommendations by a qualified expert to mitigate those impacts would need to be sought.

3.) Databases, reports and publications are never 100% accurate; there are gaps in scientific knowledge, however the data has been sourced from reputable tertiary institutions.

4.) Specialists have been engaged during the scoping phase to assist in refining the areas of sensitivity which could feed into the layout and design of the proposed development, these specialists will once again be consulted in the EIA phase of the assessment process.

See Appendix A : Composite sensitivity map

5.3.2 Potential impacts on geology, soils and hydrology

General description:

Impacts on geology are considered to be insignificant, primarily due to the fact that extruded granitic domes and the rocky slabs and scree slopes around them are considered to have high sensitivity and have been avoided as potential sites for the proposed development. The impacts on soil would include physical disturbance of the soil profile to establish the foundations to which the framework of the array would be attached, the disturbance related to the digging of trenches to lay underground cabling and the localised disturbance when planting the towers for the feeder power lines between the facility and the substation. The denuded surface created below the solar facility could result in erosion of top soil and ultimately in the alteration of the hydrology of the area. These impacts however are considered to be low as the layout will take cognisance of the 32m buffer area around ecological support areas and major drainage lies within the site. Additionally the weathered soils derived from granite are sandy and unstructured and highly porous, the substrate itself therefore lends itself to rapid absorption of rainfall, thus limiting laminar flow of water and sheet erosion i.e. the nature of the substrate is not sensitive to erosion. Finally impacts may be associated with the access roads to and within the site. These too are considered to be insignificant in terms of the potential impact as basic management interventions such as road contouring and maintenance are proven means to prevent erosion from road surfaces.

The significance of agricultural impacts is influenced by the severely limited agricultural potential of the land, which is suitable only for low intensity grazing of small stock. As a result, agricultural impacts are likely to be of low significance. Mitigation measures can also be put in place to reduce the significance of certain of these impacts, such as erosion.

Impact	Nature of Impact	Extent of Impact	No Go Areas
Soil erosion due to alteration of the surface run-off characteristics.	Alteration of run-off characteristics may be caused by construction related land surface disturbance, vegetation removal, the establishment of hard standing areas and roads, and the presence of panel surfaces. Erosion will cause loss and deterioration of soil resources and may occur during all phases of the project.	The impact could extend to areas beyond the development site i.e. at a property scale and in a very serious instance beyond the boundary of the property.	Steep slopes and rocky outcrops as well as buffer areas around drainage lines. Areas with pristine natural vegetation identified as highly sensitive.
Degradation of veld	Vehicle trampling and other disturbance, during construction phase.	Extent will be limited to the development site and access roads.	All areas outside the demarcated development site and existing access roads. Areas with pristine

			natural vegetation identified as highly sensitive.
Loss of topsoil due to poor topsoil management	Soil profile disturbance (levelling, excavations, road surfacing etc.) and resultant decrease in that soil's agricultural suitability.	Extent will be limited to the development site.	Steep slopes and rocky outcrops as well as buffer areas around drainage lines. Areas with pristine natural vegetation identified as highly sensitive.
Diversified agricultural business.	Generation of alternative land use income for land owners from energy facility rental.	Regional scale – increased income from energy generation facilities such as this will flow into the regional economy.	Positive impact.
Cumulative impacts.	Loss of agricultural resources and production as a result of other developments on agricultural land in the region.	Extent would cover a regional scale.	Highly productive agricultural land, areas of natural vegetation identified as being sensitive.

Gaps in knowledge and key recommendations for further studies needed:

Field investigation of soils and agricultural conditions across the site. This field investigation will be aimed at ground proofing the existing land type information and understanding the specific soil conditions on site. It will determine soil depths relevant to topsoil stripping and conservation for rehabilitation. The soil investigation will not be based on a grid spacing of test pits but will comprise a reconnaissance type of soil mapping exercise based on an assessment of surface conditions, topography, and hand augered samples in strategic places, if necessary. Such a soil investigation is considered adequate for the purposes of this study. A more detailed soil investigation is not considered likely to add anything significant to the assessment of agricultural soil suitability for the purposes of determining the impact of the development on agricultural resources and productivity.

The field investigation will involve a visual assessment of erosion, erosion potential and veld degradation on site, taking into account the specifics of the proposed development layout.

The EIA phase will gather more detail on agricultural activity on the site and identify any locally important soil and agricultural issues. This will be done through interviews with farmers and agricultural role players in the area.

The requirements for the report may be summarised as:

- Identify and assess all potential impacts (direct, indirect and cumulative) of the proposed development on soils and agricultural potential.
- Describe and map soil types (soil forms) and characteristics (soil depth, soil colour, limiting factors, and clay content of the top and sub soil layers).
- Map soil survey points.
- Describe the topography of the site.
- Describe historical and current land use, agricultural infrastructure, as well as possible alternative land use options.
- Describe the erosion, vegetation and degradation status of the land.
- Determine the agricultural potential across the site.

Provide recommended mitigation measures, monitoring requirements, and rehabilitation guidelines for all identified impacts.

5.3.3 Potential impact on landuse

General description

Impacts on existing landuse would result from the physical displacement of the current extensive rangeland use for grazing by small stock. There is however the potential to raise the solar grids above the surrounding landscape and allowing stock to continue to use the area as such mitigating the impact of physical displacement. This can only be considered if practical and economically viable. The fact that one landuse is replaced with another in this instance translates into a diversification of the agricultural business on the property through the economic benefit received by the owner from the lease to the area on the property.

Impact	Nature of Impact	Extent of Impact	No Go Areas
Loss of agricultural land use due to direct occupation by PV panels and other infrastructure, including roads.	Affected portions of land are out of agricultural production.	Limited to the site itself through the physical occupation of the land by the PV panels.	Steep slopes and rocky outcrops as well as buffer areas around drainage lines. Areas with pristine natural vegetation identified as highly sensitive.

Gaps in knowledge and key recommendations for further studies needed:

Field investigation of soils and agricultural conditions across the site. This field investigation will be aimed at ground proofing the existing land type information and understanding the specific soil conditions on site. It will determine soil depths relevant to topsoil stripping and conservation for rehabilitation. The soil investigation will not be based on a grid spacing of test pits but will

comprise a reconnaissance type of soil mapping exercise based on an assessment of surface conditions, topography, and hand augered samples in strategic places, if necessary. Such a soil investigation is considered adequate for the purposes of this study. A more detailed soil investigation is not considered likely to add anything significant to the assessment of agricultural soil suitability for the purposes of determining the impact of the development on agricultural resources and productivity.

The field investigation will involve a visual assessment of erosion, erosion potential and veld degradation on site, taking into account the specifics of the proposed development layout.

The EIA phase will gather more detail on agricultural activity on the site and identify any locally important soil and agricultural issues. This will be done through interviews with farmers and agricultural role players in the area.

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- Describe and map soil types (soil forms) and characteristics (soil depth, soil colour, limiting factors, and clay content of the top and sub soil layers).
- Map soil survey points.
- Describe the topography of the site.
- Describe historical and current land use, agricultural infrastructure, as well as possible alternative land use options.
- Describe the erosion, vegetation and degradation status of the land.
- Determine the agricultural potential across the site.
- Provide recommended mitigation measures, monitoring requirements, and rehabilitation guidelines for all identified impacts.

5.3.4 Potential impacts on Heritage Resources

General description:

The property was found to have an extremely low heritage signature from a pre-historic perspective. The property has a historic signature but historical sites such as the old club house and artefacts associated with this era are considered to have little significance. Sensitive areas identified are almost wholly associated with aboriginal and other grave sites. Impacts through adequate demarcation and fencing out would avoid impact on these sensitive sites.

Impact	Nature of Impact	Extent of Impact	No Go Areas
• Irreplaceable loss of archaeological resources.	Numerous grave sites and scattered archaeological artefacts were found on the site and along the identified corridor for the powerline.	Extent would be site specific with a low heritage signature for the property.	Site specific – all areas demarcated around existing and identified sites.

Gaps in knowledge and key recommendations for further studies needed:

- Specific layout of the proposed development is not yet finalised.
- The proposedpower line should follow the existing municipal power line as it does cross over some of the identified heritage sites which are of a historical nature.
- Any exhumation of aboriginal and other graves would require the requisite permits dealing with human remains from the South African Heritage Resources Agency (SAHRA), and appointment of a qualified archaeologist.

5.3.5Potential visual impacts

General description

A survey was undertaken to determine the presence of significant view corridors associated with the project site. Four dominant view corridors were identified the N7, N14, R355 and the Nababeep access road. The N14 and R355 are located beyond the five kilometre radius of the project site and are not regarded as significant in terms of a view corridor. The other two roads i.e. the N7 and the Nababeep access road are however relevant. High lying areas within the surrounding landscape were additionally identified as important areas for the evaluation of visual impact. The findings of impacts related to areas within the surrounding landscape from where the facility would be visible indicate that the proposed site would not be visible from any of the surrounding towns and roads in the area. Furthermore as the proposed site is located below a ridgeline it will not impact the skyline in any way. The viewshed analysis was based on a single point within the proposed site that had the highest elevation and calculated at 3.4m above ground level to reflect the highest point of the PV array. Each of the observation points in the surrounding landscape were calculated at 1.7 metres i.e. the average height of a human being. Findings of the zone of visual influence show that the only relevant areas within the landscape would be the high lying peaks in the surrounding landscape. Importantly the viewshed does not coincide with any populated area.

Impact	Nature of Impact	Extent of Impact	No Go Areas
• Potential visual impact of the proposed facility on sensitive observers up to 5km from the site.	Visual impact stemming from the construction of the PV Solar Array.	Local	Will be determined in the EIA phase of the assessment process.
• Change in the character of the prevailing use of the area	Visual impact stemming from the construction of the PV Solar Array.	Local	Will be determined in the EIA phase of the assessment process.
• New artificial light sources within the landscape.	Visual impact stemming from the construction of the PV Solar Array.	Local	Will be determined in the EIA phase of the assessment process.
• Reflection of the PV panels on sensitive	Visual impact stemming from the construction of the PV	Local	Will be determined in the EIA phase

receptors in the region.	Solar Array.		of the assessment process.

Gaps in knowledge and key recommendations for further studies needed:

1.) The potential severity of the visual impact requires further assessment in the EIA phase.
2.) A visual impact index will be generated to determine the potential visual impact.
3.) Identification of criteria and spatial arrangement of areas which will be exposed to visual impact.
4.) Specific mitigation measures to lessen potential visual impact.
5.) Ground truthing of the GIS viewshed to confirm actual visual impact.

5.3.6Potential impacts on the social environment

General description

Possible impacts during the construction, operational and decommissioning phases considered for each phase are:

- Health and Social Well being – which would relate to changes in population numbers and cultural differences of those new to the community, social health and self esteem of women. Increases in amenity use and changes in family health or alterations in levels of noise and dust.
- Quality of living environment – changes in sense of place as a result of the prposed development.
- Economic and Material Well being – improved skills levels and increased employment opportunity, income and benefits to the local economy.
- Family and community life – Increased family stability, changes in traffic levels, increased opportunity for education and access to education opportunities.
- Cultural Impacts – Changes in homogeneousness of the culture and changes to the local economy.
- Gender relations – change in the image of young women through preferential appointment of young women.
- Institutional, Legal, Political systems and Equity– Potential increases in stock theft and increased pressure on local authority services.

Impact	Nature of Impact	Extent of Impact	No Go Areas
Population influx	External contract workers hired and their impact as a result of interactions with the community.	Local	No mitigation possible.
Social Health decreases	Alcohol abuse.	Local	Responsibility of local authority social services.
Skills level increase	On the job or formal skills training	Local to national	Preferential employment to outsiders.
Decreased community stability	Cohesion in the community decreases	Local	Preferential employment to outsiders.

Engagement with different cultures	Decrease in homogeneousness.	Local	Not possible to mitigate.
Image of young women	Image of women amongst themselves, family and in the community worsens or improves.	Local	Preferential employment to males.
Increased crime	Social crimes and theft increases	Local	Responsibility of SAPS
Employment	Skilled, semi-skilled and unskilled permanent job opportunities.	Local to National	Preferential employment to outsiders.
Job reservation for women.	Women are preferentially employed.	Local	No preferential jobs allocated to women.
Job reservation	Job uptake by political affiliation	Local	Preferential employment to outsiders. No preferential jobs allocated to women.
Traffic levels increase	Increased heavy traffic	Local	Responsibility of local authority.
Local authority services under pressure	Using road patrols & traffic services.	Local	Responsibility of local authority.
Increased income	Semi-permanent and permanent income	Local to National	Preferential employment to outsiders. No preferential jobs allocated to women.
Education levels increase	Offering tuition in scarce subjects – maths, science and technology education and training.	Local to National	Preferential education to outsiders. No preferential education allocated to women.
Increased noise & dust levels	Decrease in family health due to increased noise levels.	Local	No dust and noise mitigation measures.
Sense of place change	From natural landscape to solar facility.	Local	No adherence to visual impact mitigation measures.
Improved local economy	Increased domestic purchases, project purchases and business opportunities for locals.	Local to National.	Preferential employment and business opportunities to outsiders. No preferential jobs allocated to women.
Local economy ceases	Strengthening of non South	Local to International	Preferential employment and

	African trade.		business opportunities to non South African residents and businesses.

Gaps in knowledge and key recommendations for further studies needed:

1) Capitalise on the positive impacts by ensuring that local people and businesses are appointed and contracted for the construction phase through preferential employment.
2) At a local and community scale ensure that young women are employed.
3) Ensure that skills development and occupational training benefits the local communities.
4) Ensure that education in the scarce subjects is financially supported and aimed at local scholars and students.

5.4 Evaluating potential impacts associated during the operational phase

5.4.1 Potential impacts on ecosystem pattern and process

Impacts on fauna: A Solar PV Array has specifically avoided areas of high sensitivity wherever practically possible and has avoided all areas where rocky granite outcrops with the exfoliated rock slabs and the scree slopes occur. These habitats have been identified as sensitive and important to vertebrate fauna locally and regionally. The sandy flats a have been identified as low value habitats for the faunal species identified, thus the selection of sandy flats for the proposed development should avoid or have low impact on faunal species. Additionally areas that have been historically transformed have been selected further lessening potential impacts on faunal species. On completion of construction PV solar facilities would be characterised by low noise levels primarily associated with the security and maintenance staff on site thus impacts from disturbance of this nature are considered to be low to negligible. During the operational phase there is the possibility that aerial vertebrates birds & bats may collide with the power line. The selection of the route for the power line has taken cognisance of this and will be routed parallel to an existing line that conceivably is familiar to the bird species resident to the area, in any event impacts related to species death for collision are considered to be low to unlikely.			
Impacts on vegetation: The aim in terms of the layout for the proposed development was to ensure that the bulk of the proposed facility would be located in low to medium sensitivity areas which would avoid significant impact of natural vegetation. Impacts of natural vegetation during the operation phase would be related to edge effects adjacent to the boundaries of the facility itself and from the use of access roads by security, operational and maintenance staff. The levels of disturbance however are considered to be low as facilities such as this are considered to have low levels of operational activity associated with them.			
Impact on processes: Process impacts are scale dependent at micro-scales ecological processes associated with the pollination of plant species could conceivably be interrupted due to the fragmentation of the populations, this risk is considered to be insignificantly small considering the >90% natural status of the ecosystem type and the broad connectivity of vegetation communities across the landscape. At a site to local scale impacts would be associated with alterations in the hydrology through transformation of the riparian areas and the buffer areas, as these have been identified and avoided in the layout impacts from this quarter are considered to be low. Areas denuded of natural vegetative cover could result in accelerated levels of erosion and as such impacts on the process of soil formation and reduced fertility and stability of the sandy flats. These impacts would be considered low if acceptable management interventions were to be implemented, these will be developed as part of the Environmental Management Programme which will accompany the EIA Report.			
Impact	Nature of Impact	Extent of Impact	No Go Areas
Loss of vegetation due to construction activities	Potential species composition changes may result from the fact that PV array create large areas of shade which is at odds with the plants species presently on site that are	Highly localised with no significant impacts on ecological process due to the extensive connectivity of extant natural vegetation within the site	High sensitivity areas, ecological support areas and the 32m buffer areas to each side of these and other drainage lines and rocky outcrops with

	adapted to high solar irradiation. The area below the array may therefore be colonised over time by more shade loving species, thus a change in vegetation community diversity and structure. The exact form of this dynamic change is an unknown at present. The change in community structure could result in alterations in the rate of erosion within the site, the localised extinction of species adapted to high solar incidence and the fragmentation of plant species populations.	and beyond.	exfoliated rock slabs and the scree slope below the outcrops.
The habitat of threatened plants lost or disturbed due construction	With the layout design responding to the baseline sensitivity of the site and the findings of the ecological specialist we consider impacts on threatened plant species to be low to insignificant.	Localised to the site itself.	High sensitivity areas, ecological support areas and the 32m buffer areas to each side of these and other drainage lines and rocky outcrops with exfoliated rock slabs and the scree slope below the outcrops.
Destruction of indigenous trees	Potential impacts associated with incursions by management or maintenance staff into buffer areas along drainage lines, potentially the harvesting of fuel wood for fires. The impacts could be avoided through effective in site management of staff and	Localised to the site itself and no-go areas directly adjacent to the site.	High sensitivity areas, ecological support areas and the 32m buffer areas to each side of these and other drainage lines.

	the implementation of rules through an Environmental Management Plan.		
The habitat of threatened animals lost or disturbed due construction	With the layout design responding to the baseline sensitivity of the site and the findings of the ecological specialist we consider impacts on threatened faunal species to be low to insignificant.	Localised to the site itself.	High sensitivity areas, ecological support areas and the 32m buffer areas to each side of these and other drainage lines and rocky outcrops with exfoliated rock slabs and the scree slope below the outcrops.
Impacts on drainage lines	Changed run-off patterns due to interception of rain by the panels and the concentration of the rain at points where the water is diverted off the array. Additionally the hard surfaces of the internal maintenance roads and access roads. These could result in increased volumes of water and the potential for gulley erosion. Impacts however would be localised and low if accepted management practice of monitoring and intervening by diverting water away from areas showing signs of erosion and along storm water control gulleys / contours. The retention of buffer areas along ecological support areas and drainage lines would further mitigate impact at larger scales.	Localised to the site itself and potentially to areas directly adjacent to the site.	High sensitivity areas, ecological support areas and the 32m buffer areas to each side of these and other drainage lines and rocky outcrops with exfoliated rock slabs and the scree slope below the outcrops.

Establishment of alien invasive species	With an increased disturbance created from the construction phase the operational phase may be sensitive to invasion by alien invasive plant species. Invasive species control projects will be identified as part of the Environmental Management Plan. The alien species currently on site will need to be removed as they will shade the proposed array and reduce its capacity for power generation.	Local and if allowed to establish to areas adjacent to the site.	Positive impact.
Gaps in knowledge and key recommendations for further studies needed: 1.) Altered run-off and potential erosion risk resulting from this run-off has not been tested or determined under local conditions, this will require an established monitoring and evaluation process as part of the environmental management of the site. Here a learning by doing approach seems appropriate. 2.) Changes in plant species communities as a result of increased shading with associated impacts (run-off) are unknown.			

5.4.2 Potential impacts on geology, soils and hydrology

General description: Impacts on geology are considered to be insignificant, primarily due to the fact that extruded granitic domes and the rocky slabs and scree slopes around them are considered to have high sensitivity and have been avoided as potential sites for the proposed development. The denuded surface created below the solar facility could result in erosion of top soil and ultimately in the alteration of the hydrology of the area. These impacts however are considered to be low as the layout will take cognisance of the 32m buffer area around ecological support areas and major drainage lies within the site. Additionally the weathered soils derived from granite are sandy and unstructured and highly porous, the substrate itself therefore lends itself to rapid absorption of rainfall, thus limiting laminar flow of water and sheet erosion i.e. the nature of the substrate is not sensitive to erosion. Finally impacts may be associated with the access roads to and within the site. These too are considered to be insignificant in terms of the potential impact as basic management interventions such as road contouring and maintenance are proven means to prevent erosion from road surfaces.

From an agricultural impact point of view, no sensitive areas were identified during scoping that should be avoided for inclusion in the development.The more level, transformed areas that are more suitable and are proposed for the solar development are also inherently more suitable than other parts of the site for agriculture. However, the agricultural potential is so severely limited, predominantly by the climate, that the loss of these areas to agriculture is not significant. Land capability is the combination of soil suitability and climate factors. The site and surrounding area has a very low land capability. It is classified, on the 8 category scale, as class 7 – non-arable, low potential grazing land. The agricultural limitations are the mountainous terrain, the extremely shallow soils limited in depth by predominantly underlying rock, and the aridity.

The significance of agricultural impacts is influenced by the severely limited agricultural potential of the land, which is suitable only for low intensity grazing of small stock. As a result, agricultural impacts are likely to be of low significance. Mitigation measures can also be put in place to reduce the significance of certain of these impacts, such as erosion.

Impact	Nature of Impact	Extent of Impact	No Go Areas
• Soil erosion due to alteration of the surface run-off characteristics.	Alteration of run-off characteristics may be caused by construction related land surface disturbance, vegetation removal, the establishment of hard standing areas and roads, and the presence of panel surfaces. Erosion will cause loss and deterioration of soil resources and may occur during all phases of the project.	Local - The impact could extend to areas beyond the development site i.e. at a property scale and in a very serious instance beyond the boundary of the property.	Steep slopes and rocky outcrops as well as buffer areas around drainage lines. Areas with pristine natural vegetation identified as highly sensitive.
• Degradation of veld	Vehicle trampling and other disturbance, during construction phase.	Local - Extent will be limited to the development site and access roads.	All areas outside the demarcated development site and existing access roads. Areas with pristine natural vegetation identified as highly sensitive.
Loss of topsoil due to poor topsoil management	Soil profile disturbance (levelling, excavations, road surfacing etc.) and resultant decrease in that soil's	Local - Extent will be limited to the development site.	Steep slopes and rocky outcrops as well as buffer areas around drainage lines. Areas with pristine

	agricultural suitability.		natural vegetation identified as highly sensitive.
Diversified agricultural business.	Generation of alternative land use income for land owners from energy facility rental.	Regional scale – increased income from energy generation facilities such as this will flow into the regional economy.	Positive impact.
Cumulative impacts.	Loss of agricultural resources and production as a result of other developments on agricultural land in the region.	Regional Scale.	Highly productive agricultural land, areas of natural vegetation identified as being sensitive.
Gaps in knowledge and key recommendations for further studies needed: Ongoing visual assessment of erosion, erosion potential and veld degradation on site should be continued for the duration of the operational phase. The requirements for the report for the operational phase may be summarised as: Implement mitigation measures, monitoring requirements and provide a rehabilitation guideline for all identified impacts.			

5.4.3 Potential impact on landuse

General description Impacts on existing landuse would result from the physical displacement of the current extensive rangeland use for grazing by small stock. If the solar grids are raised above the surrounding landscape and allow stock to continue to use the area this landuse would be retained in the operational phase. The fact that one landuse is replaced with another in this instance translates into a diversification of the agricultural business on the property through the economic benefit received by the owner from the lease to the area on the property throughout the operational phase.			
Impact	Nature of Impact	Extent of Impact	No Go Areas
• Loss of agricultural land use due to direct occupation by PV panels and other infrastructure, including	Affected portions of land are out of agricultural production.	Limited to the site itself through the physical occupation of the land by the PV panels.	Steep slopes and rocky outcrops as well as buffer areas around drainage lines.

roads.			Areas with pristine natural vegetation identified as highly sensitive.
Gaps in knowledge and key recommendations for further studies needed: To ensure that the current landuse is not lost should operations be halted will require the custodianship of the agricultural resource in this instance the retention of the fertility of the soil. 1) Visual assessment of erosion, erosion potential and veld degradation on site should be maintained throughout the operational phase. 2) Clear recommendations for mitigation measures, monitoring requirements, and rehabilitation guidelines for all identified impacts must be available to the proponent.			

5.4.4 Potential impacts on Heritage Resources

General description			
Impact	Nature of Impact	Extent of Impact	No Go Areas
NONE	NONE	NONE	NONE
Gaps in knowledge and key recommendations for further studies needed: This assessment assumes that the point sources identified in the heritage report have been fenced off and isolated from further impact. Any further impact during the operational phase would therefore be avoided.			

5.4.5 Potential impacts on the social environment

General description The following socio-economic aspects may change during operations: Population numbers, skills levels, work environment, employment levels, social services use, family health, income, air and noise quality, sense of place, small business activities and economic activity. These changes may affect the health and social well being, quality of living environment and economic and material well being of the receiving community.			
Impact	Nature of Impact	Extent of Impact	No Go Areas
Population Influx	Perception that job opportunities exist encourage people to settle in community	Local	Impossible to mitigate.
Social Health remains weak	Alcohol abuse stays high specifically amongst women	Local	Responsibility of social services of local municipality
Increased skills levels	Opportunity to improve subjects in scarce disciplines (1.5% of revenue/ annum)	Local	Preferential employment of people from outside of the community.
Image of young women	Young women become role models in community	Local	Preferential employment of males and outsiders.
Employment	Creation of permanent employment opportunities Biannual temporary employment contracts	Local	Preferential employment of people from outside of the community.
Family structure	No of single families increase	Local	Responsibility of social services of local municipality
Income	Minimal increased income.	Local	Preferential employment of people from outside of the community.
Levels of education	Increased levels of education as young people pursue the scarce subjects (specialization in mathematics, science and	Local	Preferential education of people from outside of the community.

	technology)		
Sense of place	Permanent change in sense of place	Local	No adherence to visual impact mitigation.
Culture	Created opportunity for foreign cultures to settle in community	Local to International	Impossible to mitigate.
Local Economy	Domestic purchase National and International purchase National and International sales	Local to International	Preferential employment of people, business from outside of the community.
Gaps in knowledge and key recommendations for further studies needed: 1) Capitalise on the positive impacts by ensuring that local people and businesses are appointed and contracted during the operational phase through preferential employment / sales. 2) At a local and community scale ensure that young women are employed. 3) Ensure that skills development and occupational training benefits the local communities. 4) Ensure that education in the scarce subjects is financially supported and preferentially aimed at local scholars / students.			

5.4.6 Potential visual impacts

General description: Impacts to be determined during the EIA phase.			
Impact	Nature of Impact	Extent of Impact	No Go Areas
As for visual impact under the construction phase above.	As for visual impact under the construction phase above.	As for visual impact under the construction phase above.	As for visual impact under the construction phase above.
Gaps in knowledge and key recommendations for further studies needed: 1.) As for visual impact under the construction phase above.			

5.4.7 Potential cumulative impacts

General description: Cumulative impacts may result through the addition of other similar or diverse impacts within the broader landscape. Cumulative impacts however can additionally stem from low impact activities that are amplified through the increased frequency of the activity taking place. Cumulative impacts for the proposed facility will be viewed from the perspective of:

1.) Scale dependent impacts of the proposed facility where cumulative impacts occur as a result of incremental addition of impact, impacts that are interactive or synergistic with other activities, or impacts that amplify overall impact related to the sequence in which activities are undertaken.

Canter and Sadler (1997) use the following methodology to address cumulative impacts during an EIA:

1.) Delineate sources of potential change;
2.) Identify pathways of possible change;
3.) Identify non-linear or synergistic changes.

The final process would be to classify the resultant cumulative changes.

In terms of scale the proposed Klipdam site would extend over an area of 250 ha's. Cumulative impacts would be associated with physical disturbance to areas of natural vegetation and if other similar developments were to occur in the surrounding landscape fragmentation and interruption of ecological processes through the cumulative transformation of natural vegetation and the loss of connectivity between extant natural vegetation. Adequate design to ensure connectivity and minimising impact on sensitive areas of natural vegetation would mitigate this impact to a great extent. Similarly the transformation and permanent loss of vegetation cover could cumulatively alter drainage dynamics and accelerate erosion from the site and similar sites, cumulatively these could alter sediment loads in drainage lines, retard soils formation and result over time in changes in soil nutrient balance. Cumulative visual impacts would change the character and cultural landscape and potential the visual aesthetic appeal of an area. Cumulatively developments such as these will provide for an expanding employment market which may result in an influx of new inhabitants with diverse cultural and moral perspectives which could cumulatively affect social and community

dynamics of the resident population. Furthermore the greater demand for labour could conceivably cause impacts on the local authority with increased services and housing required, which in turn may result in the development of informal townships close to existing towns or facilities. Cumulative impacts however would primarily be related to impacts on the communities sense of place. Cumulative impacts however do include the use of a renewable energy for the generation of electricity, reduced dependency on fossil fuels, lower per capita CO_2 footprint, increased decentralisation of the electricity grid with consequent stabilisation of the grid regionally, diversification of the rural economic sector, increased revenue per unit area in an extensive agricultural landscape, increased job opportunity and encouraging entrepreneurship.

Impact	Nature of Impact	Extent of Impact	No Go Areas
To be determined in the EIA phase of the assessment process.	To be determined in the EIA phase of the assessment process.	To be determined in the EIA phase of the assessment process.	To be determined in the EIA phase of the assessment process.

Gaps in knowledge and key recommendations for further studies needed:

1.) Each of the specialist studies that have been commissioned for the proposed development will identify and assess cumulative impacts.

6. CONCLUSIONS

6.1 Project overview

The project proponent, NK Energie (Pty) Ltd, proposes to develop a 2 x 75 MW Photovoltaic (PV) Solar Energy Facilities on Klipdam, Farm 134/17, Springbok in the Northern Cape. On receipt of approval, this project will be implemented in a two phased approach, each phase of construction comprising 75 MW – thus a total electricity output from the facility of 150MW. The property itself falls within the NamaKhoi Municipality which is one of the municipalities within the Namakwa District Municipality. Currently the property is zoned as Agriculture I and is used for extensive grazing by small stock. Historically the site was a golf course and is thus much of the natural vegetation has been fully transformed and artificially landscaped for fairways, bunkers, greens and exotic trees planted along the borders of each of the holes.

On completion the proposed 150MW PV Solar Energy Facility will occupy and area of approximately 250ha's. The site is therefore large enough to house the proposed development, the property being large enough to ensure that sensitive areas can either be avoided or buffered from potential significant impact.

The facility would include the following infrastructure;

- *An array of photovoltaic (PV) panels;*
- *Mounting structures to be either rammed steel pipes or piles with pre-manufactured concrete footings;*
- *Inverters and transformers;*
- *Cabling between the different components will be lain underground where practically possible;*
- *Internal roads and boundary fences;*
- *Workshop area that will cater for storage, offices, security and ablution facilities;*
- *A power line from the facility to the substation;*
- *Connection to a substation to evacuate the power from the facility into the ESKOM grid.*

Lay down areas will be accommodated within the proposed site and will therefore not increase the area that will be impacted.

The Scoping phase will concern itself with a desktop study, a field survey and consultation with affected parties, specialists and key stakeholders. After an initial public review process, the Final Scoping Report with a Plan of Study for the EIA will be submitted to the DEA for their consideration and decision. This will be followed by a detailed assessment of environmental (positive, negative, direct, indirect and cumulative impacts) impacts as identified in the Scoping Phase. These assessments will be undertaken through specialist studies, sensitivity analyses and public participation. On conclusion of the required public participation process the Final EIA Report and the Environmental Programme (EMPr) will be submitted to DEA for consideration and authorisation. The process considered alternatives in terms of appropriate landuse, alternate technologies, design and layout and the no-go option.

The Scoping Phase for this proposed solar energy facility aims to:

- *Describe the existing environmental characteristics of the proposed development;*
- *Identify potential positive and negative environmental and social impacts (construction and operational phase);*
- *Make recommendations for detail studies required during the EIA phase;*
- *Engage with interested and affected parties in order for them to provide inputs and comments to the proposed develop - This is achieved by circulating and facilitating the review of the Draft Scoping Report;*
- *Provide sufficient information to authorities to make decision on the scope and extent of issues and specialist studies that are required for the EIA process;*

In achieving these aims the following objectives have been set for the Scoping phase:

- *To gather information (achieved by interaction and consultation via desktop reviews of existing baseline data and specialist studies, correspondence with scientists and local residents, Geographic Information Systems (GIS) and with authorities, key stakeholders and communities)*
- *To identify and evaluate potential environmental issues and impacts that require further investigation;*
- *To determine the sustainability of the project in terms of the biophysical, ecological and socio-economic environment;*
- *To consider alternatives in terms of site selection, layout, design. technology, processes and sustainability;*
- *To conduct an open, participatory and transparent public participation process and*
- *To outline the methodology and activities to be undertaken during the EIA phase of the assessment.*

Areas of environmental sensitivity were identified during the scoping phase these relate to:

- Ecologically sensitive areas such as the identified Critical Biodiversity Areas and Ecological Support Areas. Additionally drainage lines have been identified as National Freshwater Priority Areas. The property however is large enough to accommodate the proposed development and avoid these areas i.e. CBA's, ESA's and NFEPA's can be categorised as no go areas. The status of the ecosystems on the property are all considered to be Least Threatened and additionally the approach has been to first fully use transformed natural vegetation (the old golf course) and thereafter to consider the least sensitive natural areas. The drainage lines in particular would be more sensitive areas and but buffering could mitigate potential impact on these areas. At a pattern scale rare and endangered species are not expected to occur in transformed and low sensitivity areas, however more detailed assessment of impacts will be concluded in the EIA phase.
- Impacts of agricultural productivity and use were considered but found to be of a low significance. No sensitive areas in terms of agriculture were evident for the site at this point. The significance of agricultural impacts is influenced by the severely limited agricultural potential of the land, which is suitable only for low intensity grazing of small stock. As a result, agricultural impacts are likely to be of low significance. Mitigation measures can also be put in place to reduce the significance of certain of these impacts, such as erosion.The site will be investigated further and in more detail during the EIA phase of the assessment.

- The cost benefit assessment of identified variables for socio-economic impacts of the proposed development at this point in the assessment process was found to be positive in nature. The greatest sensitivity would relate to the preferential employment of local people, businesses and in particular favouring the employment and education of young women over the employment of people from further afield or of other nationalities.
- Visual impacts focussed on the presence of significant view corridors associated with the project site. Four dominant view corridors were identified the N7, N14, R355 and the Nababeep access road. The N14 and R355 are located beyond the five kilometre radius of the project site and are not regarded as significant in terms of a view corridor. The other two roads i.e. the N7 and the Nababeep access road are however relevant. High lying areas within the surrounding landscape were additionally identified as important areas for the evaluation of visual impact. The findings of impacts related to areas within the surrounding landscape from where the facility would be visible indicate that the proposed site would not be visible from any of the surrounding towns and roads in the area. Furthermore as the proposed site is located below a ridgeline it will not impact the skyline in any way. Findings of the zone of visual influence show that the only relevant areas within the landscape would be the high lying peaks in the surrounding landscape. Importantly the viewshed does not coincide with any populated area.

Construction and decommissioning phases were considered to be equivalent in terms of the variables of impact associated with each of these phases. Impacts on ecological pattern and process are negative but local in nature. Impacts in terms of visual impact are negative and will extend beyond the property boundaries but remain local in extent. The balance of social impacts are positive and the extent of these impact will primarily accrue to the local inhabitants if mitigation is well implemented. The extent of social impact for a small number of variables related to improved employment, business, training and education opportunities, may however extend to regional, national and international scales. Heritage impacts are considered to have very low site specific significance and are primarily related to historical burial sites which have been identified and allow for effective avoidance of impacts of any nature by fencing out these areas. Agricultural impacts are local in extent and some variables of impact were considered to be positive in nature.

Operational impacts of the proposed development will range from local to regional and national to international scales. At greater scales impacts will be associated with the sale of renewable energy into the national grid and the decentralisation and strengthening of the grid at local and regional scales. Skills and education development associated with the proposed development will release up skilled people into the economy of South Africa and possibly further afield. All visual impacts would remain and would extend beyond the property boundary.

Importantly it should be noted that the great majority of impacts identified in the table below show that the extent of impacts will primarily be felt at site to local scales. Impacts that extend to regional, national and international scales are all positive for the majority of impact variables identified.

6.2 Conclusions drawn from the evaluation process

6.2.1 Construction and Decommissioning Phase

Potential impacts on ecosystem pattern & process		
Impact	Positive or Negative Impact.	Extent of Impact
Loss of vegetation due to construction activities	Negative	Local
The habitat of threatened plants lost or disturbed due construction	Negative	Local
Destruction of indigenous trees	Negative	Local
The habitat of threatened animals lost or disturbed due construction	Negative	Local
Impacts on drainage lines	Negative	Local
Establishment of alien invasive species	Negative	Local
Impacts on Wetlands	N/A	N/A
Potential impacts on geology, soils and hydrology		
Impact	Positive or Negative Impact	Extent of Impact
Soil erosion due to alteration of the surface run-off characteristics.	Negative	Local
Degradation of veld	Negative	Local
Loss of topsoil due to poor topsoil management	Negative	Local
Diversified agricultural business.	Positive	Local
Cumulative impacts.	Negative	Local
Potential impact on landuse		
Impact	Positive or Negative Impact	Extent of Impact
Loss of agricultural land use due to direct occupation by PV panels and other infrastructure, including roads.	Positive or Negative	Local

Potential impacts on Heritage Resources		
Impact	Nature of Impact	Extent of Impact
Irreplaceable loss of archaeological resources.	Negative	Local
Potential visual impacts		
Impact	Positive or Negative Impact	Extent of Impact
Potential visual impact of the proposed facility on sensitive observers up to 5km from the site.	Negative	Local
Change in the character of the prevailing use of the area	Negative	Local
New artificial light sources within the landscape.	Negative	Local
Reflection of the PV panels on sensitive receptors in the region.	Negative	Local
Potential impacts on the social environment		
Impact	Positive or negative Impact	Extent of Impact
Population influx	Negative	Local
Social Health decreases	Negative	Local
Skills level increase	Positive	Local to national
Decreased community stability	Negative	Local
Engagement with different cultures	Neutral	Local
Image of young women	Positive	Local
Increased crime	Negative	Local
Employment	Positive	Local to National
Job reservation for women.	Positive	Local

Job reservation	Negative	Local
Traffic levels increase	Negative	Local
Local authority services under pressure	Positive	Local
Increased income	Positive	Local to National
Education levels increase	Positive	Local to National
Increased noise & dust levels	Negative	Local
Sense of place change	Negative	Local
Improved local economy	Positive	Local to National.
Local economy ceases	Negative	Local to International

7. PLAN OF STUDY FOR ENVIRONMENTAL IMPACT ASSESSMENT

The Plan of Study describes how the EIA will proceed and includes detail of the specialist studies that arerequired. The Plan of Study is informed by key findings of the Scoping Phase as it includes inputs from the key-stakeholders, the public, EIA specialist team and the proponent. The Plan of Study is also informed by requirements of NEMA EIA June 2010 and other guidelines.

7.1 Objectives of the EIA Phase

The objectives of the EIA Phase is to;

- Assess the overall impact on the social and biophysical environment that will be effected by the proposed solar energy facility;
- Assess significant impacts that are associated with the solar energy facility;
- Identify and make recommendations for the avoidance and mitigation of potentially significant environmental impacts;
- Undertake comprehensive public participation process that will ensure that I&AP's are participating and that their comments, issues and concerns are recorded;
- Address environmental impacts and benefits (to include direct, indirect and cumulative impacts) associated with the design, construction, operational and decommissioning phases of the development, and;
- Provide enough information to the DEA to make an informed and robust decision.

7.2 Consultation with the Authorities

The regulating authorities (DEA&NC DENC) were involved from the initial application for authorisation and will remain so for the entire EIA Process. They will be involved in the remaining part of this application by receiving the Final Draft Scoping Report (after review of draft scoping report for 40 days by I&AP's), receiving the Final EIA Report (after review of draft EIA Report for 30 days by I&AP's) and a site visit if required.

Other Government Departments and key stakeholders (Municipalities) will continue to be informed of progress and consulted for the entire EIA Process.

7.3 Consideration of Alternatives

Assessment of site alternatives in this instance is not possible as this is the only site available that meets with the criteria for selection and is the only site in the possession of the owner. During the scoping phase the areas which have been selected for the assessment of potential impacts were identified based on the following criteria:

(1) Available solar resource linked to site characteristic such as topography and climatic conditions – the site chosen has the highest solar irradiation values and at temperatures that are suitable for PV Solar power generation,

(2) Adjacency to existing electricity grid infrastructure i.e. an existing substation – there is an existing sub-station due east of the site which has the capacity to accept the power generated from this proposed facility.

(3) Capacity within the sub-station to accommodate additional power generation,

(4) Road access to the site from the national and provincial road network and within the site,

(5) Topography of the site and underlying geology,

(6) Adjacency and potential impact on sensitive ecosystems,

(7) Adjacency and potential impact on sensitive habitats and species,

(8) Economic viability of the site based on the baseline sensitivities identified and the spatial area available which is suitable,

(9) Potential Impact on cultural/ historical heritage and visual receptors in the surrounding landscape.

The final layout of the proposed fixed solar array will respond to the environmental sensitivity of the site. By preference the modules for the array will be placed in the low to medium sensitivity areas. The final layout of the array will adhere to the following criteria:

(1) Areas of lowest sensitivity will be identified and prioritised as the most suitable areas for the proposed array.
(2) Once all low sensitivity areas have been filled medium sensitivity areas will be filled to accommodate the proposed solar facility.
(3) The final layout will be selected hierarchically starting with the lowest areas outside the buffer areas and then sequentially with increasing altitude.
(4) Flat to gently undulating areas will be selected as suitable while steep and rocky ground will be avoided.
(5) Areas within 32m of a drainage line will be avoided.

To summarise, the spatial layout of the proposed facility will be selected through a hierarchical framework that responds to the sensitivity of the site, topography and visual receptors.

Current technological alternatives for renewable energy generation from site such as these could conceivably include PV Solar, Concentrated Solar Power (CSP) and through wind turbines. When considering PV Solar technology alternatives would be associated with selecting the most efficient panel for the proposed site as solar panel efficiencies are improving rapidly through a dedicated research and development drive.

What is noteworthy though is that the impact posed by the different PV solar technologies would not alter the potential environmental impact posed by the facility in any meaningful way. The PV technologies are therefore generally equivalent in terms of their potential impacts. As discussed in more detail above, this would hold true for all the phases of a project such as this, planning, site preparation, construction, operation and decommissioning.

CSP is not considered a viable alternative as it requires significant quantities of water, which is not freely available on this site and is considered inappropriate in this semi-arid / water stressed environment. The scale of the construction of CSP over PV Solar is an additional consideration here as a CSP plant is a larger, more expensive and more complex facility to construct and maintain.

The site additionally does not lend itself to power generation from wind, primarily due to the much larger visual impact and due to the lack of an adequate resource.

The most appropriate technology is clearly a fixed PV Solar Array, alternative technologies mentioned above were therefore not considered feasible in this instance.

The deployment of the PV array could be either via a fixed mounting or as a tracking system. The tracking system would require a larger area to achieve the same power generation i.e. it is more "hungry" in terms of the ha to power ratio. It therefore would be less desirable in this instance where suitable low to medium sensitivity areas for the solar PV are at a premium. The construction and maintenance on a tracking system are additional constraints in that they are more complex to build, maintain and are more costly.

7.4. No Go Alternative

To pursue the no go option is not considered feasible. From an economic perspective this landuse option is aligned with international, national, provincial, local and fine scale forward planning - the intensive use of land for the generation of renewable energy does translate into the most economically sustainable landuse for this marginal agricultural locality. The opportunity cost weighs in favour of the proposed development due to the suitability of the site for the proposed development from a heritage and visual impact perspective, conservation status of the ecosystem type, low potential impact of the development. Furthermore the transformation and/or degraded nature of a large portion of the site will not impair the quality of biodiversity pattern or process resources on the site. The area is economically active due to its suitability for the extensive grazing of small stock, however returns from this landuse are marginal at best in these arid ecosystems. Sustainable landuse options for people in this location are therefore very limited and in our consultation appear to be closely linked to the ability of a landowner to diversify the income streams into the property to attain a position where the property becomes a viable business. Fundamentally it appears that it would be at odds with international commitments in terms of the use of renewable energy, the forward planning of National Government, the PSDF and DF, IDP. For these reasons the no-go alternative is considered unfeasible.

7.5 Assessment of potential impacts and mitigation recommendations

Table 5 - Assessment of potential impacts and mitigation recommendations

Issue	Activities to be undertaken to determine the impacts	Specialist to conduct the assessment
Impacts on terrestrial faunal species	Determine the potential impact that the proposed development may have on the terrestrial faunal component of the site.The field study should focus on habitat suitability for the concerned species and thereby confirm the presence of these species. The field study should focus on species that are classified as threatened (VU, EN or CR), Near threatened or Critically Rare. No additional fieldwork will be required for the IA phase, as an adequate understanding of the ecological sensitivity of the site was obtained at the Scoping Phase. Standard IA methodology should be used for rating impacts, and all potential impacts identified in the current Scoping study should be assessed, along with any others that may become apparent. Key construction phase impacts that should be assessed will be the actual PV array and associated cabling and roads, temporary laydown areas, potential fencing of the facility, and the powerline to the Springbok substation. Key operational phase impacts that should be assessed include indirect impacts of the PV facility and of the powerline. Recommendations for avoidance or mitigation of all identified impacts should be provided.	Nick Helme
Impact on vegetation	A detailed vegetation survey and study will focus on the assessment of impacts, identifying CBA's, Red Data and Endemic Species – thus providing a vegetation sensitivity map that focuses on species, habitats, communities and the ecosystem which in turn will refine and inform the design and layout of the proposed development. No additional fieldwork will be required for the IA phase, as an adequate understanding of the ecological sensitivity of the site was obtained at the Scoping Phase. Standard IA methodology should be used for rating impacts, and all potential impacts identified in the current Scoping study should be assessed, along with any others that may become apparent. Key construction phase impacts that should be assessed will be the actual PV array and associated cabling and roads,	Nick Helme

	temporary laydown areas, potential fencing of the facility, and the powerline to the Springbok substation. Key operational phase impacts that should be assessed include indirect impacts of the PV facility and of the powerline. Recommendations for avoidance or mitigation of all identified impacts should be provided.	
Impacts on geology, soils and landuse	A study should be conducted that assesses the soil classification, condition of the site (extent overgrazing), erosion status and risk of erosion of soils, management recommendations how to avoid and / or mitigate current impacts as well as potential impacts generated by the development. The terms of reference for the EIA study will include the requirements for an agricultural study as described under point 4 of section C of the National Department of Agriculture, Forestry and Fisheries document: *Regulations for the evaluation and review of applications pertaining to renewable energy on agricultural land*, dated September 2011. The above requirements together with requirements for an EIA specialist report may be summarised as: • Identify and assess all potential impacts (direct, indirect and cumulative) of the proposed development on soils and agricultural potential. • Describe and map soil types (soil forms) and characteristics (soil depth, soil colour, limiting factors, and clay content of the top and sub soil layers). • Map soil survey points. • Describe the topography of the site. • Describe historical and current land use, agricultural infrastructure, as well as possible alternative land use options. • Describe the erosion, vegetation and degradation status of the land. • Determine the agricultural potential across the site. • Provide recommended mitigation measures, monitoring requirements, and rehabilitation guidelines for all identified impacts.	Johann Lanz
Impacts on heritage	A Heritage Impact Assessment will be undertaken to identify any resources on site, determine their	Andrew Smith

	significance and to make recommendations on the mitigation measures. An assessment will also been done to determine the impact of the development on the landscape character and the sense of place. The findings of the scoping phase has determined that no significant impact will result if the recommended mitigation measures in the scoping report are adhered to therefore no impact phase report will be prepared.	
Impacts on social environment	The approach to this study is directed by the requirements for Environmental Impact Assessments and the Guidelines for Social Impact Assessments (SIA) and Economic Impact Assessments i.e.: • Review of project information and preliminary social impact reports (by J. Thomas and M. Worthington-Smith) including collection and synthesis of critical baseline data; • Identification project results and key social variables, verified through community participation (by J.Thomas and M Worthington-Smith); • Identification of additional social variables, and the impact thereof on the receiving society; • Verification of some results, social variables and impacts and compilation of Social Impact Assessment (SIA).	Anelia Coetzee - Leap
Visual Impacts	1. Determine the distance/proximity of the respective observers from the proposed facility. The distance between the observer and the observed activity is an important determinant of the magnitude of the visual impact. This is due to the visual impact of an activity diminishing as the distance between the viewer and the activity increases. Viewsheds are categorised into three broad categories of significance, namely: a) Foreground: The foreground is defined as the area within 1km from the observer within which details such as colour, texture, styles, forms and structure can be recognised. Objects in this zone are highly visible unless obscured by other landscape features, existing structures or vegetation. b) Middle ground: The middle ground is the area between 1km and 3km from the observer where the type of detail which is clearly visible in the foreground becomes indistinguishable. Objects in the middle ground can be classified as visible to moderately visible, unless obscured by other elements within the landscape. c) Background: the background stretches from approximately 3km onwards. Background views are only distinguishable by colour and lines, while structures, textures, styles and forms are often not visible (SRK	Johan Claasen - Zoneland

Consulting, 2007).

2. Determine the nature of the respective observation points

Each observation point will be categorised according to its location and significance. Differentiation is made between tourist-related corridors, including linear geographical areas visible to users of a route or vantage points and residential areas (including farmsteads and townscapes). The visual impact considered acceptable is dependent on the type of receptors. Visual rating between high (e.g. residential areas, nature reserves and scenic routes or trails), moderate (e.g. sporting or recreational areas, or places of work), or low sensitivity (e.g. industrial, mining or degraded areas) will be allocated to each observation point.

3. Determine the Visual Absorption Capacity of the environment

Visual absorption capacity (VAC) refers to the capacity of the receiving environment to absorb or screen the potential visual impact of the proposed activity. The VAC is primarily a function of the vegetation and will vary depending on the nature/density of the vegetation growth.

The VAC would also be high where the environment can readily absorb the structure in terms of texture, colour, form and light / shade characteristics of the structure. The VAC also generally increases with distance, where discernible detail in visual characteristics of both environment and structure decreases. The potential of the landscape to conceal the proposed activity will therefore be assessed in the EIA phase. A rating of *high* (effective screening by topography and vegetation), *moderate* (partial screening) and *low* (little screening) will be allocated to each observation point.

4. Determine the Visual Exposure

Visual exposure is defined as *the relative visibility of a project or feature in the landscape*. This is often also referred to as the zone of visual influence which is *an area subject to the direct visual influence of a particular project.* Exposure or visual impact tends to diminish exponentially with distance. A *high* (dominant or clearly visible), *moderate* (recognisable to the viewer) or *low* exposure (not particularly visible to the viewer) rating

	will be allocated to each observation point during the EIA phase. 5. Determine the visual intrusion of the proposed activity in the landscape The potential of the activity to fit into the surrounding environment is a very important determinant. The visual intrusion relates to the context of the proposed activity while maintaining the integrity of the landscape. A rating of *high* (noticeable change), *moderate* (partially fits into the surroundings) or *low* (blends in well with the surroundings) will be allocated to each observation point during the EIA phase. ADDRESSING DIRECT, INDIRECT AND CUMULATIVE IMPACTS In addition to the above, the cumulative visual impact of the proposed activity in the landscape should also be determined during the EIA phase. This phase should also be supplemented by appropriate mitigation measures to be employed to lessen the potential visual impact of the proposed activity on the respective observers. According to Oberholzer (2005), Direct (or primary) impact occur at the same time and in the same space as the activity. For example, the loss of views through construction of buildings. Indirect (or secondary) effects occur later in time, or at a different place, from the causal activity. For example, the construction of power lines leading to a subsequent drop in property values in the surrounding area. Cumulative effects can be: • Additive: the simple sum of all the effects, (e.g. sprawl effect of houses along a scenic route); • Synergistic: effects interact to produce a total effect greater than the sum of individual effects, (e.g. incremental urban development eventually results in total loss of rural or wilderness character of an area); • Time crowding: frequent, repetitive impacts on a visual resource at the same time (e.g. constant movement of heavy vehicles through an area). • Space crowding: high spatial density of impacts on a rural environment (e.g. rapid informal settlement). • Neutralizing: where effects may counteract each other to reduce the overall effect (e.g. provision of	

	new structures, accompanied by removal of redundant structures).	

7.6 Impact Assessment Methodology

For this proposed solar energy facility, direct, indirect and cumulative impacts will be assessed using the following seven generic rating scales;

- Duration
- Extent
- Intensity
- Significance
- Status of the impact
- Probability
- Degree of confidence.

7.6.1 Duration of impacts

The duration will determine the lifetime of the impact – this will be rated from low score (impact will have a very short lifetime e.g. 0-1yr) to a high score (impact will be permanent). See Table 6 – Duration of impact rating

Table 6: Duration of Impact rating

Rating	Description	Score
Short term	The lifetime of the impact will be for a short duration (0-5 yr)	1
Medium	The lifetime of the impact will be for a medium duration (5-15yr)	2
Long term	The lifetime of the impact will be for a long duration (>15 yr)	3
Permanent	The impact will occur even after the operational and decommissioning of the project has occurred.	4

7.6.2 Extent of impacts

Extent defines the physical or spatial scale of the impact on the receiving environment. Score will be low where impacts are limited to the site and its immediate surroundings and will increase as the extent increase to a regional and to a national level. See Table 7 : Extend of Impact

Table 7 : Extend of Impact

Rating	Description	Score
Local	The impact is limited to the site and its immediate surroundings	1
Regional	The impact extended beyond the boundary of the site	2
National	The impact is widespread and will have a impact on National level.	3

7.6.3 Intensity of impacts

The evaluation of the intensity is used to measure or establish whether the impact would be destructive or the level of destruction particular impacts will have on the receiving environment. See Table 8: Intensity of Impacts

Table 8: Intensity of Impacts

Rating	Description	Score
Low	Impacts have no effects on the processes and functions of the natural, cultural and social environment.	1
Medium	The affected environment is altered but natural, cultural and social functions and processes continue – although in a modified way.	2
High	The natural, cultural and social functions or processes are altered to the extent where they will be temporary or permanently cease.	3

7.6.4 Probability of impacts

Probability describes the likelihood of the impact occurring during the proposed development, during the operational phase and after the development. Scoring will vary from low (improbable) to high (itsdefinite that the impact will occur - regardless of any preventative or mitigatorymeasures). See Table 9: Probability of Impacts

Table 9: Probability of Impacts

Rating	Description	Score
Improbable	The possibility of the impact occurring is very low.	1
Probable	There is a possibility that the impact will occur.	2
High	The impact will definite occur - regardless of any preventative measures	3

7.6.5 Status of the Impact

The status of the impact is used to describe whether the impact would be negative, positive or no effect on the receiving environment.

7.6.6 Degree of confidence

The degree of confidence measures the level of reliability of the impact predictions subject to the availability of relevant information. See Table 10: Degree of confidence

Table 10: Degree of confidence

Rating	Description
High	Greater than 70% sure of impact prediction
Medium	Between 35% and 70% sure of impact prediction
Low	Less than 355 sure of impact prediction

7.6.7 Significance

Significance rating can be assessed as low, medium and high using a formula. The formula is S= (E+D+I)P.

S= Significance rating,

E=Extent, D=Duration, I=Intensity and P= Probability. See Table 11:Probability of Impacts

Table 11:Probability of Impacts

Rating	Description	Score
Low	<20. Impact would not have a direct influence on the decision to develop	1
Medium	20 – 30. Impact could influence the decision to develop unless it is effectively mitigated.	2
High	> 30. The impact must have an influence on the decision process to develop the area.	3

7.7 The contents of the Environmental Impact Assessment Report

The EIA Report will include and describe the following aspects;

Property description on which the activity is to be undertaken and the location of the activity on the property;

Description of the activity;

Description of the physical, biological, social, economic and heritage aspects of the environmentthat may be influenced by the proposed activity;

Description of all environmental impacts / issues identified, the assessment of the *significance of these impacts* / issues and to the *extent mitigation measures* would have to be implement;

Description of all uncertainties and gaps in knowledge

Assessment of all identified significance impacts

Describe the Public Participation Process –this to include steps undertaken according to plan of study, list of registered key stakeholders and I&AP, a comments and response report that should include detail on the receiving date of the comments, a copy of the comment.

Describe the needs and desirability,

Describe the methodology used in determining the significance of the potential impact;

Description and comparative assessments of all alternatives of all alternatives identified in the process;

Describe the impact statement that contains a summary of the key findings of the EIA and a comparative assessment of negative and positive impacts of the proposed development and alternatives.

Describe the key findings of specialist studies and these studies will be included in the EIA Report and

Include the Environmental Management Programme (EMPr).

The Draft EIA Report will be available for review for 40days. All comments and inputs will then be captured in the comments and response report that will be included in the Final EIA Report.

7.8 Public Participation Process

Key stakeholders and I&AP's will be engagedthroughout the entire EIA process. FOOTPRINT Environmental Services (FES) will use meetings, telephonic discussion and written, faxed and e-mail correspondence to encouragestakeholders and I&AP to actively participate during the processes.

The Draft EIA Report will be made available for the 30 day public review process within this time FES will arrange a public meeting in order for the general public and key-stakeholders to attend.

7.9 Activities and Timeframes for the EIA Phase

Table 12, indicate the timeframes set for the implementation and completion of the EIA Phase. See Table 12.

Activities	Milestones
Public review of the Draft Scoping Report	3 March 2014 – 11 April 2014.
Finalise the Scoping Report	22 April 2014
Submitting the Scoping Report and Plan of Study to DEA	22 April 2014
DEA accepted the Scoping Report and Plan of Study	12 May 2014
Undertake specialist studies	12 May 2014 – 31 May 2014
Distribute Draft EIA Report and Draft EMP for public, stakeholder and government department for review and	9 June 2014 – 21 July 2014

comments. Facilitation of 1 stakeholder meeting.	
Finalisation of Environmental Impact Assessment Report	25 July 2014
Submit Environmental Impact Assessment Report to DEA for authorization.	28 July 2014

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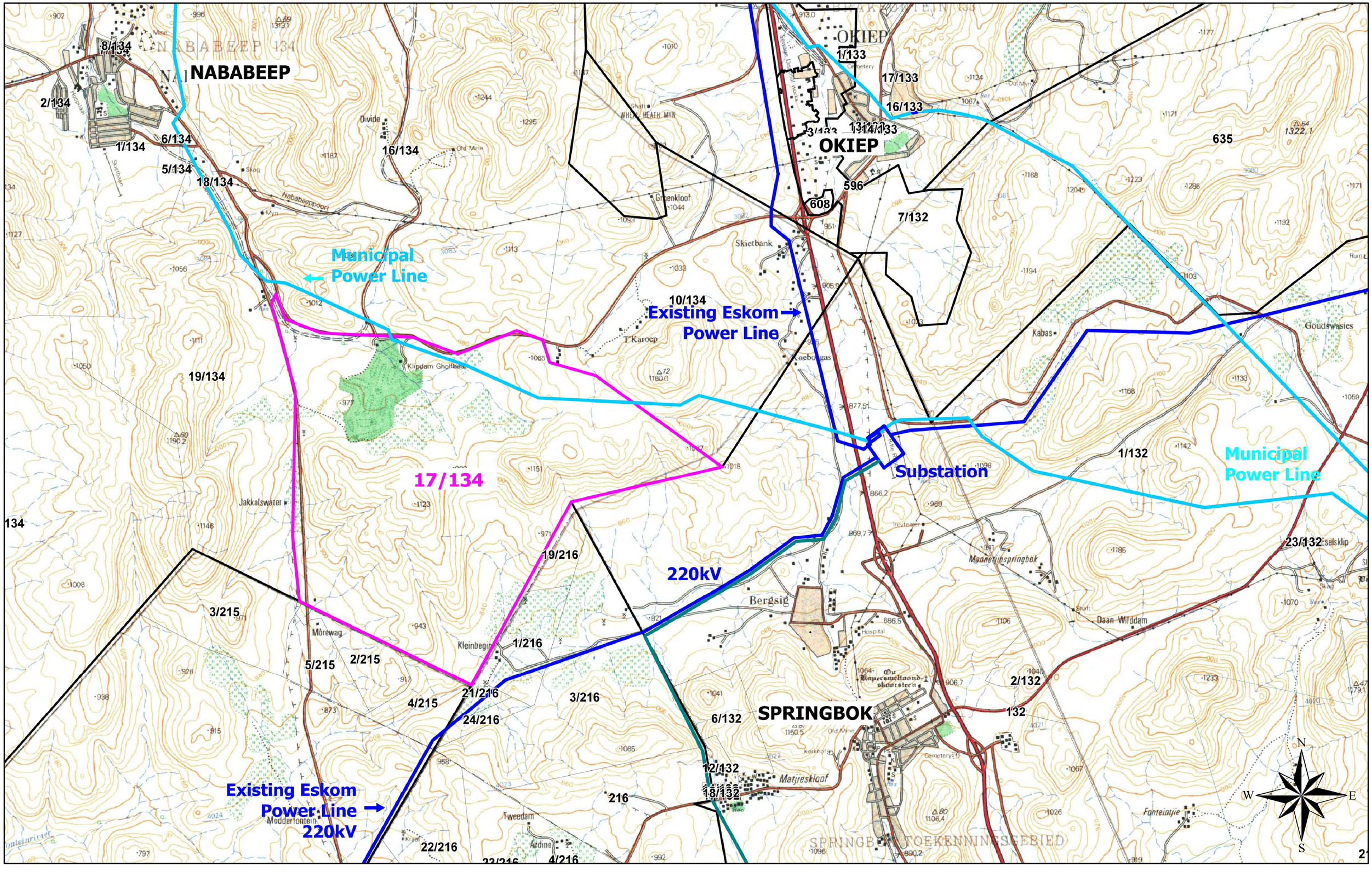
APPENDIX A – LOCALITY MAP, LAYOUT, ROUTE PLAN & SENSITIVITY MAP

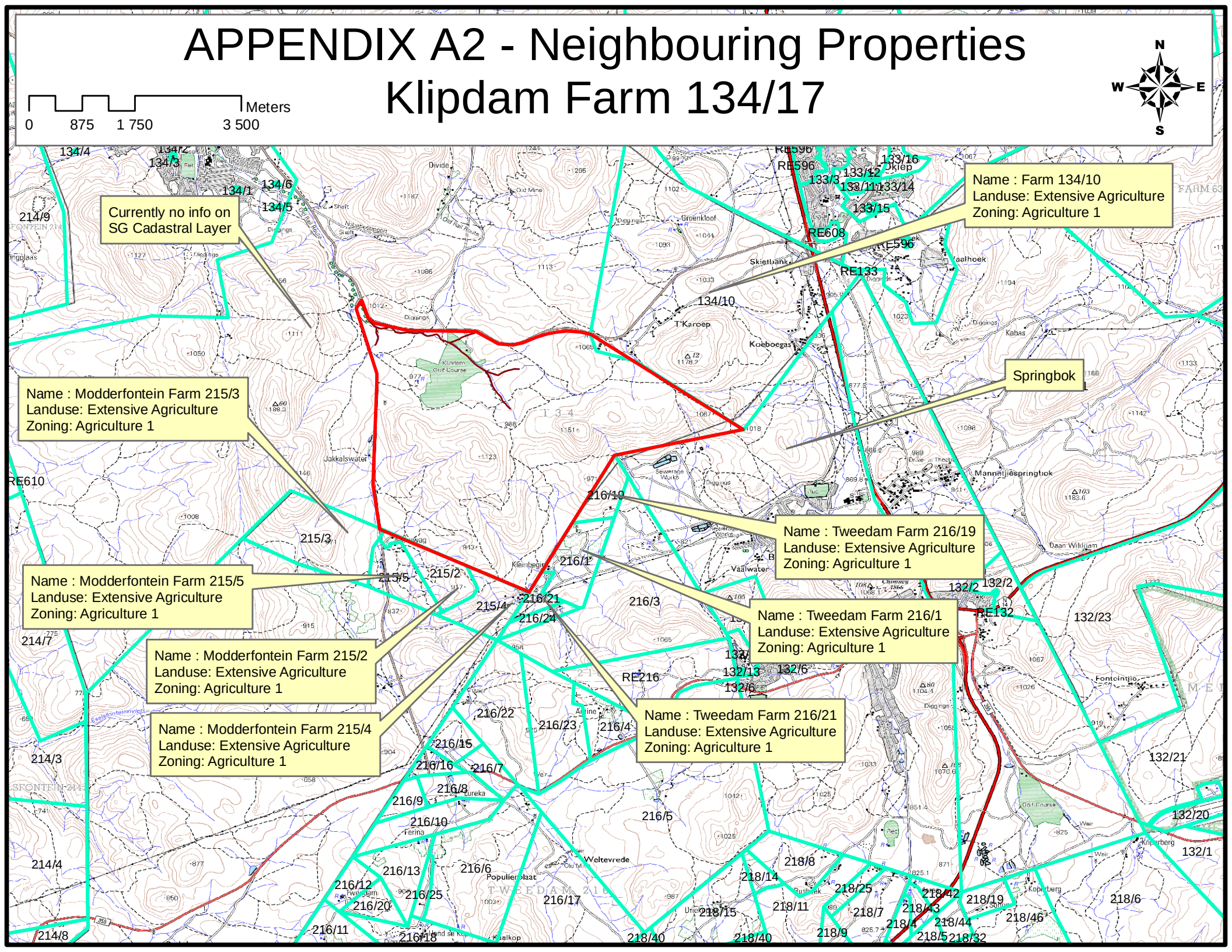
APPENDIX A1 - Locality Map Springbok
Klipdam Farm 134/17

GPS Co-ordinates WGS 84 Decimal Degrees
17.820 & -29.627

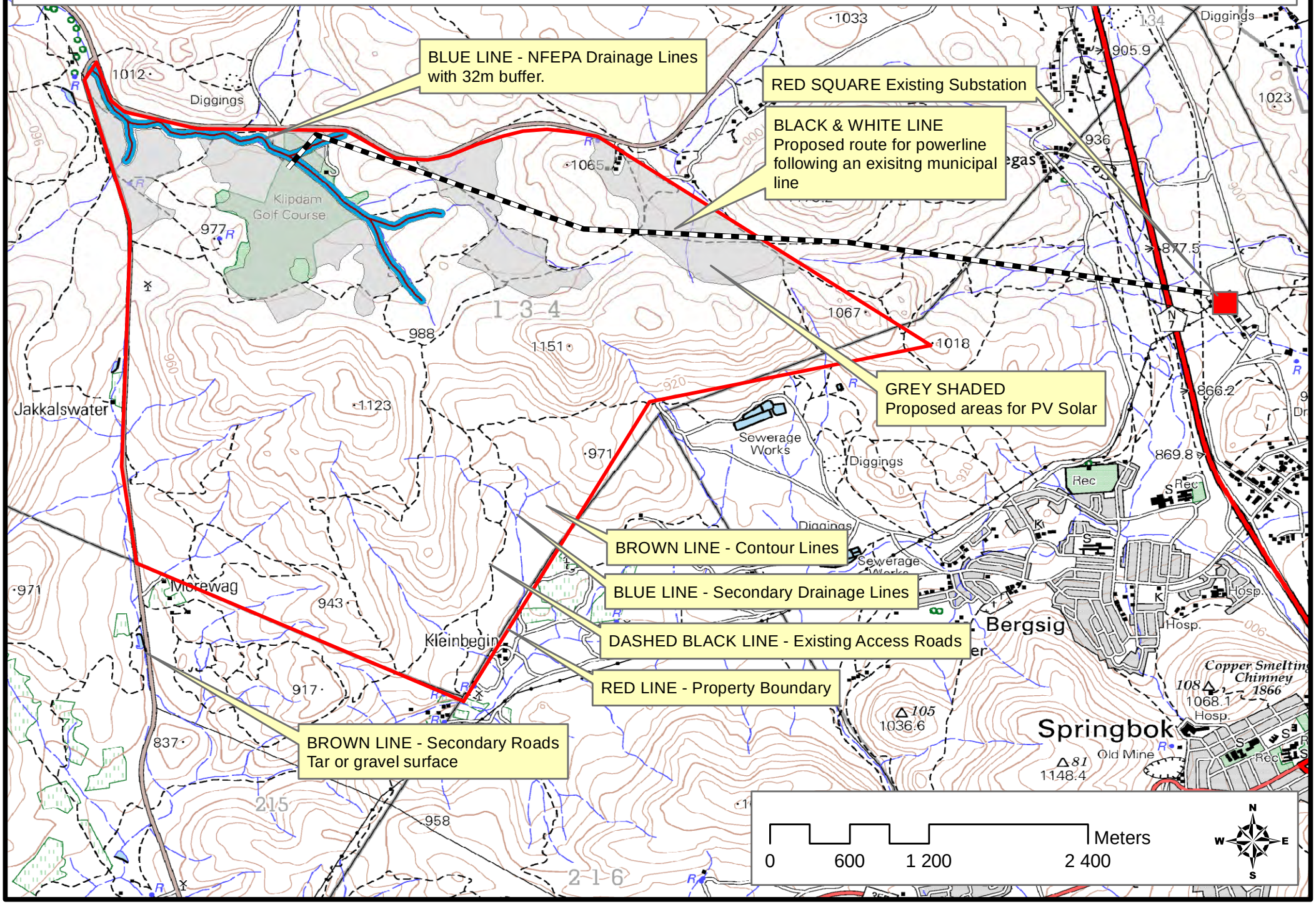
Scale : 1:500 000



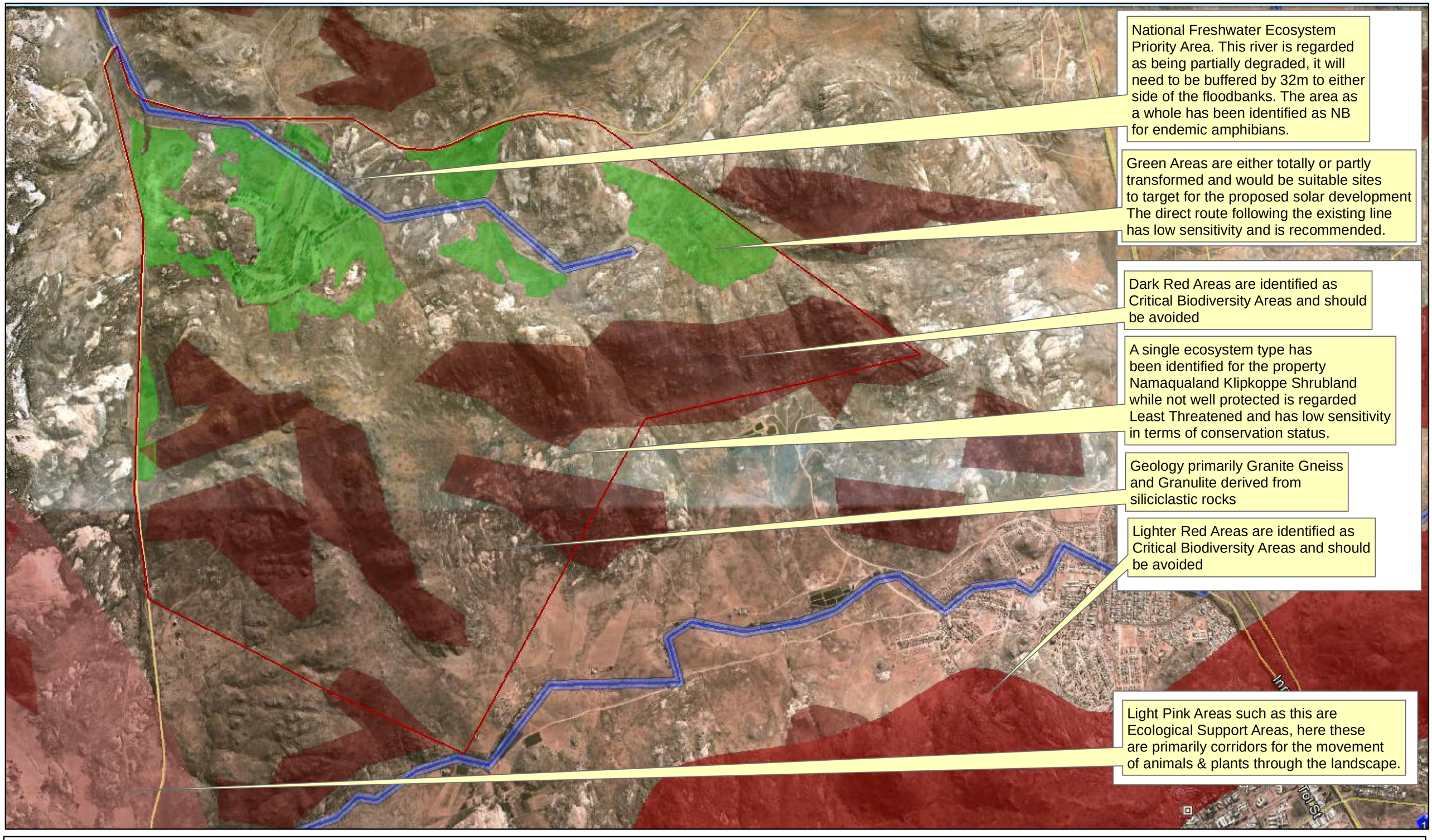
APPENDIX A2 - Neighbouring Properties
Klipdam Farm 134/17



APPENDIX A3 - Draft Site Plan - Klipdam Farm 134/17



APPENDIX A4 - Ecological Sensitivity, Klipdam.



Property Statistics

Property Size: 1378.2844 ha's
Area Highly Suitable: 214.518 ha's

Calculated with ArcGIS / ArcMap 10

The Succulent Karoo Ecosystem Project (SKEP) has identified areas as important for the conservation of endemic amphibians, mammals (an endemic molerat), endemic reptiles, birds and invertebrates.Initial scoping by the ecological specialist however found that this in not applicable in this instance.

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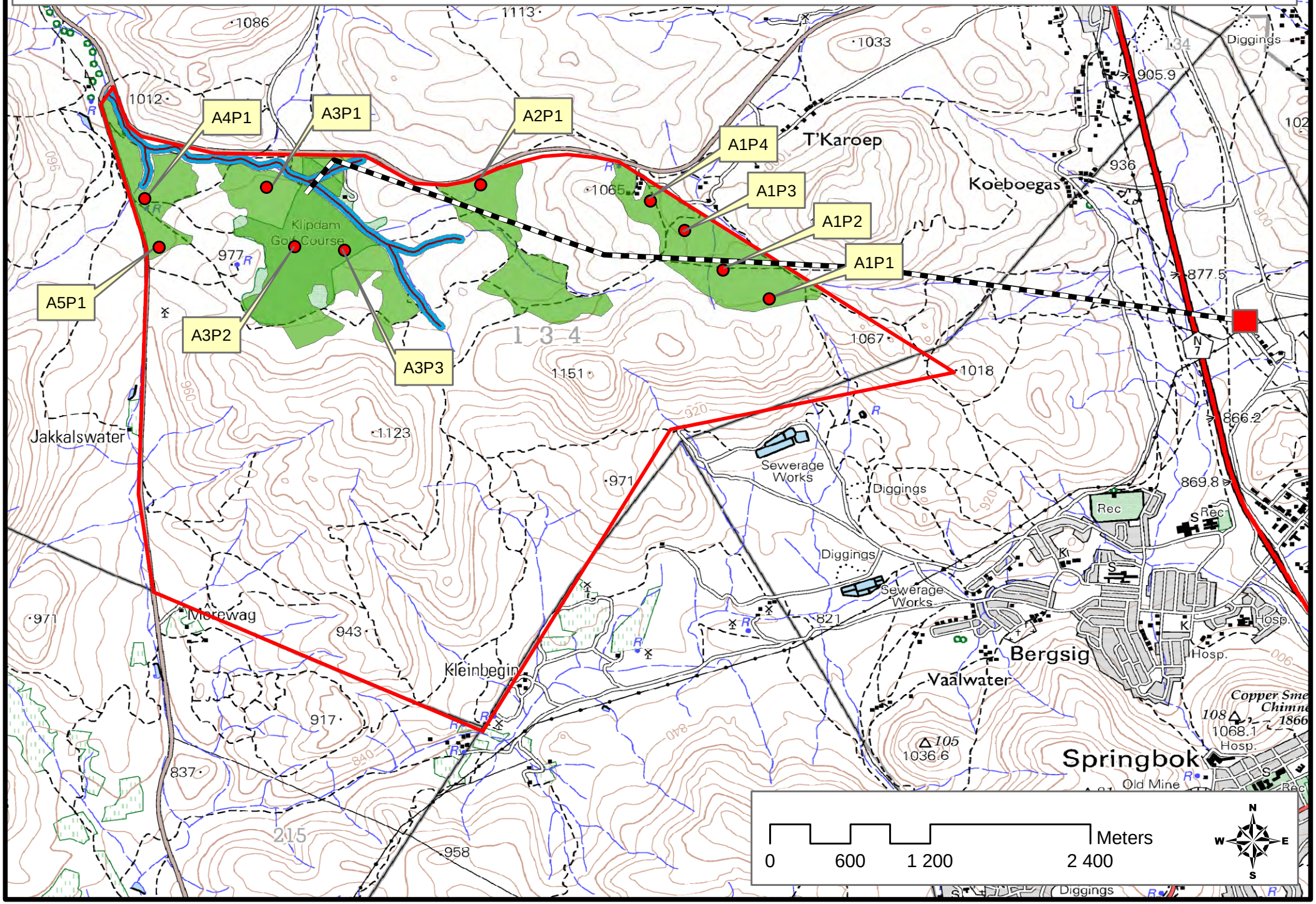
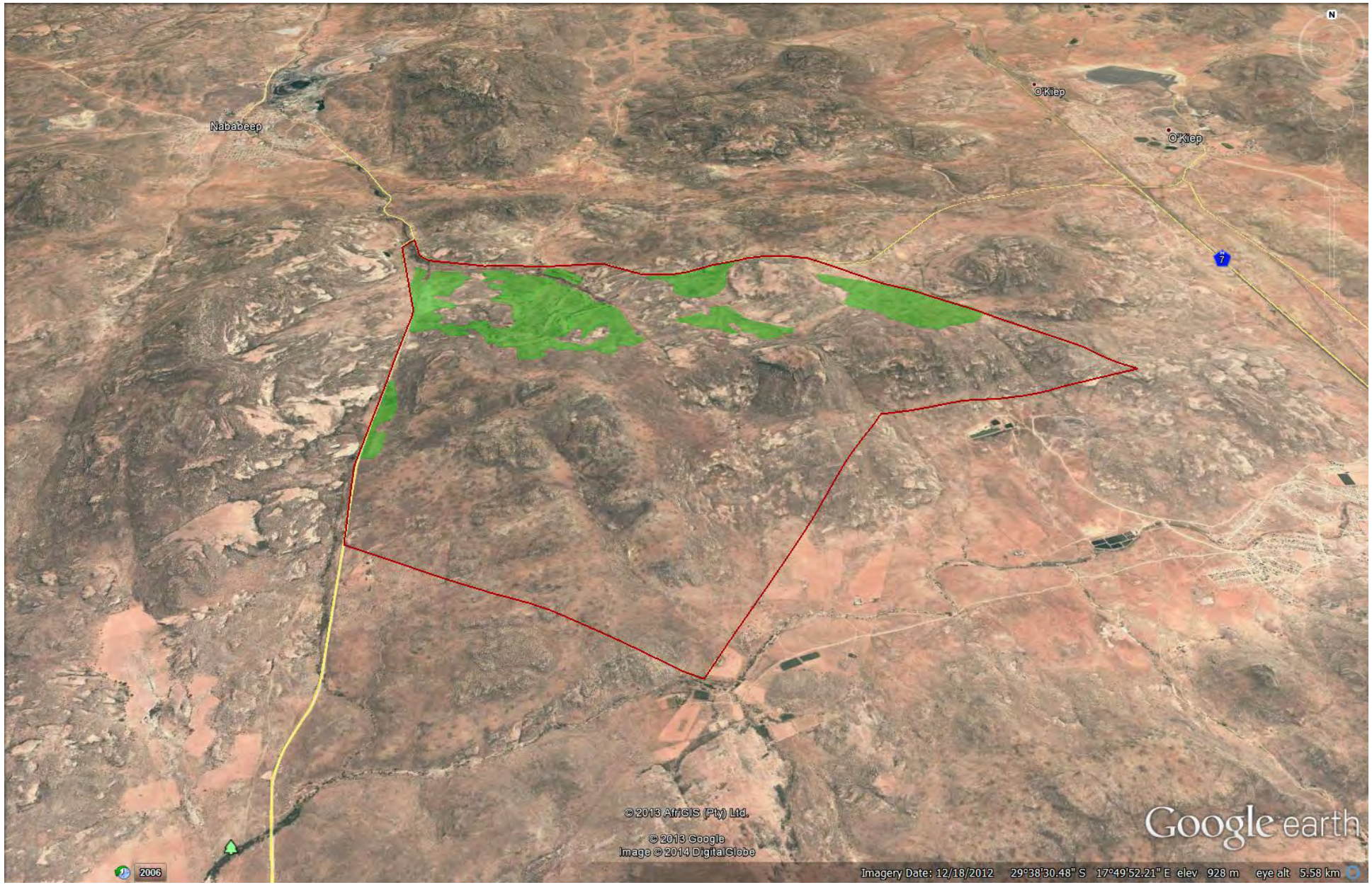
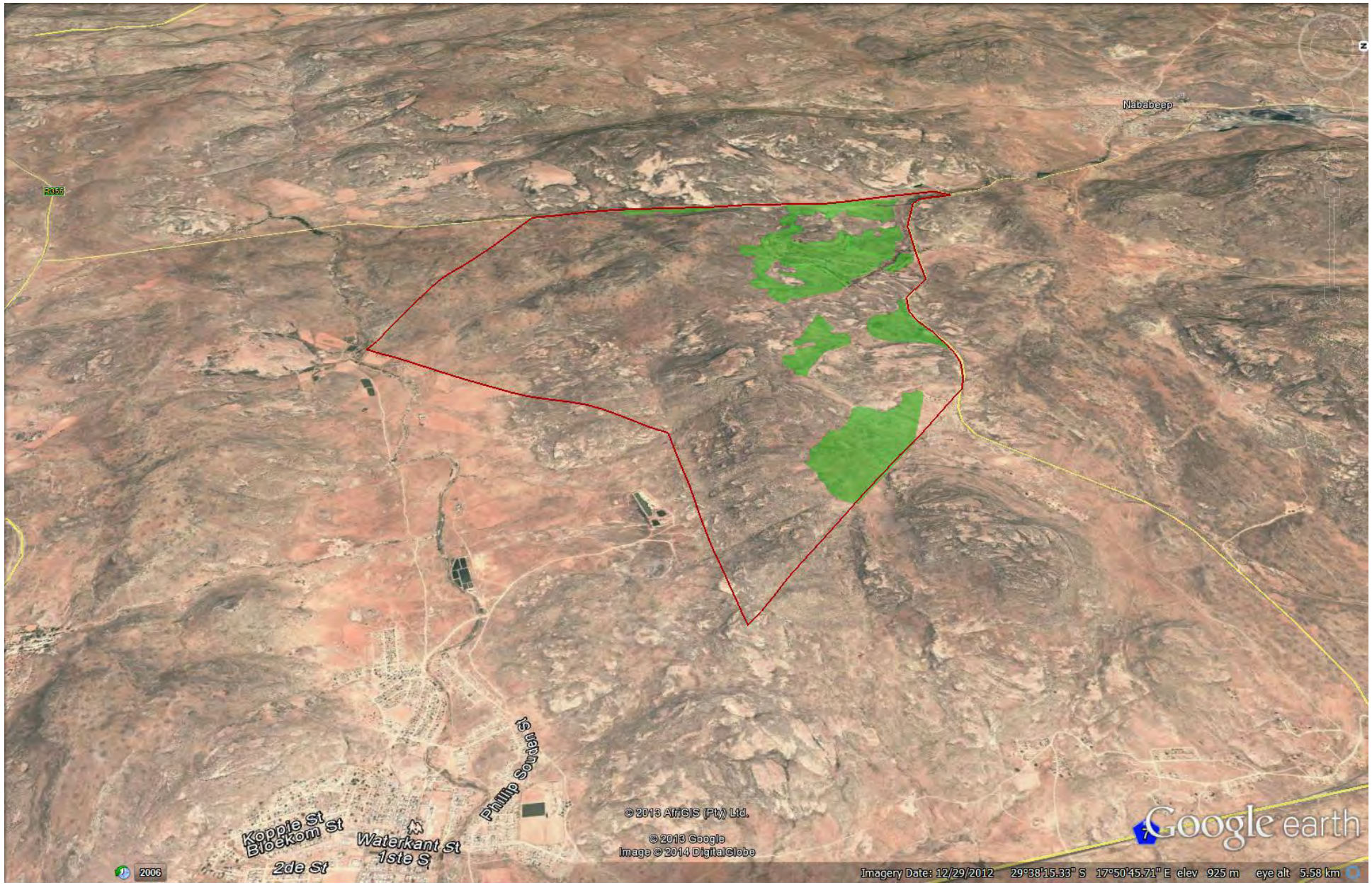
APPENDIX B – SITE PHOTOGRAPHS

APPENDIX B - Photographs - Klipdam Farm 134/17

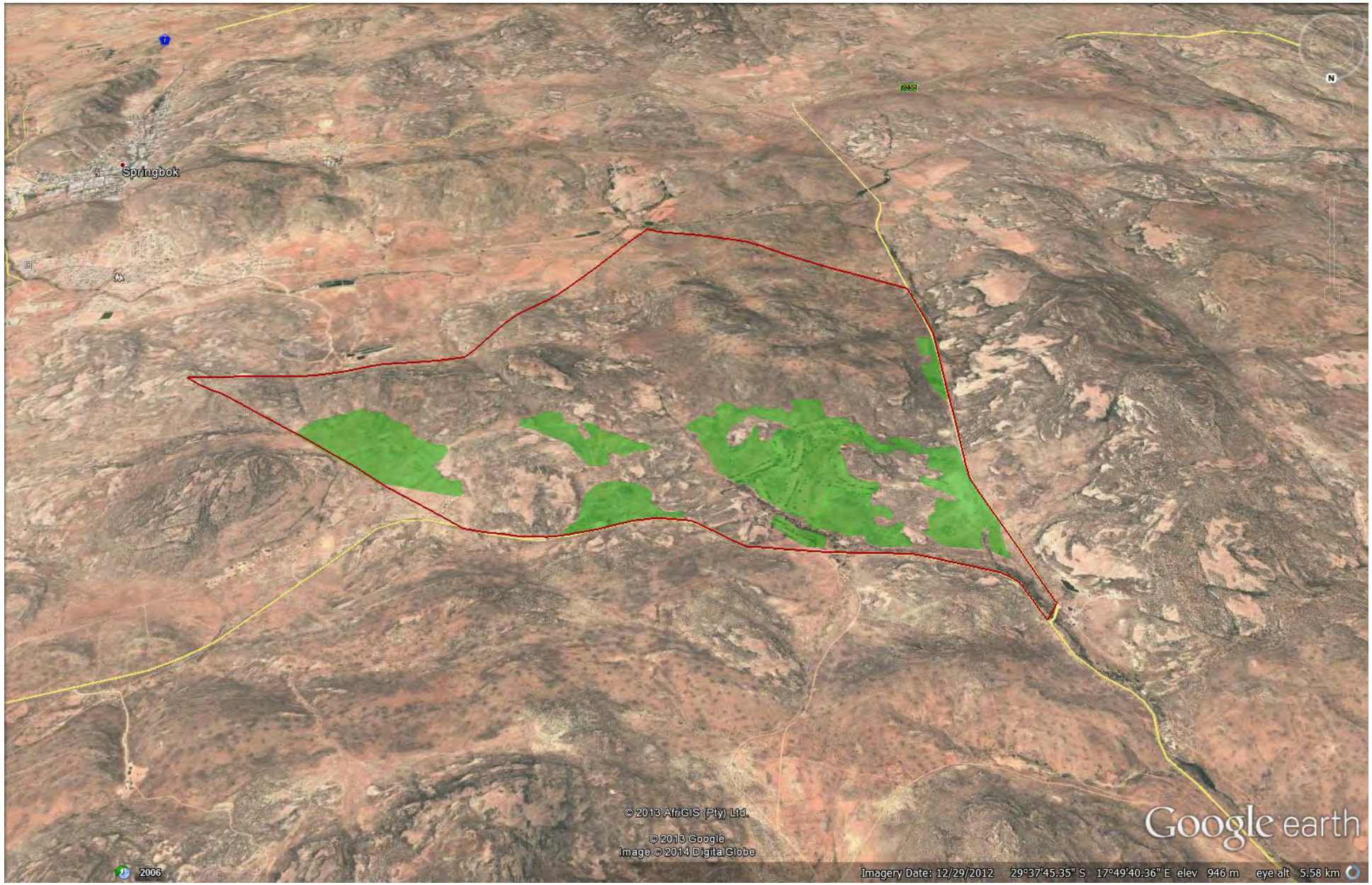




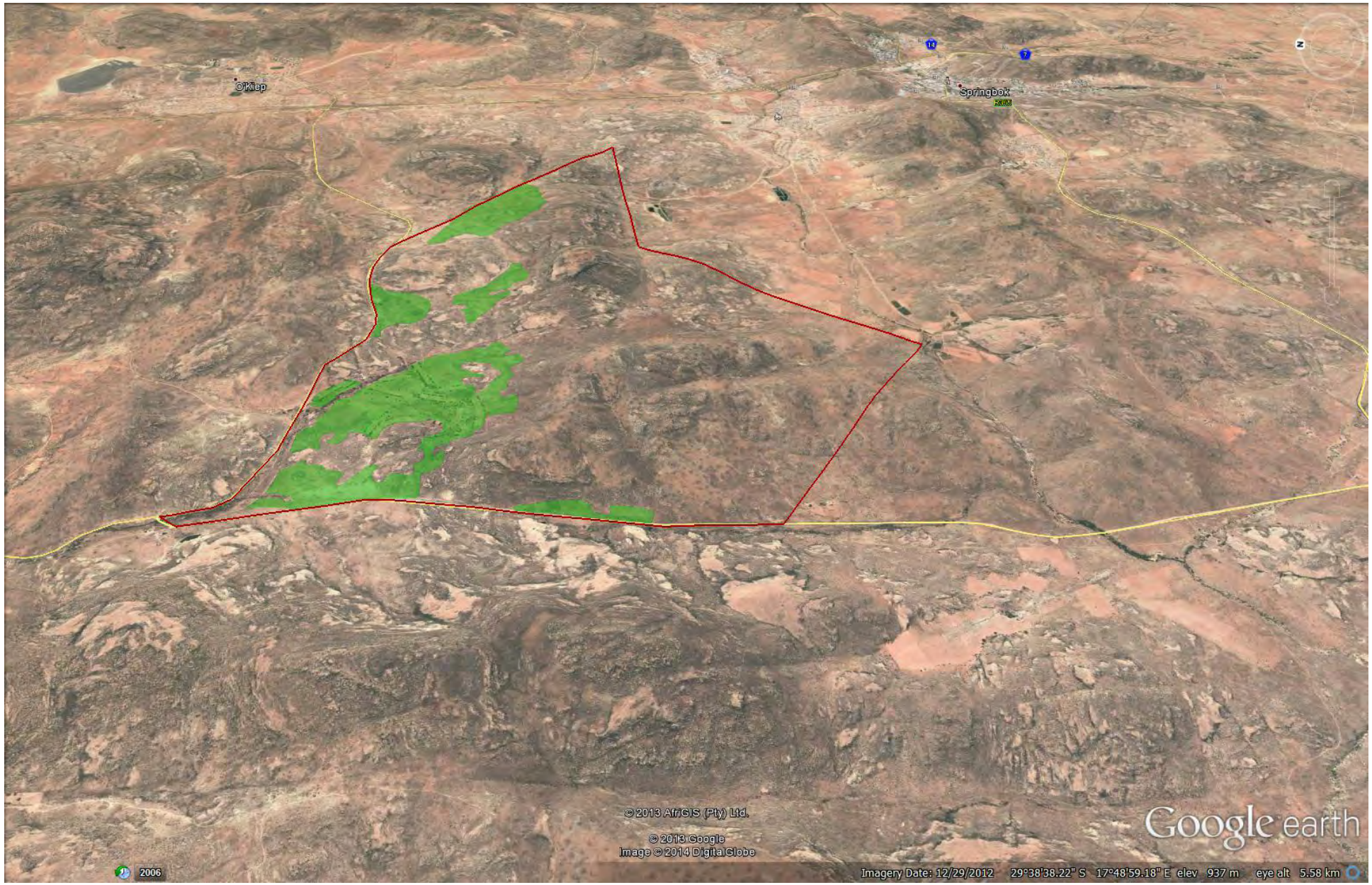
Klipdam view Northwards from elevation.



Klipdam view Eastwards from elevation.



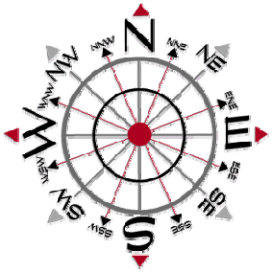
Klipdam view Southwards from elevation.



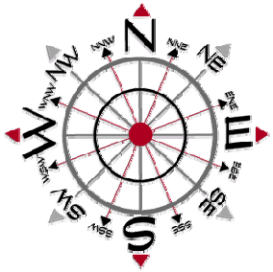
Klipdam view Westwards from elevation.

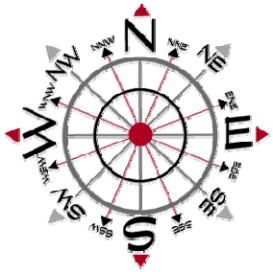
Area 1 : Photo Site 1 (A1P1)

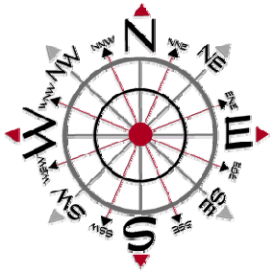
Area 1 : Photo Site 2 (A1P2)



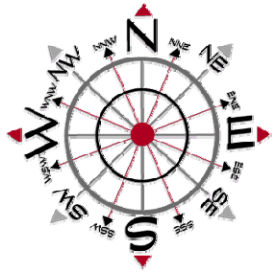
Area 1 – Photo Site 3 (A1P3)



	Area 1- Photo Site 4 (A1P4) 	
		

	Area 2- Photo Site 1 (A2P1) 	
		

Area 3 – Photo Site 1 (A3P1)



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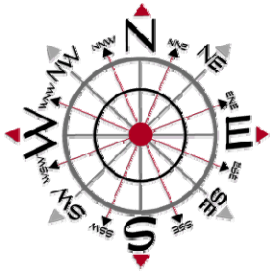
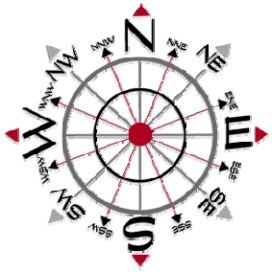
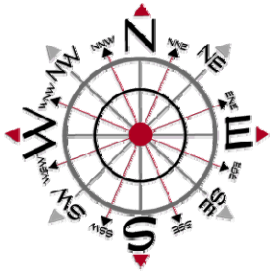


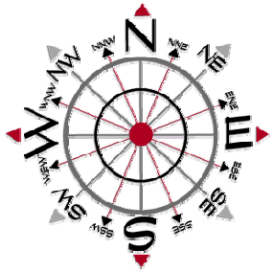
Area 3 – Photo Site 3 (A3P13)



Area 3 – Photo Site 4 (A3P4)

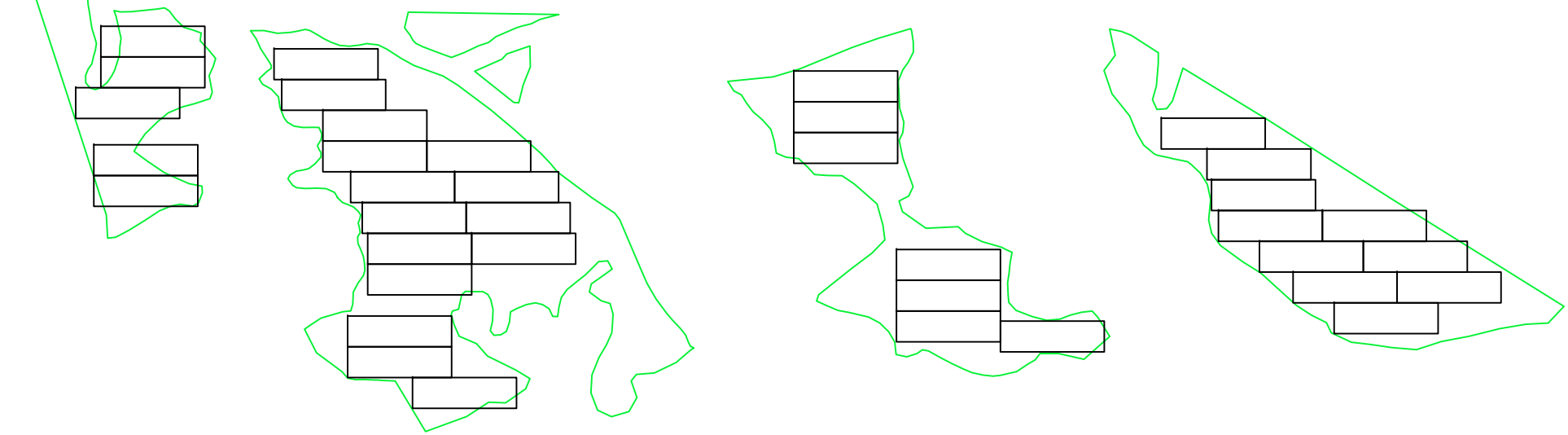


Area 5 – Photo Site 1 (A4P1)



APPENDIX C – FACILITY ILLUSTRATION

37 SOLAR FIELDS 279.720 MODULES 82.517.400 Wp WITH MODULES OF 295 Wp



SOLAR FIELD WITH FIXED STRUCTURES
7560 MODULES OF 72 CELLS

2.230.200 Wp WITH MODULES OF 295 Wp

REVISION	REV.DATE	DESIGN	CHECK	DRAW	OBSERVATION
A	-	A.V.F.	-	A.V.F	Review for technical bid

CUSTOMER:

PROJECT: KLIPDAM

TITTLE: SOLAR FIELD DESIGN CRITERIA II

elecnor

CODE: HN-01-004 | SCALE: -

PAGE: 1 OF: | FORMAT: A2

A2

APPENDIX D – SPECILAIST REPORTS

NICK HELME BOTANICAL SURVEYS
PO Box 22652 Scarborough 7975
Ph: 021 780 1420 cell: 082 82 38350 email: botaneek@iafrica.com
Pri.Sci.Nat # 400045/08

SCOPING REPORT FOR PROPOSED PHOTOVOLTAIC SOLAR ENERGY FACILITY, KLIPDAM 134/17, SPRINGBOK, NORTHERN CAPE: VEGETATION AND FAUNA.

Compiled for: Footprint Environmental Services, Paarl

Client: NK Energie (Pty) Ltd, Cape Town

12 August 2013

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

	(For official use only)
File Reference Number:	DEA Ref 14/12/16/3/3/2/561 DEA Ref 14/12/16/3/3/2/562
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

Proposed Phase 1 – Construction of a 75MW Solar PV on farm 134/17, Klipdam, Springbok within the Nama Khoi Municipality in the Northern Cape Province (DEA Ref 14/12/16/3/3/2/561) and Phase 2 – the construction of a 75MW Solar PV on farm 134/17, Klipdam, Springbok within the Nama Khoi Municipality in the Northern Cape Province (DEA Ref 14/12/16/3/3/2/562)

Specialist:	Nick Helme		
Contact person:	Nick Helme		
Postal address:	PO Box 22652 Scarborough		
Postal code:	7975	Cell:	0828238350
Telephone:	021 7801420	Fax:	-
E-mail:	botaneek@iafrica.com		
Professional affiliation(s) (if any)	SACNASP		

Project Consultant:	Cederberg Conservation Services CC t/a FOOTPRINT Environmental Services		
Contact person:	Sean Ranger		
Postal address:	PO Box 454, Porterville		
Postal code:	6810	Cell:	0832948776
Telephone:	0832948776	Fax:	0866558060
E-mail:	Sean.ranger1@gmail.com		

4.2 The specialist appointed in terms of the Regulations_

I, Nick Helme, declare that

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:

Nick Helme Botanical Surveys

Name of company (if applicable):

12 Aug 2013

Date:

Abridged CV:

Contact details as per letterhead.

Surname : HELME

First names : NICHOLAS ALEXANDER

Date of birth : 29 January 1969

University of Cape Town, South Africa. BSc (Honours) – Botany (Ecology & Systematics). 1990.

SACNASP Registration No: 400045/08 (Pri.Sci.Nat)

BEE Level Four Contributor BE # 1915.

Since 1997 I have been based in Cape Town, and have been working as a specialist botanical consultant, specialising in the diverse flora of the south-western Cape. Since the end of 2001 I have been working on my own and trade as Nick Helme Botanical Surveys, and have undertaken at least 900 site assessments during this period.

A selection of relevant work undertaken over the last few years is as follows:

- Baseline study of proposed Namakwa Sands expansion area (SRK Consulting 2013)
- Baseline study of proposed Roode Heuvel mining area, west of Garies (CES 2013)
- Scoping study of proposed Karookop Wind Energy Facility near Vredendal (CSIR 2012)
- Botanical assessment for six proposed limestone and gypsum prospecting areas in the Knersvlakte (Vapopart & Tulsanite Pty Ltd 2012)
- Scoping study of proposed Photovoltaic Solar Energy Facility near Graafwater (Savannah Environmental 2012)
- Scoping study of proposed Olifants River Wind Energy Facility near Lutzville (Savannah Environmental 2011)
- Basic Assessment of three proposed sites for a new landfill for Matzikamma Municipality (Anel Blignaut Environmental Consultants 2010)
- Botanical assessment of proposed wind energy facility in the Knersvlakte near Juno substation, Vredendal (DJ Environmental 2010)
- Botanical scoping study of proposed Nama East and Nama West wind energy facilities near Springbok (DJ Environmental 2010)
- Botanical scoping and impact assessment of proposed wind energy facility on the Toringberg, west of Bitterfontein (DJ Environmental 2010)
- Botanical assessment for five proposed limestone prospecting areas in the Knersvlakte (Stellenryck Environmental Solutions 2010)
- Botanical assessment of a proposed development site near Graafwater (Footprint Consultants 2009)
- Botanical assessment of a proposed agricultural development near Rocher Pan (Footprint Consultants 2009)
- Botanical baseline and impact assessment of proposed St Helena Hills SDI area (DJ Environmental Consultants 2008, 2009)
- Botanical scoping and impact assessment for proposed Eskom Wind Energy Facility near Vredendal (Savannah Environmental 2007)

- Botanical assessment of Vredelus farm, Redelinghuys (Cederberg Environmental Assessment Practise 2007)
- Fine Scale vegetation mapping project in NW Sandveld (CapeNature 2007)
- Scoping and Impact Assessment for proposed new Eskom powerline from Alexander Bay to Vredendal (SEFSA 2006)
- Assessment of proposed Bound for Gold mineral sands exploration program on the west coast south of Brand se Baai (Amathemba Environmental 2006)
- Botanical assessment of proposed granite and limestone quarries in the Namakwa District (SitePlan 2006)
- Impact Assessment of proposed Namakwa Sands expansion project, Brand se Baai (Golder 2005)

TABLE OF CONTENTS

1. INTRODUCTION

This botanical and faunal scoping study was commissioned in order to help inform the environmental authorisation process being followed for a proposed new 150MW solar photovoltaic (PV) energy facility in the Springbok region of the Northern Cape. The proposed facility would be on Portion 17 of the Farm Klipdam 134, which lies 2km southeast of the small town of Nababeep, and the overall property is 1378ha in extent. A new powerline would connect with the existing substation north of Springbok, and would be about 5.6km long. The study area and the existing powerline are shown in Figure 1.

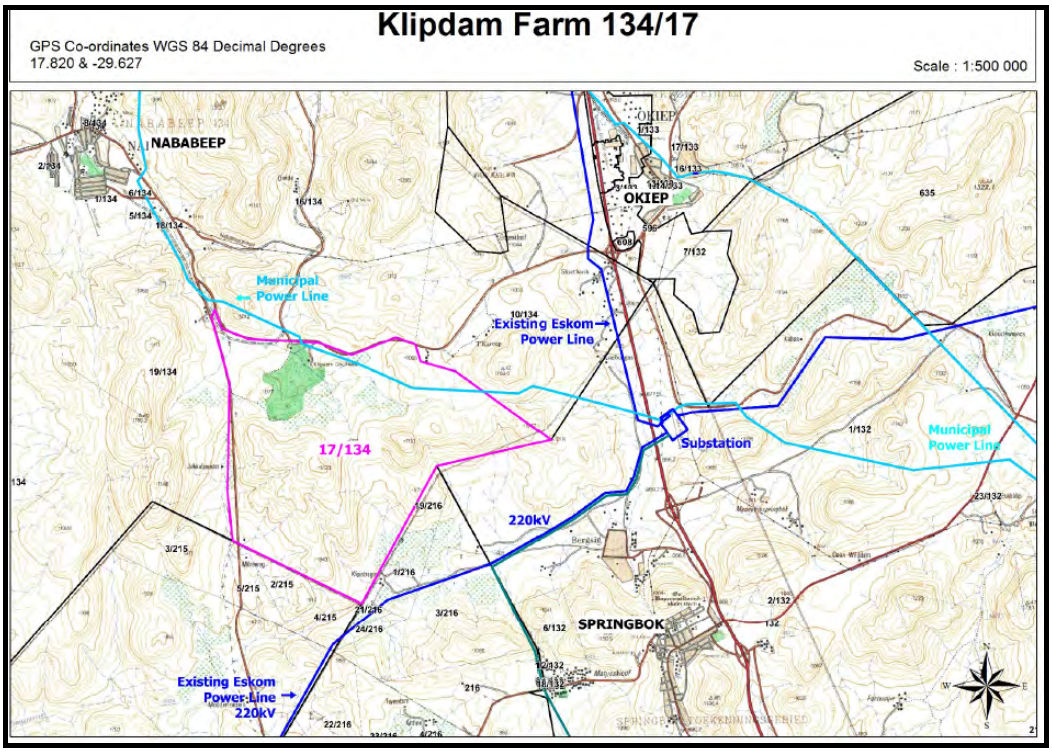


Figure 1: Map showing the location of the Klipdam study area (pink outline; map courtesy of Footprint Environmental). The existing municipal powerline is shown in light blue.

2. TERMS OF REFERENCE

The Scoping Phase Report terms of reference were as follows:

1. Description of the Locality
2. Description of the environment for contextualisation.
    a. Climate and rainfall information
    b. Topography and drainage on the proposed sites
    c. Existing Landuse and Infrastructure
    d. Access to the site
    e. Baseline vegetation assessment / overview

f. Baseline vertebrate and invertebrate assessment / overview

g. Baseline aquatic ecosystem / sensitive aquatic habitat assessment / overview.

h. Invasive alien species.

3. Methods used

a. To undertake the Screening Survey

b. To undertake the Scoping survey for plants, vertebrates, invertebrates and alien invasive species.

c. For scoping in terms of the Red Data Classes.

d. To undertake the vegetation, vertebrate, invertebrate, aquatic ecosystem/habitat survey for the EIA phase

e. To undertake the sensitivity analysis in terms of ecological pattern and process.

f. For the assessment of Impacts in the EIA phase.

4. Results

a. Vegetation Survey result

b. Vertebrate / invertebrate survey result

c. Aquatic ecosystem / sensitive aquatic habitat survey

d. Assessment of potential impacts

e. Limitations of the study and the significance of those limitations.

5. Discussion and conclusions

- The report should provide sufficient information to provide a robust contextualisation of the site.
- The report should provide a clear indication of the status of the ecosystem (pattern & process) and a spatial understanding of its ecological sensitivity.
- The report should provide a clear understanding of the status of special habitats and rare or endangered species on site.
- A clear and concise understanding of the potential impacts associated with the proposed development.
- A clear and concise description of the methodology and scope of work to be undertaken in the EIA phase of the study.
- A clear and concise description of the assumptions and limitations associated with the study and their risk significance.

3. LIMITATIONS, ASSUMPTIONS AND METHODOLOGY

A site visit was undertaken on 6 July 2013, and the site was accessed via the old golf course entrance, which is adjacent to the only occupied farmhouse on site. Only the most likely areas for development (the flatter areas on deeper soils) were studied in any detail (about 20% of the total study area), as the bulk of the greater study areas is clearly not suitable for a PV development, on account of the steep and rocky terrain. The main focus area was walked and driven, and notes were made of the vegetation and fauna encountered, and various digital photographs were taken. The author has extensive experience in the region, and this, in combination with the available Google Earth imagery (the most recent being December 2012, which is of a high resolution and is easily interpreted) and a habitat based approach, means that the author has a high degree of confidence in the accuracy of the findings in this report.

Conservation value and sensitivity (terms which are often used interchangeably in ecological assessments) of habitats are a product of species diversity, plant community composition, rarity of habitat, degree of habitat degradation, rarity of species, ecological viability and connectivity, vulnerability to impacts, and reversibility of threats (which in this case generally refers to the rehabilitation potential of the habitat; high sensitivity habitats having low rehabilitation potential). The ecological sensitivity analysis methodology is outlined in Section 7. For purposes of this report the terrestrial faunal sensitivity is assumed to depend on the botanical sensitivity, unless otherwise noted, on the generally acknowledged basis that intact natural habitat is the key requirement of any threatened or localised fauna. Lists of possible mammal, reptile, amphibian and bird species are included in the Appendices. References are as noted in the text. No specific faunal surveys were undertaken, and incidental observations of faunal were made only whilst surveying the site and its vegetation. The faunal study is thus largely a desktop study (with references as noted in the text), as no faunal samples were made.

4. STUDY AREA AND REGIONAL CONTEXT

The study area is located within what is now recognised as the Extra Cape Subregion (ECR) of the Greater Cape Floristic Region (GCFR; Snijman 2013), and is part of the Succulent Karoo biome. The GCFR is essentially defined by its predominantly winter rainfall, and a distinct flora. The GCFR is one of only six Floristic Regions in the world, and it is also by far the smallest floristic region. The Extra Cape Subregion occupies only 0.1% of the world's land surface, and

supports about 3720 plant species, almost 20% of all the plant species in southern Africa, and some 8% of the plant species in sub-Saharan Africa. About 40% of all the species in the Extra Cape Subregion do not occur outside this region (Snijman 2013), and many have very small home ranges (these are known as narrow endemics). Although land use pressures are relatively low in the region (apart perhaps from overgrazing and mining), and there are consequently far fewer threatened plants in the region than in the Core Cape Region (commonly referred to as the Fynbos), many of the range restricted species are vulnerable to intense local development due to their very small ranges and specific habitat requirements.

The study area is part of what has been called the Namaqualand Hardeveld bioregion (Mucina & Rutherford 2006; Snijman 2013). This bioregion has a fairly distinct flora, and a particularly high number of locally and regionally endemic plant species, as well as plant Species of Conservation Concern (Snijman 2013, Raimondo *et al* 2009). The region is also known to support a high diversity of reptiles (Bates *et al* - in press) and scorpions (Prendini 2005).

The study area is within the planning domain of the Namakwa District Biodiversity Sector Plan (Desmet & Marsh 2008), which has identified and mapped Critical Biodiversity Areas (CBAs) throughout the region. Critical Biodiversity Areas are regarded as essential areas for the achievement of regional conservation targets, and are designed to ensure minimum land take for maximum result. The relevant map is shown in Figure 2, and it can be seen that about 50% of the total site is a designated terrestrial CBA, mostly in the central and southern areas. These CBAs were selected primarily for habitat heterogeneity and the importance of steep south facing slopes as potential climate refugia (Desmet & Marsh 2008).

The Springbok area has an average annual rainfall of about 150mm, most of which falls in winter, although there are occasional summer thunderstorms (Mucina & Rutherford 2006). The wettest months are June, July and August. Evaporation rates are high, especially in summer, when daily temperature maxima are regularly over 30^{0}C. Daily winter maxima are usually in the range of 10 to 20^{o}C, although this can drop to less than 10^{o}C in the days during or following the passage of a cold front. Winter minima are regularly below 10^{o}C, although frosts are fairly rare (8 to 30 days per year).

The single seasonal stream in the northern part of the site is in fair to good condition, although it has been dammed at one point, and the stream is a designated aquatic CBA (Figure 2).

There are currently very low stocking rates on site and grazing impact is thus low. There are low numbers of introduced gemsbok and springbok in the area.

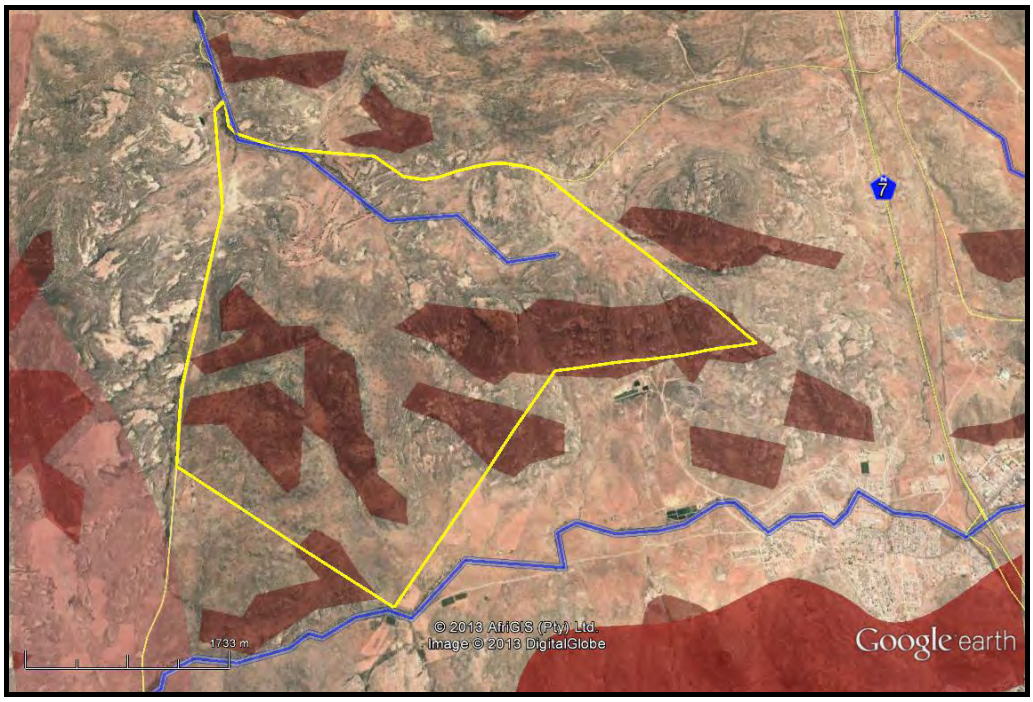


Figure 2: Extract of the Namakwa District Biodiversity Sector Plan (Desmet & Marsh 2008), showing the greater study area (yellow outline), in relation to the mapped terrestrial Critical Biodiversity Areas (brown shading) and mapped wetlands of importance (blue).

5. OVERVIEW OF THE VEGETATION

The SA Vegetation Map (Mucina & Rutherford 2006) indicates that a single vegetation type occurs throughout the study area – Namaqualand Klipkoppe Shrubland (and hence no vegetation type map is provided for the site). This vegetation type is regarded as Least Threatened on a national basis, with some 95% of its original total extent still remaining, and about 6% protected (Rouget *et al* 2004; DEA 2011). The vegetation type is widespread in the Bitterfontein to Springbok region, and is characterised by rocky granite (or gneiss) hills, separated by sandy slopes and valleys.

Three distinct habitats or plant communities occur within the study area (see Figure 3) - deeper sandy soils on the flats; shallow rocky soils, mostly on the

hills; and the seasonal drainage lines in the valley bottoms. The vegetation on the sandy flats could in fact be better classified as Namaqualand Blomveld (Least Threatened; DEA 2011), but this interpretation has no real implications.

Sandy Flats

About 60ha in the northern part of the entire study area, within this habitat, has been heavily disturbed by the creation of a golf course (defunct as of about 8 years ago), which at one stage had irrigated greens and even fairways. The golf course area was levelled, although partly natural areas remain in the "rough" between the fairways. Alien *Eucalyptus* trees (blue gums) were planted along the fairways, and most of these large trees are still standing (Plate 1). There is a low diversity of indigenous plant species present in the golf course area, mostly in the form of resilient annuals and herbs, but the overall species diversity is now less than 25% of what it would have been prior to disturbance, and overall open space is as high as 70%. The ecological conservation value of these areas is Low at a site and regional scale. The dominant indigenous plant species in this area are widespread and resilient weedy species such as *Galenia africana* (kraalbos), *Dorotheanthus bellidiformis* (bokbaaivygie), *Helichrysum herniarioides, Heliophila variabilis, Chrysocoma ciliata* (bitterbos), *Adenogramma glomerata, Conicosia pugioniformis* (vetkousie), *Hermannia althaeoides* and *Ursinia cakilefolia*.

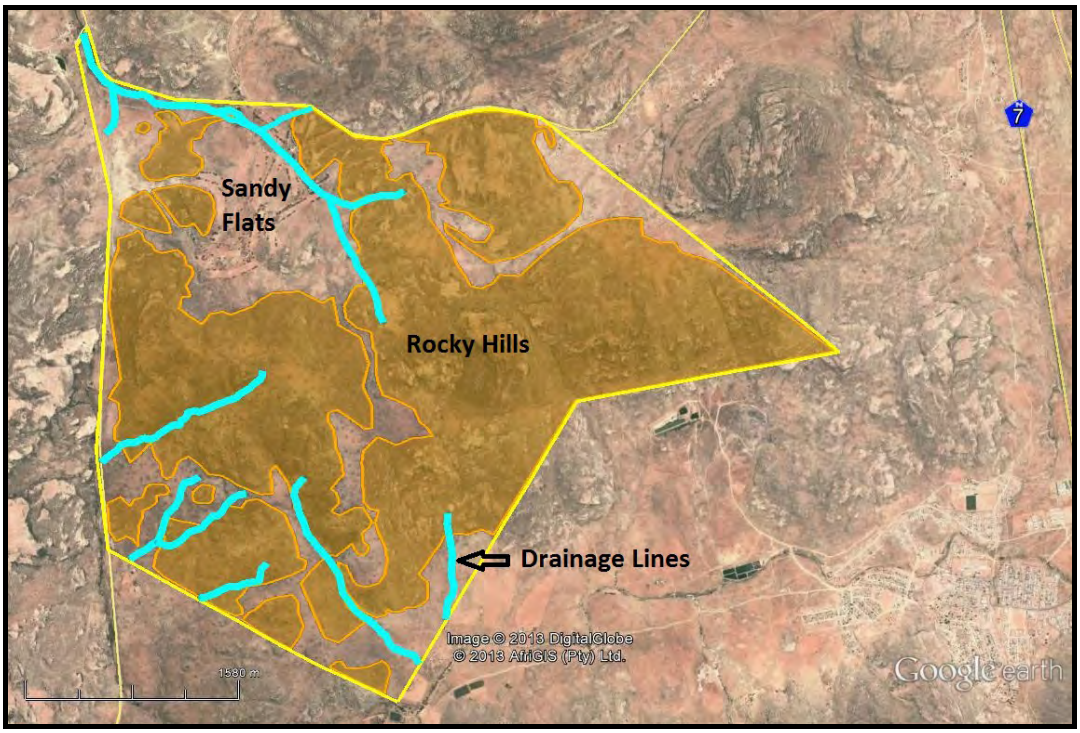


Figure 3: Image of the study area showing the three main habitats.

In the sandy flats that were not part of the golfcourse development, but which were cultivated greater than 20 years ago (green hatched areas in Figure 1), plant species diversity and plant cover is significantly higher than in the old golf course area (Plate 2), and the botanical and ecological conservation value (or sensitivity) is correspondingly higher, being Low to Medium at a site and regional scale. In these areas the following additional species were recorded: *Gymnodiscus linearis, Lotononis* sp*., Ehrharta calycina* (rooisaadgras), *Oxalis flava, Leysera gnaphalodes, Pteronia incana* (asbos), *Zygophyllum retrofractum, Ruschia robusta*, *Drosanthemum* sp*., Zaluzianskya* sp., *Cyanella hyacinthoides, Senecio* sp., *Babiana curviscapa*, *Didelta spinosa* (perdebos), *Calobota sericea* (fluitjiesbos), *Othonna floribunda*, *Ornithogalum* sp., *Eriocephalus pedicellaris, Monsonia spinosa* (boesmankers), *Othonna undulosa, Othonna* sp*., Zygophyllum morgsana, Lycium cinereum, Pteronia ciliata* (biltongbos) and *Tripteris sinuata*.

In undisturbed parts of the sandy flats habitat, and at the base of the rocky hills, species diversity and plant cover is at its highest (see Plate 3). Additional species include *Cheiridopsis robusta, C. cigarettifera, Ficinia laevis, Ruschia sp., Berkheya* sp., *Cephalophyllum rigidum, Hermannia trifurca, Arctotis* sp. nov*,. Searsia incisa* (taaibos), *S. burchellii, Thesium lineatum, Tylecodon wallichii* (krimpsiektebos), *Brunsvigia bosmaniae* (Maartlelie) and *Zygophyllum spinosum*.

Plate 1: View of the old golf course area, with large alien *Eucalyptus* trees planted next to the fairways (bare areas). This area is of low ecological sensitivity due to previous habitat modification. *Galenia africana* (kraalbos) is the common green shrub in the foreground.

No plant Species of Conservation Concern[1] (SCC) were recorded from within the sandy flats part of the study area, and but SCC that may occur in this habitat are *Colchicum cruciatum* (Vulnerable; Raimondo *et al* 2009), which is restricted to the Springbok to Steinkopf area, *Gladiolus salteri* (Rare; from Springbok towards Aggeneys), *Moraea indecora* (Vulnerable; Nababeep to Goegab), *Oxalis exserta* (Rare; Concordia to Kamiesberg) and *Lachenalia concordiana* (Rare), which is more widespread. None of these are however likely to occur from within the more disturbed parts of this habitat.

Invasive alien plant species are not a major feature of this habitat, and the primary one is *Atriplex lindleyi* ssp *inflata* (blasiebrak). This is a very widespread small perennial, and is likely to dominate in any areas with disturbed soil. The planted invasives alien blue gums (*Eucalyptus*) that are present are not actively spreading, and are unlikely to do so. They are however, likely to be incompatible with a solar PV energy facility.

Plate 2: View of sandy flats southwest of the old golf course, looking south towards the rocky hills. This area was apparently cultivated at least twenty years ago. The ecological conservation value of the sandy flats in this area is Medium. Note the significantly higher vegetation cover than in the old golf course area shown in Plate 1.

[1] The recent Red List of South African Plants (Raimondo *et al* 2009) has assessed all plant species in South Africa, and all indigenous species are now technically Red Listed or Red Data Book species, and thus it is preferable to use the term Species of Conservation Concern to refer to species that are listed as either Threatened or Rare.

Plate 3: View of undisturbed sandy flats habitat in the foreground, grading into typical rocky hills, with extensive exposed granite. This part of the area has a high species diversity and a High conservation value at a site scale.

Seasonal drainage lines

All the drainage lines on site are seasonal, and hold surface water only for short periods after heavy rains. The main seasonal drainage line in the northern part of the site is generally less than 10m wide, with the actual channel being only about a metre wide (see Plate 4), and has three minor tributaries (Figure 3). At a point close to the house the drainage line has been dammed, and the dam is surrounded by *Phragmites australis* (reeds), which is not well represented elsewhere along this drainage line, presumably because there is not adequate available groundwater.

There are five other drainage lines throughout the greater site, but some of these are poorly developed when compared with the one flowing past the old golf course. Indigenous species associated with the drainage lines include *Acacia karoo*, *Salix mucronata* (willow), *Codon royenii, Zygophyllum foetidum, Scirpoides dioecus, Tapinanthus oleifolius* (partial parasite in *Acacia karoo*) and various annuals. No plant Species of Conservation Concern were recorded from within this habitat, and none are expected to occur, except possibly *Colchicum cruciatum* (Vulnerable).

Arundo donax (Spaanseriet) is one of only two significant invasive alien plants in this habit, and it was observed only near the dam, and is not considered

problematic on site. *Atriplex lindleyi* ssp. *inflata* (blasiebrak) is also present in some of the drainage lines, but it is never really problematic on site.

Rocky Hills

This habitat occupies the bulk (about 80%) of the study area, and is characterised by extensive exposed bedrock granite (or gneiss), boulders of various sizes, and intervening sandy areas with prominent heuweltjies (old termite mounds of higher fertility). The habitat was not extensively or exhaustively surveyed, as it is clearly unsuitable for the proposed development, due to the steep slopes and rocky ground.

Plant species diversity in this unit is high, and prominent species include *Aloe dichotoma* (kokerboom), *Aloe microstigma* ssp. *microstigma*, *Dyerophytum africanum, Hermannia amoena, H. cuneifolia, Pelargonium carnosum, Diospyros ramulosa, Tetragonia fruticosa, Euryops dreganus* (vaalrapuis), *Pentzia incana* (ankerkaroo), *Senecio junceus*, *Searsia undulata, Ehrharta barbinodis, Polygala leptophylla, Didelta spinosa, Arctotis revoluta, Hirpicium alienatum, Adromischus* spp., *Crassula* spp., *Polymita albiflora, Othonna daucifolia, O. macrophylla* and *Zygophyllum retrofractum*. Cryptic, dwarf succulents on the rocky domes include *Conophytum pageae, C. bilobum*, *C. breve* and *C. roodii*.

There is a possibility that a number of plant Species of Conservation Concern could be present in this habitat, and these include *Moraea fenestralis* (Rare), *Othonna euphorbioides* (Threatened), *Romulea namaquensis* (Near Threatened), *Lachenalia verticillata* (Rare), *Moraea indecora* (Vulnerable) and *Eriospermum pusillum* (Rare).

No significant populations of invasive alien plant species were observed within this habitat on site.

Plate 4: View of the main seasonal drainage line on site, looking east. The prominent tree along the drainage line is *Acacia karoo* (doringboom).

5.1 Proposed Powerline route

There is an existing (132kV?) powerline that runs from Nababeep to the Springbok substation east of the site, and it is assumed that the new powerline would parallel this line, either within the existing servitude, or in a new servitude adjacent to this one.

Within the study area the route crosses a number of abandoned lands, sandy flats and rocky hills. From the eastern edge of the study area to the substation is about 3km. About 30% of this is across fairly degraded vegetation either side of the N7 highway, and the remainder crosses mostly rocky hills, including some fairly steep south facing slopes that have been mapped as a terrestrial CBA, and which is the only portion of the route that is deemed to be of High sensitivity. The remainder is of Low and Medium sensitivity.

There are existing tracks for at least 60% of the proposed route.

6. FAUNA

Mammals

A total of 53 terrestrial mammals and ten bat species occur or potentially occur within the study area (Appendix 1). The proximity of the site to both Springbok and Nababeep and human activity is however likely to deter a number of shy species or species vulnerable to disturbance from the area, notably the larger

species. The area is likely to experience some predation by feral and wandering dogs as well as poaching or harvesting by locals. The degraded nature of much of the sandy flats part of the area means that species able to tolerate relatively low plant cover are likely to predominate in these areas.

Species likely to be associated with the rocky parts of the site include the Namaqua Rock Mouse *Aethomys namaquensis* and Western Rock Elephant Shrew *Elephantulus rupestris*. The plains are likely to be dominated by ubiquitous, nocturnal small mammals such as Pygmy Mouse *Mus minutoides*, Cape Short-tailed Gerbil *Desmodillus auricularis* and Hairy-footed Gerbil *Gerbillurus paeba*. Middle-sized mammals which were observed on site include Cape Porcupine (quills, scat and diggings), Aardvark (diggings), Cape Hare, Springbok (introduced) and Yellow Mongoose, and Gemsbok was the only large mammal seen (introduced). Two Red Listed species are known to occur in the general area, namely Leopard *Panthera pardus* (Near Threatened) and Black-footed Cat *Felis nigripes* (Vulnerable). However, given the proximity of the site to Nababeep and Springbok it is not likely that either occurs at the site.

The majority of bat species which occur in the area require caves or rock crevices for roosting sites. Such roosting sites are likely to occur within the large granite outcrops surrounding the site, as well as the mine adits and buildings of the abandoned mines nearby. Within the site itself, there are no likely bat roosting sites, and the development would result only in the potential loss of some low value bat foraging habitat as well as a very small risk of collision with the new powerline.

Overall, the study area is not likely to be an important area for terrestrial mammals or bats, and it is not likely that the development of a small portion of the site would result in a significant impact on the viability of the local populations of any mammal species.

Reptiles

The site lies in or near the distribution range of at least 57 reptile species (Appendix 2; Animal Demography Unit website; http://vmus.adu.org.za). This is a comparatively high total indicating that the area has a rich reptile assemblage. Based on distribution maps and habitat requirements, the composition of the reptile fauna is likely to comprise 3 tortoises, 20 snakes, 21 lizards and skinks, 12 geckos and 1 chameleon. Species observed at the site include the Spotted Desert

Lizard *Meroles suborbitalis*, Variegated Skink *Mabuya variegata* and Western Rock Skink *Mabuya sulcata*.

The reptiles which may occur in the area includes quite a large number of range restricted species and Namaqualand endemics. This includes the Speckled Padloper *Homopus signatus*, Namaqua Thick-toed Gecko *Pachydactylus namaquensis*, Namaqua Leaf-toed Gecko *Goggia rupicola,* Namaqua Day Gecko *Phelsuma ocellata* and Peers Girdled Lizard *Cordylus peersi*. A large proportion of these restricted and specialized reptiles which occur in the area are associated with granitic outcrops which provide habitat in the form of abundant cracks, fissures and exfoliating rock sheets. The many rocky outcrops in the study area would provide suitable habitat for at least some of these species, making it likely that many of these species occur in the study area, but not within the suggested development footprint (the flat, sandy areas). The majority of species which are associated with sandy lowlands are relatively widespread species. Exceptions which may occur at the site include the Thin-tailed Legless Skink *Acontias gracilicauda namaquensis,* which is a localized endemic (but not threatened) and Cape Whip Snake *Psammophis leightonii* (Vulnerable). Two other threatened species may occur in the study area, but are unlikely in the potential development area – the Speckled Padloper *Homopus signatus* (Vulnerable; Bates *et al* - in press) and Fisk's House Snake *Lamprophis fiskii* (Vulnerable).

Apart from a relatively small direct loss of habitat, the shading of the soil by the solar panels is likely to affect reptile composition on account of changes in soil temperature (presumably lower, due to more shading). Most reptiles are also sensitive to the amount of plant cover, which is also likely to be affected by site clearing as well as shading by the arrays. The presence of the arrays and electrical infrastructure would however create additional habitat for species which may utilize such structures (such as tubercled geckos (*Chondrodactylus* spp.) and agamas (*Agama* spp)). Depending on the management of the vegetation beneath the panels reptile abundance in the development area could increase as a result of increased habitat diversity as well as the protective effect of the panels on reptiles from avian predators. This would only benefit a small proportion of the species present and is not viewed as a positive outcome of the development.

Amphibians

The study area lies within or near the range of seven amphibian species (Appendix 3; Animal Demography Unit website; http://vmus.adu.org.za), including several Namaqualand endemics with moderately restricted ranges,

including the Namaqua Stream Frog *Strongylopus springbokensis*, Namaqua Caco *Cacosternum namaquense* and Paradise Toad *Vandijkophrynus robinsoni*. None of the likely species are however Red Listed as Species of Conservation Concern (Measy *et al* 2011). Many of the drainage lines in the study area are too small to provide regular breeding habitat for most of the potential species, which require water for breeding purposes, but at least three of the species are very likely to occur within the existing dam near the farmhouse, and three others are likely within the greater study area.

Given the lack of suitable habitat and the degraded nature of the proposed development area it is not likely that the actual site supports many amphibians.

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. Provided that suitable precautions are taken during the construction phase to reduce impacts such as pollution, then it is highly unlikely that the development would have a significant impact on amphibians.

Scorpions

The Springbok area is part of an identified centre of scorpion diversity (Prendini 2005), which extends north into the Richtersveld. Scorpions may be present both in rocky areas and sandy areas, and may thus be present in significant numbers in all parts of the study area. As they are mostly burrowing, nocturnal creatures no observations were made, and they are also presumably most diverse in the areas that have not been previously disturbed, paralleling the plant diversity patterns. It is possible that a number of threatened or localised species occur within the study area, but further work would be needed to determine this.

Butterflies

No threatened butterfly species are known to occur in the area (Mecenero *et al* 2013), although this does not mean that none are present.

Avifauna

According the SABAP checklist (Animal Demography Unit website http://vmus.adu.org.za), 130 bird species are known from the area, including five Red Listed species (Table 1). The Red Listed species are all wide-ranging species with a broad distribution across the semi-arid parts of South Africa, and are not

specifically concentrated within the study area. The site also does not fall within an area listed as an Important Bird Area (BirdLife South Africa: www.birdlife.org.za). Overall the study area is not likely to have an exceptional or remarkable avifauna.

The proposed powerline to link the development to the substation would pose a small risk to certain birds. Although powerlines pose a significant collision risk to many medium and larger bird species, the length of the line would be fairly short (<6km), it would also not traverse areas which are likely to experience a large amount of activity from potentially affected species, and there is an existing powerline in the area. The potential avifaunal impact of the powerline is thus likely to be low, and loss of habitat very minor, and of no real consequence for any Red Listed bird species.

Table 1. Red Listed bird species known to occur within the vicinity of the proposed Klipdam PV facility (according to SABAP 1 and 2 databases), and their risk of collision with or electrocution from power line infrastructure.

Species	Common Name	Status	Collision	Electrocution
Falco biarmicus	Lanner Falcon	NT	High	Moderate
Ciconia nigra	Black Stork	NT	High	Moderate
Circus maurus	Black Harrier	NT	Moderate	Low
Neotis ludwigii	Ludwig's Bustard	VU	High	Low
Polemaetus bellicosus	Martial Eagle	VU	Moderate	High

7. ECOLOGICAL SENSITIVITY AND CONSTRAINTS ANALYSIS

Figure 4 is a visual summary of combined, overall ecological sensitivity of the study area, and Figure 5 is a closeup of the northern part of the site which has the most Low sensitivity area, and is thus the most suitable for the proposed development.

Low sensitivity areas are usually areas: that have been heavily disturbed (soil disturbance); that have a low botanical diversity and plant cover; that are unlikely to support significant populations of plant or animal Species of Conservation Concern; that are not within designated Critical Biodiversity Areas; that do not provide key ecological linkages. Low sensitivity areas are the most appropriate areas for development and present no significant constraints to the proposed development. The largest patch of Low sensitivity habitat is 52ha in extent, and the second largest is 18ha in extent.

Medium sensitivity areas are usually areas: that are partly disturbed (may have been previously cultivated or heavily grazed); that have a moderate level of botanical diversity and plant cover; that are unlikely to support significant populations of plant or animal Species of Conservation Concern; that are not within designated Critical Biodiversity Areas, but may provide a fair degree of ecological connectivity. Medium sensitivity areas could be considered for development and present no significant constraints to the proposed development, but should only be used if the development cannot all be accommodated within Low sensitivity areas.

High sensitivity areas are usually areas: with largely undisturbed soils (but may be subject to grazing); that have a high level of botanical diversity and plant cover (except where there is bare rock or very shallow soils); that are likely to support populations of plant or animal Species of Conservation Concern; that include all designated Critical Biodiversity Areas, and provide important ecological connectivity and habitat linkages. Most of the seasonal drainage lines are included within this category, as are most of the rocky outcrops.

High sensitivity areas are not appropriate areas for large scale development or habitat transformation, and development of a PV facility in these areas would potentially have High negative ecological impacts (both at the construction and operational phases). Crossing High sensitivity areas with the powerline is

unavoidable, but ecological impacts associated with this should be minimal, as very little habitat transformation is likely.

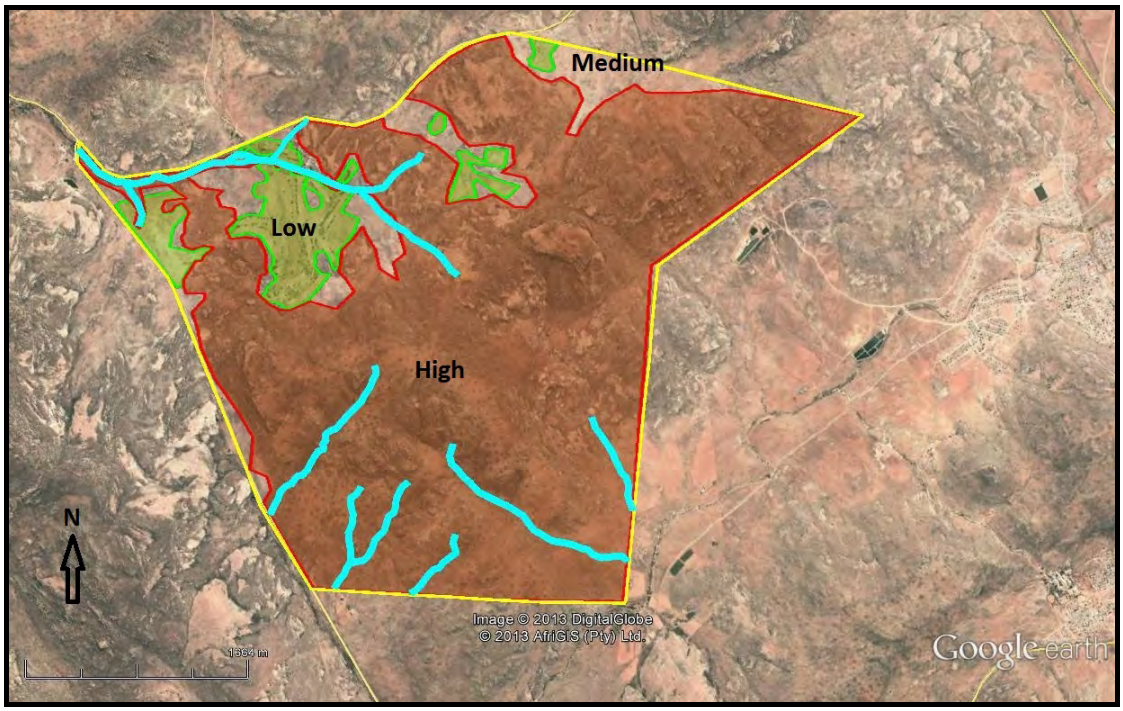


Figure 4: Map of the combined, overall ecological sensitivity of the study area. Unshaded areas are of Medium sensitivity.

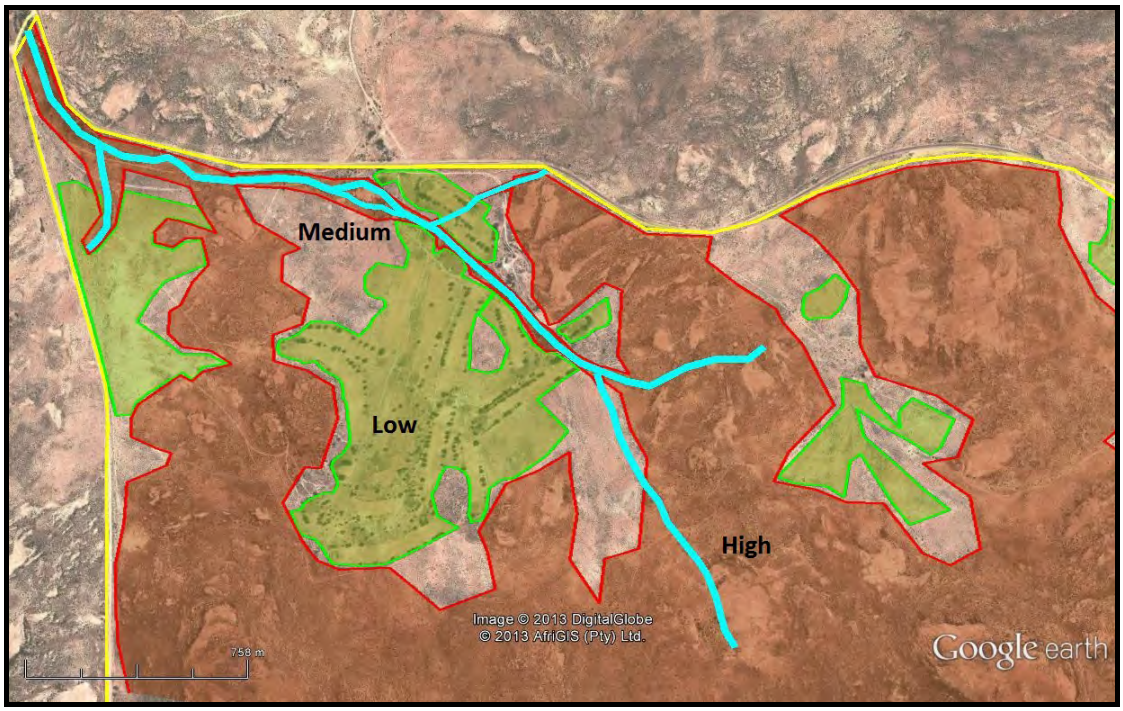


Figure 5: Closeup of the northern part of the site, showing the overall ecological sensitivity of this part of the study area. Unshaded areas are of Medium sensitivity.

8. ISSUES IDENTIFIED

In terms of the construction of the proposed photovoltaic panel infrastructure the following potentially negative ecological issues have been identified, although some are unlikely to be significant in the case of this project:

- Direct, permanent loss of Low, Medium or High Sensitivity vegetation and faunal habitat at the construction phase
- Direct, permanent impacts on fauna at the construction phase (loss of actual individuals)
- Temporary to long term direct loss and degradation of Medium and High Sensitivity vegetation and faunal habitat at the construction phase (laydown areas; work areas; access roads for powerline installation)
- Indirect ecological impacts at the operational phase (fragmentation of natural habitat and ecological corridors; reduction of subpopulations of rare/threatened fauna and flora species)
- Direct impacts at the operational phase (collision and electrocution threats to certain birds from the powerline).

No potentially positive ecological impacts associated with this project have been identified, although certain smaller animals may benefit from the additional cover created by the photovoltaic panels.

9. RECOMMENDATIONS

The following recommendations relate purely to the planning phase (prior to Impact Assessment phase). Construction and operational phase recommendations will be made only at the Impact Assessment phase, once the preferred development layout is known.

- The bulk of the photovoltaic panel facility should be placed within the areas mapped as being of Low ecological sensitivity (Figures 4 & 5). If necessary some of the adjacent Medium sensitivity areas may also be used without significant ecological impact.
- No photovoltaic panel or other permanent infrastructure (other than powerline pylons) should be located within the identified areas of High ecological sensitivity.
- All seasonal drainage lines should have a buffer of at least thirty metres, meaning no roads or permanent infrastructure within 30m of the outside edge of the drainage channels.

- The proposed powerline route to the Springbok substation should follow the existing powerline and use existing access tracks as far as possible, in order to minimise construction and operational phase ecological impacts.
- The existing alien invasive blue gums (*Eucalyptus* species) around the old golfcourse could be felled with no deleterious ecological impacts (other than loss of certain roosting areas for some birds), and some positive ecological impacts (these trees exude chemicals into the soil which prevent germination of most indigenous plant seeds).

9.1 Scope of Work for Impact Assessment (IA) Phase

No additional fieldwork will be required for the IA phase, as an adequate understanding of the ecological sensitivity of the site was obtained at the Scoping Phase.

Standard IA methodology should be used for rating impacts, and all potential impacts identified in the current Scoping study should be assessed, along with any others that may become apparent. Key construction phase impacts that should be assessed will be the actual PV array and associated cabling and roads, temporary laydown areas, potential fencing of the facility, and the powerline to the Springbok substation. Key operational phase impacts that should be assessed include indirect impacts of the PV facility and of the powerline. Recommendations for avoidance or mitigation of all identified impacts should be provided.

10. CONCLUSION

The study area presents a viable opportunity for the development of the proposed photovoltaic solar energy facility, provided that it is located primarily within the identified areas of Low ecological sensitivity. The largest such area is about 52ha in extent, centred on the old golfcourse.

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APPENDIX 1 - List of Mammals

A list of mammals which are known to occur and are likely to occur in the vicinity of the Klipdam PV 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	Probability
Golden Moles:				
Chrysochloris asiatica	Cape Golden Mole	LC	Coastal parts of the Northern and Western Cape	Low
Elephant Shrews:				
Macroscelides proboscideus	Round-eared Elephant Shrew	LC	Open country, with shrubs and sparse grass cover, also occurs on gravelly and sandy plains with sparse boulders	High
Elephantulus rupestris	Western Rock Elephant Shrew	LC	Rocky koppies or piles of boulders	High
Elephantulus edwardii	Cape Rock Elephant Shrew	LC	Usually in rocky areas	High
Aardvark:				
Orycteropus afer	**Aardvark**	LC	Widespread; often associated with sandy soil	Burrows observed
Hyrax:				
Procavia capensis	**Rock Hyrax**	LC	Rocky outcrops, esp. granite hills, and dolerite koppies in the Karoo	Observed
Hares and Rabbits:				
Pronolagus rupestris	**Smith's Red Rock Rabbit**	LC	Rocky hillsides	Observed
Lepus capensis	**Cape Hare**	LC	Dry, open regions, with palatable bush and grass	Observed
Lepus saxatilis	Scrub Hare	LC	Usually in more disturbed areas than Cape hare	High
Rodents:				
Bathyergus janetta	Namaqua Dune Mole Rat	LC	Sandy substrates along the coast or inland; regional endemic	Low
Cryptomys hottentotus	**African Mole Rat**	LC	Wide diversity of habitats	Observed
Hystrix africaeaustralis	**Cape Porcupine**	LC	Wide diversity of habitats	Observed
Petromus typicus	**Dassie Rat**	LC	Mountainous regions and inselbergs, where they are confined to rocky outcrops and live in crevices or piles of boulders	Observed
Xerus inauris	South African Ground Squirrel	LC	Open terrain with a sparse bush cover and a hard substrate	High
Graphiurus ocularis	Spectacled Dormouse	LC	Rocks and trees	High
Graphiurus platyops	Rock Dormouse	LC	Rocky terrain, under the exfoliation plates on granite, and in piles of boulders	High
Rhabdomys pumilio	**Four-striped Mouse**	LC	Occurs in wide variety of habitats where there is good cover	Observed
Mus minutoides	Pygmy Mouse	LC	Wide habitat tolerance	High
Aethomys namaquensis	**Namaqua Rock Mouse**	LC	Catholic in their habitat requirements, but prefer rocky koppies	Observed
Parotomys brantsii	**Brants's Whistling Rat**	LC	Dry, sandy substrates in arid parts of the Nama and Succulent Karoo. Selects areas of low plant cover and deep sands.	Observed

Parotomys littledalei	Littledale's Whistling Rat	LC	Riverine alluvium, with *Lycium* or *Psilocaulon*	Moderate
Otomys unisulcatus	**Bush Vlei Rat**	LC	Shrubby areas with rocky outcrops	Observed
Desmodillus auricularis	Cape Short-tailed Gerbil	LC	Usually on hard ground, unlike other gerbils, with some cover of grass or karroid bush	High
Gerbillurus paeba	Hairy-footed Gerbil	LC	Widespread; preferring sandy soil or alluvium with a grass, scrub or light woodland cover	High
Gerbilliscus leucogaster	Bushveld Gerbil	LC	Predominantly associated with light sandy soils or sandy alluvium	Low
Malacothrix typica	Gerbil Mouse	LC	Arid areas with short grass and hard substrate	High
Petromyscus collinus	Pygmy Rock Mouse	LC	Arid areas on rocky outcrops	High
Petromyscus barbouri	Barbour's Rock Mouse	LC	Rocky areas	High
Primates:				
Papio ursinus	Chacma Baboon	LC	Widespread, simply need water and access to refuges	High
Shrews:				
Suncus varilla	Lesser Dwarf Shrew	LC	Often associated with termitaria, little else known	High
Crocidura cyanea	Reddish-Grey Musk Shrew	LC	Arid areas, often in association with scrub and rocks.	High
Carnivores:				
Proteles cristata	Aardwolf	LC	Common in the 100-600mm rainfall range of country, widespread	Moderate
Caracal caracal	Caracal	LC	Widespread, variable	Moderate
Felis silvestris	African Wild Cat	LC	Wide habitat tolerance; often arid	High
Panthera pardus	Leopard	NT	Wide habitat tolerance, often associated with rocky koppies or woodland	Low
Felis nigripes	Black-footed cat	VU	Arid areas with some cover	Low
Genetta genetta	Small-spotted genet	LC	Widespread, often in woodland	High
Suricata suricatta	Meerkat	LC	Open arid country where substrate is hard and stony.	High
Cynictis penicillata	**Yellow Mongoose**	LC	Semi-arid country on a sandy substrate	Observed
Herpestes pulverulentus	Cape Grey Mongoose	LC	Wide habitat tolerance, usually with denser cover	High
Vulpes chama	Cape Fox	LC	Associated with open country with low cover	Moderate
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	Moderate
Ictonyx striatus	Striped Polecat	LC	Widely distributed throughout the sub-region	High

Mellivora capensis	Ratel/Honey Badger	LC	Catholic habitat requirements	Moderate
Antelope:				
Oryx gazella	**Gemsbok**	LC	Open arid country	Observed
Sylvicapra grimmia	Common Duiker	LC	Presence of bushes is essential	Low
Antidorcas marsupialis	**Springbok**	LC	Arid regions and open grassland.	Observed
Raphicerus campestris	**Steenbok**	LC	Inhabits open country,	Scat observed
Oreotragus oreotragus	Klipspringer	LC	Closely confined to rocky habitat.	Moderate
Bats:				
Rousettus aegyptiacus	Egyptian Rousette	LC	Require fruit and caves for roosting in the vicinity	Moderate
Pipistrellus capensis	Cape Serotine Bat	LC	Wide habitat tolerances, but often found near open water	High
Tadarida aegyptiaca	Egyptian Free-tailed Bat	LC	In arid areas, often associated with water sources	High
Nycteris thebaica	Egyptian Slit-faced Bat	LC	Wide habitat tolerance	High
Miniopterus natalensis	Schreibers' long-fingered bat	NT	Suitable caves are an essential habitat requirement	Moderate
Cistugo seabrae	Angolan hairy bat	LC	Areas with annual rainfall of less than 100 mm, often in dry riverbeds	High
Eptesicus hottentotus	Long-tailed serotine bat	LC	Wide habitat tolerance	Moderate
Rhinolophus capensis	Cape horseshoe bat	LC	Roosts in caves and mine adits	High
Rhinolophus clivosus	Geoffroy's horsehoe bat	LC	Wide habitat tolerance but roost in caves and adits	High
Rhinolophus darlingi	Darling's horseshoe bat	LC	Wide habitat tolerance but roost in caves and adits	Moderate
Sauromys petrophilus	Roberts's flat headed bat	LC	Widespread; roosts in rock crevices	Moderate

Appendix 2 - List of Reptiles

A list of reptiles which may occur in the proposed Klipdam PV facility study area. Habitat notes and distribution records are based on Alexander and Marais (2007), while conservation status is from Bates *et al* (in press).

Scientific Name	Common Name	Distribution	Status	Habitat	Probability
Tortoises and Terrapins:					
Homopus signatus	Speckled Padloper	Endemic	VU	Ridges and stony areas, often on plateaus and ridges	High
Chersina angulata	Angulate Tortoise	Endemic	LC	Sandy coastal regions, incl valley bushveld & coastal fynbos, scarcer in arid hinterland	High
Psammobates tentorius trimeni	Tent Tortoise	Endemic	LC	Varied: usually arid karroid areas or rocky sandveld	High
Snakes:					
Rhinotyphlops lalandei	Delalande's Beaked Blind Snake	Endemic	LC	Varied: semi-desert, coastal bush, fynbos & savannah	High
Rhinotyphlops schinzi	Schinz's Beaked Blind Snake	Endemic	LC	Semi-deseet and arid savanna	High
Lamprophis capensis	Brown House Snake	Widespread	LC	Common in highveld grassland & arid karroid regions, but found everywhere & tolerant of urban sprawl	High
Lamprophis guttatus	Spotted Rock Snake	Endemic	LC	Inland mnts of Cape & Cape fold mnts, extending into S.Namibia	Low
Lamprophis fiskii	Fisk's House Snake	Endemic	VU	Karroid sandy veld, but few specimens from widely scattered localities	Low
Pseudaspis cana	Mole Snake	Widespread	LC	Sandy scrubland in SW Cape, highveld grassland & mountainous & desert regions	High
Philothamnus semivariegatus	Spotted Bush Snake	Widespread	LC	River banks, shrubs or rocky regions in karoo scrub. Also savanna and lowland forest.	High
Prosymna frontalis	South-western Shovel-Snout	Widespread	LC	Rocky areas in arid regions	High
Dipsina multimaculata	Dwarf Beaked Snake	Endemic	LC	Rocky, sandy areas. Cape karroid areas.	High
Psammophylax rhombeatus	Spotted Or Rhombic Skaapsteker	Widespread	LC	Highland grassveld & fynbos, entering karroid areas	High
Psammophis notostictus	Karoo Sand or Whip Snake	Widespread	LC	Arid scrubland & karroid regions	High
Psammophis leightoni	Cape Whip Snake	Endemic	VU	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	LC	Rocky, arid regions	High
Aspidelaps lubricus	Coral Shield Cobra	Widespread	LC	Karroid & sandveld regions, entering dry valley plains in S and E Cape	High
Naja nivea	Cape Cobra	Endemic	LC	Arid karroid regions, particularly along river courses, entering well drained open areas along the southern coast	High
Naja nigricollis woodi	Black Spitting Cobra	Endemic	LC	Namibia to Citrusdal in karroid scrub	High
Hemachatus haemachatus	Rinkhals	Endemic	LC	Grassland from the coast up to 2500 m	High
Bitis arietans	Puff Adder	Widespread	LC	Absent only from desert & mnt tops	High

Bitis cornuta	Many-horned Adder	Endemic	LC	Mountainous regions, rocky outcrops, gravel plains and mountain fynbos	High
Bitis caudalis	Horned Adder	Widespread	LC	Sandy regions, throughout Karoo	High
Lizard and Skinks:					
Acontias gracilicauda namaquensis	Thin-tailed Legless Skink	Endemic	LC	Valley bushveld, grassland entering sandy regions	High
Acontias lineatus	Striped Legless Skink	Endemic	LC	Sandy, arid soils	High
Scelotes sexlineatus	Striped Dwarf Burrowing Skink	Endemic	LC	Succulent Veld	Low
Scelotes capensis	Western Dwarf Burrowing Skink	Endemic	LC	Leaf litter and friable sand	High
Mabuya capensis	Cape Skink	Widespread	LC	Very varied: arid karroid veld, moist coastal bush, montane grassland, etc	High
Mabuya occidentalis	Western Three-Striped Skink	Widespread	LC	Arid Savanna karroid veld and desert	High
Mabuya sulcata	Western Rock Skink	Widespread	LC	Karroid areas	Observed
Mabuya variegata	Variegated Skink	Widespread	LC	Extremely varied; desert, karroid veld, montane grassland, savanna, coastal bush & valley bushveld	Observed
Meroles suborbitalis	Spotted Desert Lizard	Endemic	LC	Varied, arid savanna to desert	Observed
Nucras tessellata tessellata	Striped Sandveld Lizard	Widespread	LC	Open arid savannah & karroid veld	High
Pedioplanis laticeps	Cape Sand Lizard	Endemic	LC	Coastal dunes and succulent karroid veld	High
Pedioplanis lineoocellata	Spotted Sand Lizard	Endemic	LC	Very varied: karroid veld, valley bushveld & arid & mesic savannah	High
Pedioplanis namaquensis	Namaqua Sand Lizard	Widespread	LC	Karroid veld	High
Pedioplanis inornata	Plain Sand Lizard	Endemic	LC	Bedrock flats in semi-desert	High
Cordylosaurus subtessellatus	Dwarf Plated Lizerd	Endemic	LC	Sandy areas among rocks	High
Gerrhosaurus typicus	Namaqua Plated Lizard	Endemic	LC	Karroid succulent veld	High
Cordylus peersi	Peers Girdled Lizard	Narrow Endemic	LC	Rocky outcrops in succulent karroid veld	High
Cordylus polyzonus	Karoo Girdled Lizard	Endemic	LC	Karroid regions	High
Cordylus cataphractus	Armadillo Girdled Lizard	Endemic	LC	Rock outcrops and mountain ranges	High
Agama atra	Southern Rock Agama	Endemic	LC	Semi-desert to fynbos, from sea level to mountain tops	High
Agama hispida	Southern Spiny Agama	Endemic	LC	Arid semi-desert, coastal dunes & salt pans	Low
Chameleons:					
Chamaeleo namaquensis	Namaqua Chameleon	Widespread	LC	Sandy regions (incl coastal dunes) with scrub vegetation	High
Geckos:					
Afroedura africana	African Flat Gecko	Endemic	LC	Rocky desert and succulent karroid veld	High
Chondrodactylus angulifer	Giant Ground Gecko	Endemic	LC	Gravel plains, interdune spaces & sandy flats	High
Chondrodactylus bibronii	Bibron's Tubercled Gecko	Endemic	LC	Rocky outcrops, cliffs and large trees	High
Pachydactylus labialis	Western Cape Thick-toed Gecko	Endemic	LC	Succulent karroid veld	High
Pachydactylus namaquensis	Namaqua Thick-toed Gecko	Narrow Endemic	LC	Karroid succulent veld	High
Pachydactylus mariquensis	Marico Thick-toed Gecko	Endemic	LC	Flat sandy plains with sparse vegetation	High
Pachydactylus weberi	Weber's Thick-toed Gecko	Endemic	LC	Succulent karroid veld	High

Phelsuma ocellata	Namaqua Day Gecko	Endemic	LC	Boulder strewn hillsides and rocky outcrops	Moderate
Pachydactylus rugosus	Rough Thick-toed Gecko	Endemic	LC	Semi-desert and succulent karroid veld	High
Ptenopus garrulus	Common Barking Gecko	Endemic	LC	Desert and semi-desert on various soil types, preferring flat stable sandy soils with sparse vegetation cover	High
Goggia rupicola	Namaqua Leaf-toed Gecko	Endemic	LC	Rocky areas in Namaqualand	High
Goggia lineata	Striped Leaf-Toed Gecko	Endemic	LC	Coastal fynbos, succulent & transitional karroid veld, montane grassland	High

Appendix 3 – List of Amphibians

A list of amphibians which may occur within the proposed Klipdam PV facility study area. Habitat notes and distribution records are based on Minter *et al* (2004), while conservation status is from Measy (2011).

Scientific Name	Common Name	Status	Habitat	Likelihood
Vandijkophrynus gariepensis	Karoo Toad	Least Threatened	Widespread and varied	High
Vandijkophrynus robinsoni	Paradise Toad	Least Threatened	Most waterbodies in the greater Namakwaland region	Medium (in dam)
Xenopus laevis	Common Platanna	Least Threatened	Any more or less permanent water	High (in dam)
Amietia fuscigula	Cape River Frog	Least Threatened	Large still bodies of water or permanent streams and rivers.	Medium (in dam)
Cacosternum namaquense	Namaqua Caco	Least Threatened	Rocky granite outcrops, and breeds in temporary or permanent natural or man-made pools	High
Strongylopus springbokensis	Namaqua Stream Frog	Least Threatened	Mountainous areas of Namaqualand associated with seeps and springs	Low
Tomopterna delalandii	Cape Sand Frog	Least Threatened	Widespread in Fynbos and Succulent Karoo; breeds in shallow, often seasonal water	High

Appendix 4 - List of Birds

A list of birds which were observed or which are likely to occur in and around the Klipdam PV study area, based on personal observation **(bold**) and 52 cards from SABAP 2 as well as SABAP1. Listed according to the SABAP reporting rate.

Rank	Common name	Scientific name	Status	Reporting rate
1	**Cape Bunting**	*Emberiza capensis*		92.3
2	**Bokmakierie**	*Telophorus zeylonus*		92.3
3	**Cape Sparrow**	*Passer melanurus*		90.4
4	**Common Fiscal**	*Lanius collaris*		88.5
5	Mountain Wheatear	*Oenanthe monticola*		82.7
6	**Pied Crow**	*Corvus albus*		82.7
7	Rock Martin	*Hirundo fuligula*		80.8
8	**Karoo Prinia**	*Prinia maculosa*		78.8
9	**Cape Turtle-Dove**	*Streptopelia capicola*		76.9
10	White-backed Mousebird	*Colius colius*		76.9
11	Speckled Pigeon	*Columba guinea*		75.0
12	**Cape Weaver**	*Ploceus capensis*		73.1
13	White-throated Canary	*Crithagra albogularis*		73.1
14	Anteating Chat	*Myrmecocichla formicivora*		71.2
15	Pale-winged Starling	*Onychognathus nabouroup*		67.3
16	Jackal Buzzard	*Buteo rufofuscus*		67.3
17	**Karoo Scrub-Robin**	*Cercotrichas coryphoeus*		63.5
18	**Laughing Dove**	*Streptopelia senegalensis*		63.5
19	**Dusky Sunbird**	*Cinnyris fuscus*		59.6
20	Karoo Chat	*Cercomela schlegelii*		55.8
21	Grey-backed Cisticola	*Cisticola subruficapilla*		55.8
22	Southern Masked-Weaver	*Ploceus velatus*		53.8
23	**Acacia Pied Barbet**	*Tricholaema leucomelas*		51.9
24	Large-billed Lark	*Galerida magnirostris*		51.9
25	**Layard's Tit-Babbler**	*Parisoma layardi*		50.0
26	Cape Glossy Starling	*Lamprotornis nitens*		48.1
27	**Malachite Sunbird**	*Nectarinia famosa*		48.1
28	Familiar Chat	*Cercomela familiaris*		46.2
29	Cape Wagtail	*Motacilla capensis*		44.2
30	Southern Double-collared Sunbird	*Cinnyris chalybeus*		44.2
31	Capped Wheatear	*Oenanthe pileata*		44.2
32	Karoo Lark	*Calendulauda albescens*		44.2
33	Rock Kestrel	*Falco rupicolus*		42.3
34	**Grey Tit**	*Parus afer*		40.4
35	Karoo Eremomela	*Eremomela gregalis*		40.4
36	African Red-eyed Bulbul	*Pycnonotus nigricans*		36.5
37	Southern Pale Chanting Goshawk	*Melierax canorus*		36.5
38	Cape Bulbul	*Pycnonotus capensis*		34.6
39	Little Swift	*Apus affinis*		34.6
40	**Rufous-eared Warbler**	*Malcorus pectoralis*		32.7
41	Yellow Canary	*Crithagra flaviventris*		32.7
42	House Sparrow	*Passer domesticus*		32.7
43	Karoo Thrush	*Turdus smithi*		30.8
44	Verreaux's Eagle	*Aquila verreauxii*		30.8
45	Red-capped Lark	*Calandrella cinerea*		30.8
46	Black-headed Canary	*Serinus alario*		30.8
47	Cinnamon-breasted Warbler	*Euryptila subcinnamomea*		28.8

48	Orange River White-eye	*Zosterops pallidus*		26.9
49	**Cape Robin-Chat**	*Cossypha caffra*		25.0
50	Namaqua Sandgrouse	*Pterocles namaqua*		25.0
51	African Sacred Ibis	*Threskiornis aethiopicus*		23.1
52	**Long-billed Crombec**	*Sylvietta rufescens*		23.1
53	Spike-heeled Lark	*Chersomanes albofasciata*		21.2
54	**South African Shelduck**	*Tadorna cana*		21.2
55	Blacksmith Lapwing	*Vanellus armatus*		21.2
56	Lark-like Bunting	*Emberiza impetuani*		21.2
57	Fairy Flycatcher	*Stenostira scita*		19.2
58	Red-eyed Dove	*Streptopelia semitorquata*		17.3
59	**Egyptian Goose**	*Alopochen aegyptiacus*		17.3
60	Red-knobbed Coot	*Fulica cristata*		17.3
61	Long-billed Pipit	*Anthus similis*		17.3
62	Black Harrier	*Circus maurus*	NT	17.3
63	Namaqua Warbler	*Phragmacia substriata*		15.4
64	European Bee-eater	*Merops apiaster*		15.4
65	Brown-throated Martin	*Riparia paludicola*		15.4
66	Tractrac Chat	*Cercomela tractrac*		15.4
67	Three-banded Plover	*Charadrius tricollaris*		13.5
68	**Common Ostrich**	*Struthio camelus*		13.5
69	Little Grebe	*Tachybaptus ruficollis*		13.5
70	Pririt Batis	*Batis pririt*		11.5
71	Namaqua Dove	*Oena capensis*		11.5
72	Common Waxbill	*Estrilda astrild*		11.5
73	Booted Eagle	*Aquila pennatus*		11.5
74	Spotted Eagle-Owl	*Bubo africanus*		11.5
75	Greater Kestrel	*Falco rupicoloides*		11.5
76	Rock Dove	*Columba livia*		9.6
77	Cattle Egret	*Bubulcus ibis*		9.6
78	**Hadeda Ibis**	*Bostrychia hagedash*		7.7
79	Grey-backed Sparrowlark	*Eremopterix verticalis*		7.7
80	Ludwig's Bustard	*Neotis ludwigii*	VU	7.7
81	Yellow-billed Duck	*Anas undulata*		7.7
82	African Hoopoe	*Upupa africana*		7.7
83	Ground Woodpecker	*Geocolaptes olivaceus*		7.7
84	Cape Crow	*Corvus capensis*		7.7
85	Chestnut-vented Tit-Babbler	*Parisoma subcaeruleum*		5.8
86	Cape Penduline-Tit	*Anthoscopus minutus*		5.8
87	Southern Red Bishop	*Euplectes orix*		5.8
88	Black-eared Sparrowlark	*Eremopterix australis*		5.8
89	Chat Flycatcher	*Bradornis infuscatus*		5.8
90	Red-faced Mousebird	*Urocolius indicus*		5.8
91	Barn Swallow	*Hirundo rustica*		5.8
92	Cape Teal	*Anas capensis*		5.8
93	Karoo Long-billed Lark	*Certhilauda subcoronata*		5.8
94	African Pipit	*Anthus cinnamomeus*		5.8
95	Black-headed Heron	*Ardea melanocephala*		5.8
96	Cape Clapper Lark	*Mirafra apiata*		5.8
97	Lanner Falcon	*Falco biarmicus*	NT	5.8
98	Alpine Swift	*Tachymarptis melba*		5.8
99	Common Quail	*Coturnix coturnix*		3.8
100	Speckled Mousebird	*Colius striatus*		3.8
101	Mallard Duck	*Anas platyrhynchos*		3.8

102	Helmeted Guineafowl	*Numida meleagris*		3.8
104	Black-shouldered Kite	*Elanus caeruleus*		3.8
105	Yellow Bishop	*Euplectes capensis*		3.8
106	Yellow-bellied Eremomela	*Eremomela icteropygialis*		3.8
107	Pied Starling	*Spreo bicolor*		3.8
108	Martial Eagle	*Polemaetus bellicosus*	VU	3.8
109	Cape Long-billed Lark	*Certhilauda curvirostris*		3.8
110	Grey Heron	*Ardea cinerea*		3.8
111	Black-winged Stilt	*Himantopus himantopus*		3.8
112	Spotted Thick-knee	*Burhinus capensis*		3.8
113	Cape Spurfowl	*Pternistis capensis*		1.9
114	White-necked Raven	*Corvus albicollis*		1.9
115	Common Starling	*Sturnus vulgaris*		1.9
116	African Palm-Swift	*Cypsiurus parvus*		1.9
117	Wattled Starling	*Creatophora cinerea*		1.9
118	Yellow-billed Kite	*Milvus aegyptius*		1.9
119	Cape Shoveler	*Anas smithii*		1.9
120	African Reed-Warbler	*Acrocephalus baeticatus*		1.9
121	Cape White-eye	*Zosterops virens*		1.9
122	Cape Eagle-Owl	*Bubo capensis*		1.9
123	Black-throated Canary	*Crithagra atrogularis*		1.9
124	White-throated Swallow	*Hirundo albigularis*		1.9
125	Pied Avocet	*Recurvirostra avosetta*		1.9
126	Maccoa Duck	*Oxyura maccoa*		1.9
127	**Freckled Nightjar**	*Caprimulgus tristigma*		1.9
128	Secretarybird	*Sagittarius serpentarius*	NT	1.9
129	White-rumped Swift	*Apus caffer*		1.9
130	African Harrier-Hawk	*Polyboroides typus*		1.9
131	Sickle-winged Chat	*Cercomela sinuata*		1.9

1st Consultative Draft

PROPOSED KLIPDAM PHOTOVOLTAIC SOLAR ENERGY FACILITY – PHASE 1

Portion 17 of the Farm Klipdam No. 134, Springbok, Northern Cape Province

SCOPING PHASE VISUAL IMPACT ASSESSMENT

Input for scoping report to be undertaken in terms of the National Environmental Management Act, 107 of 1998

1 AUGUST 2013

PROJECT NO: VIA_120613.FE

Produced for:

NK Energie (Pty) Ltd.

On behalf of:

Footprint Environmental Services

Produced by:

ZONE LAND SOLUTIONS

www.zonesolutions.co.za

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1 INTRODUCTION

1.1 Background and Purpose of Report

NK Energie (Pty) Ltd. proposes to establish a commercial photovoltaic (PV) solar energy facility as well as associated infrastructure on a site approximately 7km north-west of Springbok in the Northern Cape Province. The project would be developed in two phases. It is envisaged that the completed (phase 1 & phase 2) solar energy facility will be able to generate 150MW.

This Visual Impact Assessment (VIA) is undertaken as part of the Environmental Impact Assessment (EIA) process being facilitated by Footprint Environmental Services, in terms of the National Environmental Management Act 107 of 1998 (NEMA). The purpose of this report is to identify the associated impacts of the proposed activity which might have a visual impact. As such, the aim of this report is to focus the impact assessment on a manageable number of important questions on which decision-making is expected to focus and to ensure that only key issues and reasonable alternatives are examined.

This Scoping Assessment is undertaken in terms of the *Guidelines for Involving Visual and Aesthetic Specialists in the EIA Process* and the *NEMA EIA Regulations of 2010*.

1.2 Components of the Report

The aspects addressed in this report are as follows:

a) Description of the methodology adopted in preparing the report.
b) Description of the receiving environment.
c) Description of the view catchment area, view corridors, viewpoints and receptors.
d) Identification of potential visual impacts associated with the proposed activity and the alternatives identified, by using the established criteria.
e) Identification of additional issues such as:
    - Impact on skyline.
    - Negative visual impact.
    - Impact on aesthetic quality and character of place.
f) Assumptions made and uncertainties or gaps in knowledge.

1.3 Study Methodology

As stated previously, this VIA is undertaken in accordance with the *Guideline for Involving Visual and Aesthetic Specialists in EIA Processes*, as issued by the Western

Cape Government's Department of Environmental Affairs and Development Planning during 2005[1].

The VIA was undertaken in distinct steps, each of which informed the subsequent steps. The figure below summarises the methodology adopted for undertaking the assessment.

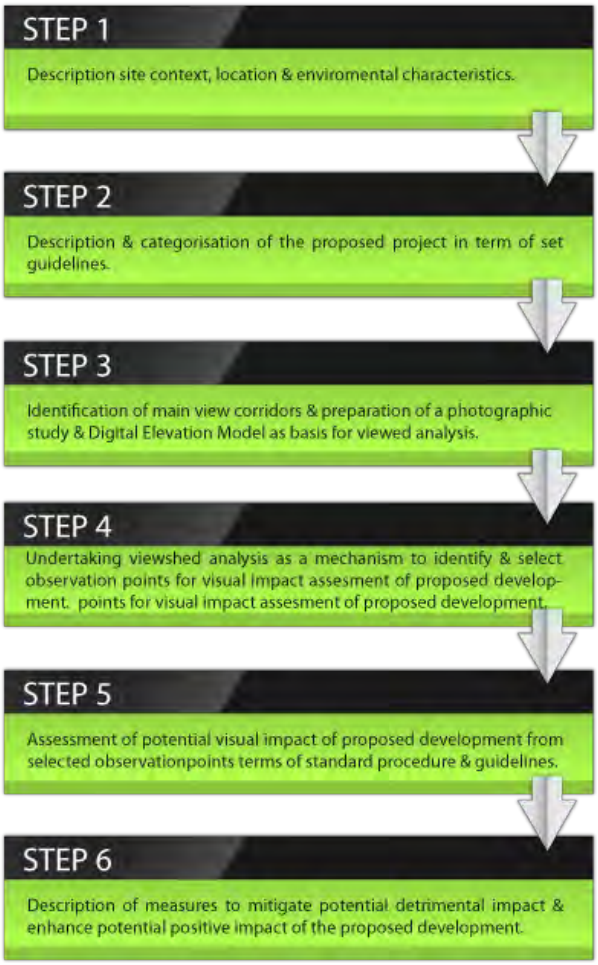

Figure 1: Methodology adopted for the VIA.

1.4 Gaps in Knowledge, Assumptions and Limitations

This report is based on the Terms of Reference of 12 June 2013 provided by Footprint Environmental Services for the mentioned project.

Assessments of this nature generally suffer from a number of defects that must be acknowledged:

- **Limited time:** A comprehensive assessment requires a systematic assessment of the environment at different times of the day. Such luxury is not always possible and therefore most assessments are based on observations made at a specific

[1] No similar policy exists for the Northern Cape Province. However, the Guideline is based upon universally accepted principles and is therefore applicable to the said project.

time of day. Educated estimates are made, where applicable, based on the knowledge of the area.

- **Availability of literature:** A thorough assessment requires that all relevant literature on the subject matter is studied, acknowledged and incorporated in the report. Due to a range of factors, forward planning documents are not always available for all spheres of government.

Notwithstanding the above, it is believed that this assessment identified all issues of likely importance from a visual perspective point of view.

2 THE AFFECTED ENVIRONMENT

2.1 Locality

The project site is located in the Nama Khoi Local Municipality (NC062), as part of the Namakwa District Municipality in the Northern Cape Province, and is some 7km north-west of the town of Springbok via the N7.

Although Springbok is regarded as a rural settlement in context of the Northern Cape, it is the administrative capital of the Nama Khoi Municipality and is the largest town in the Namaqualand district in the Northern Cape Province. The town is surrounded by several smaller settlements that primarily originated as mining settlements. These include Nababeep (some 16km north-west of Springbok), Okiep (at 7km north of Springbok) and Carolusberg some 7km north-east of Springbok.

Figure 2: Regional context of the subject property.

The Goegap Nature Reserve, at some 15km south-east of Springbok, is the closest conservation area to the project site. No heritage sites are evident in the area.

The early settlement of Springbok originated as a major commercial and administrative centre for copper mining operations in the region. Even though mining activities have dwindled, the town remains an important administrative capital in the region and due to its location a favourite stopover for tourists on their way to Namibia. Today the main income is generated from tourism, mining activities, commerce and farming (http://en.wikipedia.org/wiki/Springbok,_Northern_Cape).

The Northern Cape Provincial Spatial Development Framework (2012) described the economic base of Springbok as mainly depending on agriculture (stock framing), mining and tourism as the traditional anchor activities. The downscaling of mining activities in the surrounding settlements over the past years not only resulted in job losses which impact negatively on families, but emphasises the need for further diversification of the economy (PSDF, 2012). Springbok has a well-developed business and service sector to meet the needs of the farming and surrounding mining communities of Aggeneys, Okiep, Kleinzee, Port Nolloth, Garies, Steinkopf, etc. This puts the town in a very suitable position to supply a wide hinterland with higher-order shopping goods and regional services. The range of its services transcends provincial and even international boundaries.

Figure 3: A view of Springbok from 'Klipkoppie' (http://en.wikipedia.org/wiki/File:Springbok_Northern_Cape.jpg).

The Northern Cape Town Study (2012) provides a context and methodology for municipalities on the development of towns in the Northern Cape. In terms of the study, Springbok ranks 4th on the overarching Development Potential scale (where position 1 represents the best situation), is characterised by a high profile and is well positioned for a favourable development niche as a regional urban centre in the western part of the Northern Cape and Namaqualand.

The Human Needs index has a strong low poverty level at rank 11 (rank 1 indicates the best situation), implying that the quality of life in Springbok compares relatively favourable in relation to the provincial average. When the town's specific Development Potential index is integrated with its Human Needs index, Springbok is a strong candidate for *Infrastructure Capital Investment*, supplemented by *Basic Services* upliftment if needed (as suggested by the National Spatial Development Plan). This is because of the town's position in the high development potential and low human needs quadrant (Northern Cape Provincial Spatial Development Framework, 2012).

2.1.1 Intrinsic Values of the Namaqualand

It is a common principle of planning that each place has a specific intrinsic, instrumental and systemic value and that such values need to be carefully considered when contemplating the current and future use of any particular place.

Broadly -speaking, two different philosophical perspectives are possible when considering the value of any place or object, namely **what is it good for?** and **what is its own good?** The first question relates to its instrumental value, while the second deals with intrinsic value. Instrumental value uses something as a '*means to an end'* while intrinsic value refers to being '*worthwhile in itself'* (Rolston, 1994).

Systemic value relates to the fact that '*things do not have their separate natures merely in, and for themselves, but they face outward and co-fit into broader natures. Value seeps out into the system and the individual lose its status as sole locus of value'* (Rolston, 1994:174). Systemic value refers to the relations that things have with other things, and to the role they play in larger wholes.

The value system of Namaqualand was determined in the various collaborative, participative processes undertaken during the drafting of forward planning documentation, policy and guidelines. As such, the intrinsic value of the Namaqualand is found in the agrarian landscape with strong linkages to the rural, natural landscape.

As described above, even though the intrinsic value of the Namaqualand is based on the agrarian characteristics, the values of the project site and its surroundings have to a large degree been lost.

2.2 Project Site Description

As illustrated by the figure below, the project site consists of a single property, namely Portion 17 of the Farm Klipdam No. 134. This property is some 1362ha in extent, while approximately 209ha has been made available for the establishment of the first phase of the proposed activity. The proposed routing corridors take up a further 172ha en route to the existing substation. The total distance of the latter routing corridors are in excess of 7km from the western boundary of the project site, up to the existing substation in the east.

The provisional location of the first phase is indicated by the figure below. It should however be noted that the final position is still to be determined by means of the EIA process to be undertaken.

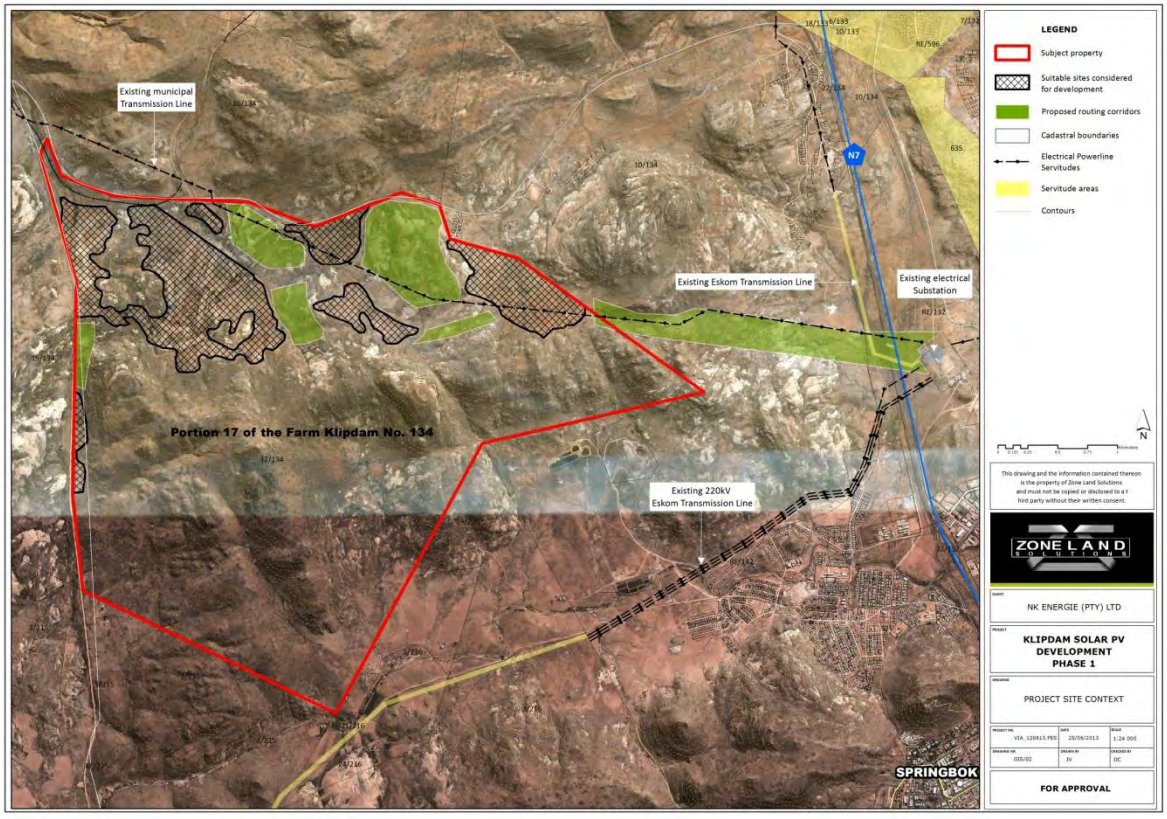

Figure 4: Extent of subject property and location of proposed improvements.

An existing municipal electrical power line crosses the subject property in an east-west direction. The electricity generated on site will be evacuated into the electrical grid at the existing electrical substation immediately east of the N7 (on erf 3091). The proposed routing corridors for the electrical lines are to follow a similar alignment to that of the municipal electrical power line.

In addition to the above lines, an existing 220kV Eskom transmission line passes south of the property en-route to the substation.

2.2.1 Landscape Character

The landscape character of the region typifies that of the Namaqualand. The area is harsh and stony but, soon after the winter rains; the almost lifeless Namakwa is transformed into an exquisite floral display of beauty during spring.

Several large trees and bushes are present on the project site. These large, predominant alien species such as Eucalyptus trees have been introduced in the vicinity of the former golf course. The project site has a generally undulating terrain, with very prominent 'koppies' in the centre of the project site. Several other similar landscape features occur in the area immediately surrounding the project site.

The most prominent topographical feature on site is the local 'koppie' at 1151m above mean sea level. A secondary koppie also features on the project site (1123m).

The project site is currently used for the extensive grazing of livestock (sheep and goat); however, a portion of approximately 70 ha was previously used as a golf course. As a result, the former natural vegetation in this area made way for exotic fairways and greens.

As mentioned above, commercial livestock farming is the main form of farming in the region and the mainstay of the economy.

The Namakwa area experiences severe climatic conditions with rainfall being as low as 106mm per year with most rain occurring during winter. The average midday temperatures range from approximately 16.5°C in June to 28.3°C in January. The region is the coldest during July when the mercury drops to 3.8°C on average during the night.

The area is dominated by Namaqualand Klipkoppe Shrubland (SKn1) vegetation type. According to Mucina and Rutherford (2006), the vegetation type forms part of the Namaqualand Hardeveld group. Namaqualand Klipkoppe Shrubland occurs on the huge granite and gneiss domes, smooth glacis and disintegrating boulder koppies supporting open shrubland, up to 1m tall dominated by shrubs of dwarf to medium stature and with ericoid or succulent leaves. Further landscape features include flat or gently sloping rock sheets that support dwarf or prostate succulents in shallow pockets with soil or in cracks. Fringe vegetation at the bottom of steep rock sheets consist of 1-3 m tall shrubs with non-succulent leaves and canopy cover reaching 40-100%.

Important taxa in this group include Succulent trees: *Aloe dichotoma var. dichotoma* (d). Small trees: *Ficusilicina, Pappeacapensis*. Succulent shrubs: *Dideltaspinosa (d),*

Euphorbia decussate (d), E. mauritanica (d). Endemic taxa include succulent shrubs such as *Ottosonderiamonticola, Tylecodonnigricaulis*. Low shrubs: *Lotonosisbenthamiana, L. longiflora, L quinata, Wiborgiaincurvata*, etc.

Namaqualand Klipkoppe Shrubland is least threatened in terms of its conservation status and some 6% is statutorily conserved in the Namaqua National Park, Goegap Nature Reserve and a small portion of the Moedverloren Nature Reserve.

2.2.2 Solar Radiation

The portions of the Northern Cape that border on the Orange River and Namibia have the highest solar radiation intensity in the world (Northern Cape State of the Environment Report, 2005). This translates to an excellent comparative economic advantage for this region and an opportunity to harness the natural sun power and to generate electricity. This positions the Nama Khoi Municipality as an ideal location for the development of concentrated solar power (CSP) and photovoltaic solar power generation technologies[2].

Figure 5 below illustrates the measured annual direct and diffuse solar radiation of the Northern Cape Province in context of the country as a whole.

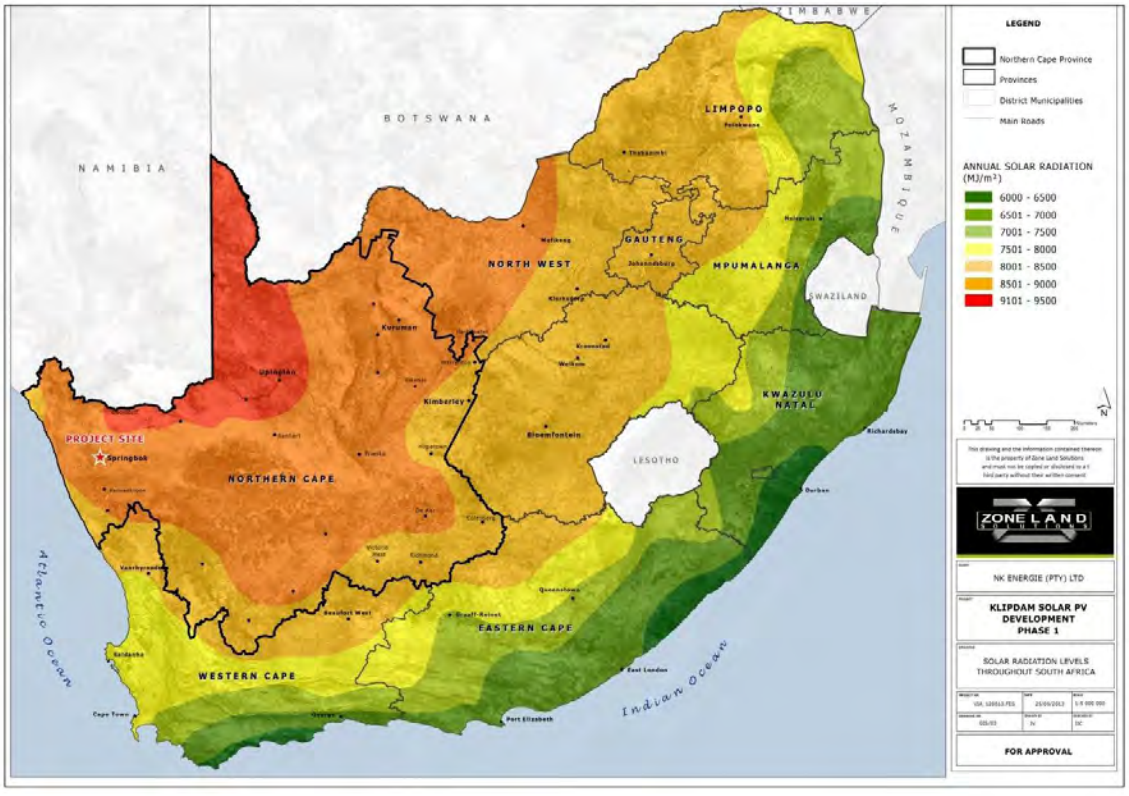

Figure 5: Solar radiation levels for South Africa.

[2] It has however been confirmed that a photovoltaic solar power plant will be considered for development on the project site.

3 PROJECT DESCRIPTION AND INSTALLATIONS

The proposed solar power plant will make use of PV solar panels and associated infrastructure with a total generation capacity of approximately 75MW in the first phase. This facility is to be developed in two phases with a maximum generation capacity of 150MW.

The overall aim of the design and layout of the facilities is to maximise electricity production through exposure to the solar radiation, while minimising infrastructure, operation and maintenance costs, as well as possible social and environmental impacts. The use of solar energy for power generation can be described as a non-consumptive use of natural resources which emits zero greenhouse gas emissions.

3.1 Project Components

The proposed Klipdam PV Solar Energy Facility would typically comprise of the following infrastructure:

- An array of photovoltaic panels with an installed capacity of up to 75MW in the first phase;
- Inverter/transformer enclosures;
- Grid connection and 132kV overhead power lines;
- A mounting structure to be either rammed steel piles or piles with pre-manufactured concrete footings to support the PV panels;
- Cabling between the project components, to be lain underground where practical;
- Electrical power lines to be erected en route to the existing electrical substation;
- Internal access roads and fencing; and
- A workshop area for maintenance and storage and offices.

3.2 Renewable Energy Technology Proposed

Various renewable energy technologies are available for electricity generation. Renewable energy technologies offer an alternative to fossil fuels, thereby reducing the amount of CO2 emissions into the atmosphere.

3.2.1 Photovoltaic Technology

Solar energy facilities, such as those using PV panels use the energy of the sun to generate electricity through a process known as Photovoltaic Effect. This effect refers to photons of light colliding with electrons, and therefore placing the electrons into a higher state of energy to create electricity.

Photovoltaic systems use solar panels to convert sunlight into electricity. The system is made up of one or more solar panels, usually a controller or power converter, and the interconnections and mounting for the other components.

The proposed PV modules will be approximately 1.9 m² (0.99m x 1.96m) in size. Each module will be mounted on a metal supporting structure, no more than 1.8m off the ground. There are a number of options regarding the structure and their anchoring to the ground. Typically this is done by means of a small concrete 'foot' at the base of the pole supporting the structure. This facility will make use of specially designed metal screw that will be screwed into the ground and the support structure will be bolted onto it.

Individual ground-mounted PV panels (also referred to as free-field or stand-alone arrays) will be connected into a 'string' of panels of approximately 3.4m in height. The 'string' will be attached to a steel support structure set at an angle so to receive the maximum amount of solar radiation. The angle of the panel is dependent on the latitude of the proposed facility and the angles may be adjusted to optimise for summer or winter solar radiation characteristics.

The photovoltaic cells to be used consist of a polycrystalline silicone cell which acts as a semiconductor used to produce the photovoltaic effect. Individual PV cells are linked and placed behind a protective glass sheet to form a photovoltaic panel.

The photovoltaic effect produces electricity in direct current. Therefore an inverter must be used to change it to alternating current.

The PV panels are designed to operate continuously for more than 20 years, unattended and with low maintenance.

Figure 6: Illustration of typical photovoltaic panels (Source: YB Mashalaba and Associates Consultants CC).

3.3 Potential 'triggers' or Key Issues

A 'trigger' is a characteristic of either the receiving environment or the proposed project which indicates that visibility and aesthetics are likely to be key issues and may require further specialist involvement (DEA&DP, 2005).

The 'triggers', as they relate to the proposed project refer to the following:

Table 1: Potential triggers.

KEY ISSUE	FOCAL POINTS	DESCRIPTION
a) Nature of the receiving environment:	*Areas lying outside a defined urban edge line.*	The proposed activity is situated outside the demarcated urban edge of the nearest town and will be assessed accordingly.
	Areas of important tourism or recreational value.	The N7 is regarded as a tourism corridor and stretches from Cape Town through Namaqualand up to Namibia.
	Areas with visually prominent ridgelines or skylines.	The subject property is characterised by several prominent hills and mountains. The proposed activity will be assessed in terms of these landforms.
b) Nature of the project:	*A change in land use from the prevailing use.*	The prevailing use will change on approximately 381ha. Should the proposed mitigation measures be implemented, the prevailing use could be retained to a degree.
	Possible visual intrusion in the landscape.	The proposed activity will form an integral part of the future landscape character. The extent and significance of a possible visual impact is to be determined through this VIA.
	A significant change to the fabric and character to the area.	The proposed activity will form an integral part of the future landscape character. The extent and significance of a possible visual impact is to be determined through this VIA.

3.4 Development Category

Based upon the 'triggers' and key issues and the environmental context summarised above, the proposed activity is categorised as a **Category 4 Development**.

This categorisation is based upon the *Guidelines for Involving Visual and Aesthetic Specialists in EIA Processes*, which lists the following categories of development:

Box 3: KEY TO CATEGORIES OF DEVELOPMENT

Category 1 Development: e.g. nature reserves, nature-related recreation, camping, picnicking, trails and minimal visitor facilities.

Category 2 Development: e.g. low-key recreation/resort/residential type development, small-scale agriculture/nurseries/narrow roads and small-scale infrastructure.

Category 3 Development: e.g. low density residential/resort type development, golf or polo estates, low to medium-scale infrastructure.

Category 4 Development: e.g. medium density residential development, sport facilities, small-scale commercial faculties/office parks, one-stop petrol stations, light industry, medium-scale infrastructure.

Category 5 Development: e.g. high density township/residential development, retail and office complexes, industrial facilities, refineries, treatment plants, power stations, wind energy farms, power lines, freeways, toll roads, large-scale infrastructure generally. Large-scale development of agriculture land and commercial tree plantations. Quarrying and mining activities with related processing plants.

Based upon the above categorization and the assessment criteria provided in the *Guidelines for Involving Visual and Aesthetic Specialists in EIA Processes* it is expected that the visual impact of the proposed activity would be classified as **'moderate'** (refer to the table below).

The objectives of the VIA described in this report is to:

a) determine whether such broad impact categorisation is appropriate and if not, to determine an appropriate category of impact;

b) formulate and implement measures or interventions that would mitigate any detrimental impacts to the extent that the activity will be acceptable.

Table 2: Categorization of expected visual impact (DEA&DP, 2005).

Type of environment	Type of development				
	Category 1	Category 2	Category 3	Category 4	Category 5
Protected/wild areas of international 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,	Minimal visual	Moderate visual	High visual impact	High visual impact	Very high visual

historical significance	impact expected	impact expected	expected	expected	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 or 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

4 VIEWSHED ANALYSIS

4.1 Dominant View Corridors

As a first step of this VIA, a survey was undertaken to determine the existence of significant view corridors associated with the project site. A view corridor is defined as *'a linear geographic area, usually along movement routes, that is visible to users of the route'* (DEA&DP, 2005). Accordingly, four dominant *view corridors* were identified in the region, namely:

a) **N7-** The main movement corridor between Cape Town and Namibia.

b) **N14-** The main movement corridor across the spine of the country between Springbok in the west and Pretoria in the east via Upington and Vryburg.

c) **R355-** A main movement route south of the project site between Springbok and the Atlantic seaboard.

d) **Nababeep access road-** The primary access road to Nababeep off the N7. This road passes along the northern boundary of the project site.

When determining dominant view corridors, one has to take into consideration the class of the road and dominance and nature of the town/settlement in which direction it travels. In this regard, Nababeep, as the nearest settlement to the project site, is regarded as a rural settlement within the municipality.

These settlements are often not well positioned in terms of transportation routes or infrastructural developments. There is also often a lack of public/private investment in these areas.

As the N14 and R355 is located beyond 5km from the nearest point to the project site, and therefore located in the *Background* of the project site (refer to Chapter 8.1), these roads should not be regarded as dominant view corridors of relevance to the proposed activity.

The only relevant view corridor is that of the N7 and the Nababeep access road, north of the project site.

4.2 Relevant Topographic and Physical Characteristics

A further key aspect affecting the potential visual impact of any proposed activity is the topography of the project site and the surrounding environment and the existence of prominent biophysical features from where the project site is visible. The topography and the major ridgelines of the area were subsequently determined and mapped by using a *Digital Elevation Model*[3].

As illustrated by the DEM below, the project site is located at a mean elevation of approximately 992m above sea level. The DEM shows that there are several prominent topographical manifestations on the project site and in close proximity to the project site, from which the proposed activity is particularly visually exposed. The major concentration of receptors (towns and roads) are however not located on top of these manifestations but rather in the valleys between the hills.

Furthermore, as stated previously, the project site is located below any ridgeline. The proposed activity will therefore not impact on the skyline.

[3] A Digital Elevation Model (DEM) is a geographic information system-based outcome generated from contours for a specific area. In this instance, 20m contour intervals for reference sheet nos. 2917da and 2917db were used to calculate the DEM for the region.

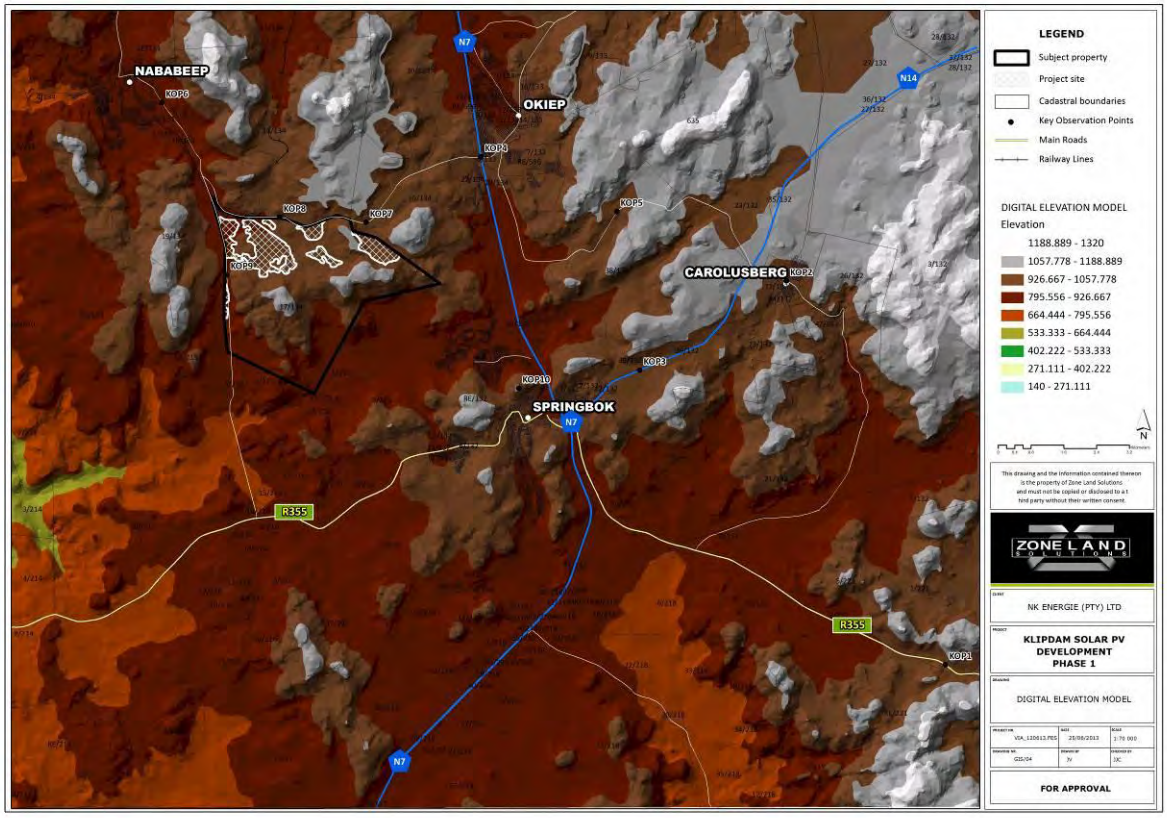

Figure 7: Digital Elevation Model illustrating major ridgelines and dominant view corridors in the sub-region.

5 DIGITAL VIEWSHED ANALYSIS

As mentioned above, a digital viewshed analysis was undertaken, based upon the Digital Elevation Model (refer to Figure 7). The purpose of this step was to provide a basis for the identification and selection of appropriate observation points outside the project site for the VIA.

The viewshed[4] analysis was undertaken in accordance with the *Guideline Document for involving Visual Specialists in EIA Processes*. Geographic Information Systems (GIS) technology was used to analyse and map information in order to understand the relationships that exist between the observer and the observed view. Key aspects of the viewshed are as follows:

- It is based on a *single viewpoint* from the highest point of the project site.
- It is calculated at an assumed 3.4m above the natural ground level to reflect the highest point of the PV panels.
- It represents a '*broad-brush' designation*, which implies that the zone of visual influence may include portions that are located in a view of shadow and it is

[4] A viewshed is defined as '*the outer boundary defining a view catchment area, usually along crests and ridgelines. Similar to a watershed'*. A Viewshed Analysis is therefore the study into the extent to which a defined area is visible to its surroundings.

therefore not visible from the project site and *vice versa*. This may be as a result of landscape features such as vegetation, buildings and infrastructure not taken into consideration by the DEM.

- The viewshed generated from each of the selected observation points is calculated at 1.7m above the natural ground level to reflect the average height of person either walking or sitting in a vehicle.

As illustrated by the generated viewsheds (refer to Figure 8 below), the *zone of visual influence*[5]is severely restricted. The viewshed is primarily associated with the major topographical features of the area but is scattered in small pockets in an east and southeast direction up to 17km from the project site. The viewshed also does not coincide with any populated area and most of the dominant view corridors.

The GIS-generated viewshed illustrates a theoretical *zone of visual influence*. This does not mean that the proposed activity would be visible from all observation points in this area. The GIS-generated viewshed and expected visual impact will be assessed by means of ground truthing that will be undertaken as part of the EIA process.

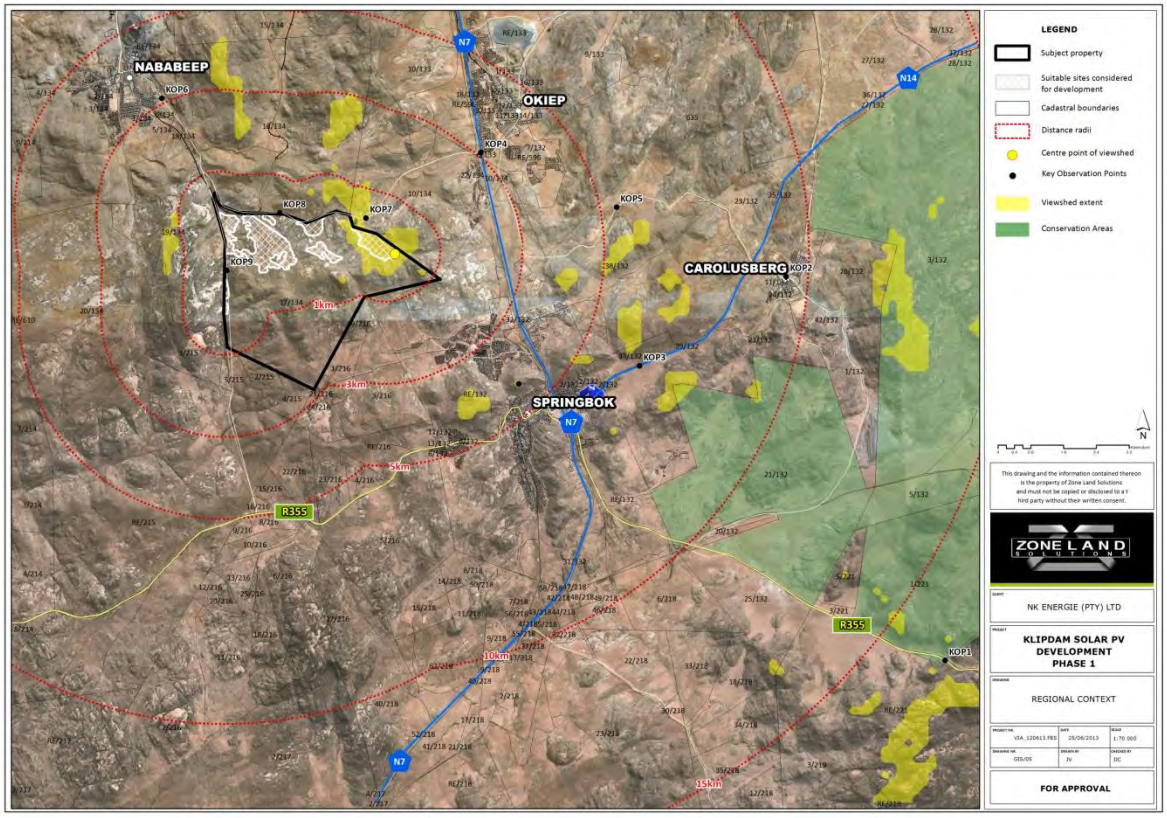

Figure 8: Viewshed generated from the project site.

[5] Zone of visual influence is defined as *'An area subject to the direct visual influence of a particular project'.*

The distance radii indicating the various viewing distances from the combined development sites are illustrated by Figure 7. Also illustrated by the figure are the view corridors of the N7, N14, R355 and Nababeep access road. As described above, these corridors are situated in the foreground, middle ground and background to the project site and therefore only some would be affected by the proposed activity.

6 SCOPING-PHASE VISUAL IMPACT ASSESSMENT

6.1 Selection of Observation Points

A total of 10 Key Observation Points (KOPs) were provisionally identified and selected within the defined viewshed for the visual assessment in accordance with the selection criteria stipulated in the Visual Guidelines. These KOPs correspond with movement routes and populated areas in the region. The description and assessment of the individual KOPs will be included as part of the EIA phase.

KOPs selected for the assessment are generally located at the intersection between the zone of visual influence and the defined view corridors. The view corridors are those areas that are accessible to the general observer.

6.2 Assessment Criteria

It is stated in the DEA&DP's Visual Guidelines that to aid decision-making, the assessment and reporting of possible impacts requires consistency in the interpretation of impact assessment criteria.

The potential visual impact of the proposed activity will be assessed in the EIA phase against these criteria, with reference to the summary of criteria in Box 12 of the Visual Guidelines. Table 3 provides a description of the summary criteria used to determine the impact significance.

Table 3: Summary of criteria used to assess the potential impacts of the proposed activity.

CRITERIA	DESCRIPTION
NATURE OF THE IMPACT	The nature of the impact refers to the visual effect the proposed activity would have on the receiving environment. The nature of the development proposals are described in the preceding sections.
EXTENT	This category deals with the spatial or geographic area of influence and refers to the following levels: • *Site-related* (extending only as far as the activity), • *Local* (limited to the immediate surroundings), • *Regional* (affecting a larger metropolitan or regional area), • *National* (affecting large parts of the country),

	• *International* (affecting areas across international boundaries). A value between 1 and 5 is assigned as appropriate (with 1 being low and 5 being high).
DURATION	Duration refers to the expected life-span of the visual impact. A rating of short term (during the construction phase) (assigned score of 1 or 2), *medium term* (duration for screening vegetation to mature) (assigned score of 3), *long term* (the lifespan of the project) (assigned score of 4), or *permanent* (where time will not mitigate the visual impact) (assigned score of 5) were applied.
MAGNITUDE	Magnitude refers to the magnitude of the impact on views, scenic or cultural resources. The following ratings were allocated to determine the intensity of the impact: • *No effect* (assigned score of 0), • *Low* (visual and scenic resources not affected) (score of 2), • *Minor* (will not result in impact on processes) (score of 4), • *Medium* (affected to a limited scale) (assigned score of 6), • *High* (scenic and cultural resources are significantly affected) (assigned score of 8), • *Very high* (result in complete destruction of patterns) (score of 10).
PROBABILITY	This category refers to the degree of possibility of the visual impact occurring. A rating of *very improbable* (probably will not happen) (assigned score of 1), *improbable* (very low possibility of the impact occurring) (assigned score of 2), *probable* (distinct possibility that the impact will occur) (assigned score of 3), *highly probable* (most likely) (assigned score of 4), or *definite* (impact will occur regardless of any preventative measures) (assigned score of 5) were applied.
STATUS	Status will be described as positive, *negative* or *neutral*.
REVERSIBILITY	Degree to which the activity can be reversed. The following rating were allocated: • Reversible (assigned score of 1), • Recoverable (assigned score of 3), or • Irreversible (assigned score of 5).
SIGNIFICANCE	The significance is calculated by combining the criteria in the following formula: S = (E+D+M)P S = Significance E = Extent D = Duration M = Magnitude P = Probability

	The significance ratings for each potential impact are as follows: • *Low* (where it will not have an influence on the decision) (<30 points), • *Medium* (where it should have an influence on the decision unless it is mitigated) (30-60 points), or • *High* (where it would influence the decision regardless of any possible mitigation) (>60 points).

7 ANTICIPATED ISSUES RELATING TO VISUAL IMPACT

The anticipated visual impacts associated with the proposed activity are described in Table 4. These anticipated visual impacts should be assessed in further detail during the EIA phase of the project as this report is only focussed on defining the potential visual exposure of the proposed development and identifying the potential issues associated with the visibility of the activity.

Table 4: Evaluation of anticipated visual impacts.

a) **Potential Visual Impacts:**

Potential visual impact of the proposed Klipdam PV Solar Energy Facility on the sensitive receptors in the foreground and middle ground of the proposed facility.

Issue	Nature of Impact	Extent of Impact	'No go' areas
Potential visual impact of the proposed facilities on sensitive observers up to 5km from the project site.	Construction of the proposed solar energy facility.	Local (without mitigation)	To be determined in EIA phase once viewshed have been confirmed.

b) **Potential Visual Impacts:**

Potential visual impact of the proposed Klipdam PV Solar Energy Facility on the sense of place of the Nababeep and Springbok area.

Issue	Nature of Impact	Extent of Impact	'No go' areas
Change in character of the prevailing use of the area.	Construction of the proposed solar energy facility.	Local (without mitigation)	To be determined in EIA phase once viewshed have been confirmed.

c) **Potential Visual Impacts:**

Potential visual impact of artificial lighting in the region as a result of the proposed Klipdam PV Solar Energy Facility.

Issue	Nature of Impact	Extent of Impact	'No go' areas
Introduction of artificial light sources in a rural landscape.	Construction of associated infrastructure of the solar energy facility (i.e. workshop area, storage area and offices).	Local (without mitigation)	To be determined in EIA phase once viewshed have been confirmed.

d) **Potential Visual Impacts:**

Potential visual impact of reflection and glare of the photovoltaic panels and electrical wires.

Issue	Nature of Impact	Extent of Impact	'No go' areas
Reflection of the PV panels and electrical wires on the sensitive receptors in the region.	Construction of the proposed solar energy facility.	Local (without mitigation)	To be determined in EIA phase once viewshed have been confirmed.

Gaps in knowledge & recommendations for further study:

The above-mentioned anticipated visual impacts need to be assessed in greater detail during the EIA phase of the project.

It is recommended that:

- The severity of the potential visual impact be assessed in further detail in the EIA phase.
- Additional spatial analyses must be undertaken in order to create a visual impact index that will further aid in determining potential visual impact.
- Specific spatial criteria need to be applied to the visual exposure of the proposed facility in order to successfully determine visual impact and ultimately the significance of the visual impact.
- Specific mitigation measures be proposed to lessen any potential visual impact.
- Ground truthing of the GIS-generated viewshed be undertaken to determine/confirm actual visual impact.

8 CONCLUSION AND PLAN OF STUDY FOR EIA

The construction of the proposed Klipdam PV Solar Energy Facility will have a defined visual impact on its surroundings. In order to successfully determine the exact extent of this impact, the anticipated impact will be assessed during the EIA phase. In this regard, the proposed Plan of Study for EIA is as follows:

8.1 Determine the distance/proximity of the respective observers from the proposed facility

The distance between the observer and the observed activity is an important determinant of the magnitude of the visual impact. This is due to the visual impact of an activity diminishing as the distance between the viewer and the activity increases. Viewsheds are categorised into three broad categories of significance, namely:

a) Foreground: The foreground is defined as the area within 1km from the observer within which details such as colour, texture, styles, forms and structure can be

recognised. Objects in this zone are highly visible unless obscured by other landscape features, existing structures or vegetation.

b) Middle ground: The middle ground is the area between 1km and 3km from the observer where the type of detail which is clearly visible in the foreground becomes indistinguishable. Objects in the middle ground can be classified as visible to moderately visible, unless obscured by other elements within the landscape.

c) Background: the background stretches from approximately 3km onwards. Background views are only distinguishable by colour and lines, while structures, textures, styles and forms are often not visible (SRK Consulting, 2007).

8.2 Determine the nature of the respective observation points

Each observation point will be categorised according to its location and significance. Differentiation is made between tourist-related corridors, including linear geographical areas visible to users of a route or vantage points and residential areas (including farmsteads and townscapes).

The visual impact considered acceptable is dependent on the type of receptors. Visual rating between high (e.g. residential areas, nature reserves and scenic routes or trails), moderate (e.g. sporting or recreational areas, or places of work), or low sensitivity (e.g. industrial, mining or degraded areas) will be allocated to each observation point.

8.3 Determine the Visual Absorption Capacity of the environment

Visual absorption capacity (VAC) refers to the capacity of the receiving environment to absorb or screen the potential visual impact of the proposed activity. The VAC is primarily a function of the vegetation and will vary depending on the nature/density of the vegetation growth.

The VAC would also be high where the environment can readily absorb the structure in terms of texture, colour, form and light / shade characteristics of the structure. The VAC also generally increases with distance, where discernable detail in visual characteristics of both environment and structure decreases.

The potential of the landscape to conceal the proposed activity will therefore be assessed in the EIA phase. A rating of *high* (effective screening by topography and vegetation), *moderate* (partial screening) and *low* (little screening) will be allocated to each observation point.

8.4 Determine the Visual Exposure

Visual exposure is defined as *the relative visibility of a project or feature in the landscape*. This is often also referred to as the zone of visual influence which is *an area subject to the direct visual influence of a particular project.*

Exposure or visual impact tends to diminish exponentially with distance. A *high* (dominant or clearly visible), *moderate* (recognisable to the viewer) or *low* exposure (not particularly visible to the viewer) rating will be allocated to each observation point during the EIA phase.

8.5 Determine the visual intrusion of the proposed activity in the landscape

The potential of the activity to fit into the surrounding environment is a very important determinant. The visual intrusion relates to the context of the proposed activity while maintaining the integrity of the landscape. A rating of *high* (noticeable change), *moderate* (partially fits into the surroundings) or *low* (blends in well with the surroundings) will be allocated to each observation point during the EIA phase.

9 ADDRESSING DIRECT, INDIRECT AND CUMULATIVE IMPACTS

In addition to the above, the cumulative visual impact of the proposed activity in the landscape should also be determined during the EIA phase. This phase should also be supplemented by appropriate mitigation measures to be employed to lessen the potential visual impact of the proposed activity on the respective observers.

According to Oberholzer (2005), **Direct** (or primary) impact occur at the same time and in the same space as the activity. For example, the loss of views through construction of buildings.

Indirect (or secondary) effects occur later in time, or at a different place, from the causal activity. For example, the construction of power lines leading to a subsequent drop in property values in the surrounding area.

Cumulative effects can be:

- Additive: the simple sum of all the effects, (e.g. sprawl effect of houses along a scenic route);
- Synergistic: effects interact to produce a total effect greater than the sum of individual effects, (e.g. incremental urban development eventually results in total loss of rural or wilderness character of an area);
- Time crowding: frequent, repetitive impacts on a visual resource at the same time (e.g. constant movement of heavy vehicles through an area).

- Space crowding: high spatial density of impacts on a rural environment (e.g. rapid informal settlement).
- Neutralizing: where effects may counteract each other to reduce the overall effect (e.g. provision of new structures, accompanied by removal of redundant structures).

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ZONE LAND SOLUTIONS
30 AUGUST 2013

PROPOSED KLIPDAM PHOTOVOLTAIC SOLAR ENERGY FACILITY – PHASE 1

Portion 17 of the Farm Klipdam No. 134, Springbok, Northern Cape Province

ANNEXURE 1

DECLARATION OF INDEPENDENCE

1 AUGUST 2013

PROJECT NO: VIA_120613.FE

Produced for:

NK Energie (Pty) Ltd.

On behalf of:

Footprint Environmental Services

Produced by:

Declaration of Independence

I, Jacques Louis Volschenk, representing Zone Land Solutions (Pty) Ltd., hereby declares that I am an independent consultant appointed to provide specialist input for a VIA assessment. I confirm that I have no personal financial interest in the project other than remuneration for the VIA study itself, and neither I nor Zone Land Solutions (Pty) Ltd. will benefit in any other way from the outcomes of this VIA study. I further declare that opinions expressed in this report have been formulated in an objective manner without interference from any third party.

Jacques Volschenk

Print Name		**Signature**
1 August 2013		
Date		

Preliminary Socio-Economic Impact Assessment
Review Report, Scoping Phase

Proposed 2x 75MV Solar Facility on Portion 17 of Farm no 132, Klipdam in the vicinity of Springbok, NamaKhoi Municipality

(DEA Ref 14/12/16/3/3/2/561& 562)

By Leap Sustainable Development, January 2014

Preliminary Socio-Economic Impact Assessment Report Review, Scoping Phase

Proposed 2x 75MV Solar Facility on Portion 17 of Farm no 132, Klipdam in the vicinity of Springbok, NamaKhoi Municipality

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Preliminary Socio-Economic Impact Assessment Report Review, Scoping Phase

Proposed 2x 75MV Solar Facility on Portion 17 of Farm no 132, Klipdam in the vicinity of Springbok, NamaKhoi Municipality

(DEA Ref 14/12/16/3/3/2/561& 562)

Executive Summary

Footprint Environmental Services was appointed by NK Energie Bpk as Environmental Assessment Practitioners to undertake an Environmental Impact Assessment for a proposed solar facility located on Portion 17 of No 132 Klipdam in the NamaKhoi Municipality, Northern Cape. James Thomas and Margie Worthington-Smith Consultants were appointed by NK Energy to undertake a specialist Social Impact Assessment (SIA) as part of the Impact Assessment application. They compiled a draft SIA report as part of the Scoping Phase of the Environmental Impact Assessment. This draft SIA for the scoping phase described the social and economic context of the proposed facility and the potential impacts that the development may have on social and economic resources of the receiving community.

Leap Sustainable Development was appointed to complete the Social Impact Assessment started by after James Thomas passed away earlier this year. This report is a review of the scoping report compiled by Thomas and Worthington-Smith.

Proposed Solar Facility

The proposed solar facility is located approximately 5km north-west of Springbok and is reached via the N7 and the Nababeeb – Okiep access road.

As Independent Power Producer (IPP), the energy generated will be fed into the Eskom grid.

Receiving Community

Springbok is the main town in the area and services half of the Northern Cape. All the regional government services are located here. Nababeep, Okiep, Concordia and Carolusberg were all established as towns to house the people working on the mines. These towns have a total population of twenty six thousand one hundred and five (26 105) persons in 2001 and 30992 in 2011.

The sectors of employment in the NamaKhoi Municipality, according to the 2001 Census, are general government (21.7%), community, social and personal services (17.3%), wholesale & retail trade, catering and accommodation (17.3%) and mining (16%).

Seventy three percent (72.9%) of the population are of employable age (between 15 and 65) (Census 2001). Fourty seven percent (47% or 12269 persons) of the employable population are employed, whilst

9.3% (or 2428 persons) are unemployed and discouraged work-seekers. Fourty four percent (43.7% or 11408 persons) of the population is not economically active.

Household income overall is low as 51% of the population earns R38 400 (maximum R3 200 per month) and less, whilst 33.4% earns between R 38 401 and R 153 600 (maximum R12 800 per month) and 9% earn more than R12 800 per month.

The high unemployment (9.3%) and economically not active (43.7%) rate together with low monthly household income necessitate economic growth and broadening and extending the skills base.

Approach

The approach to this study is directed by the requirements for Environmental Impact Assessments and the Guidelines for Social Impact Assessments (SIA) and Economic Impact Assessments i.e.:

- Review of project information and preliminary social impact reports (by J. Thomas and M. Worthington-Smith) including collection and synthesis of critical baseline data ;
- Identification project results and key social variables, verified through community participation (by J. Thomas and M Worthington-Smith);
- Identification of additional social variables, and the impact thereof on the receiving society;
- Verification of some results, social variables and impacts and compilation of Social Impact Assessment (SIA);

Policy and Planning Context

The proposed solar facility is aligned with the relevant sector policies and development plans i.e.:

- White Paper on Energy Policy for the RSA (1998);
- White Paper on Renewable Energy (2003);
- National Energy Act (2008);
- National Alternative Energy Strategy (2009);
- National Spatial Development Perspective, 2006 (NSDP);
- Northern Cape Spatial Development Strategy;

Impacts Identified

During the **Construction Phase** the following impacts were identified:

Positive impacts are: increased skills levels, employment, job reservation for women, increased income, increased levels of education, improved local economy and increased educational opportunities and community amenities.

Impacts that can only be decided after further investigation are: image of young women in the community and their family, and the pressure on municipal and authority services.

Negative impacts are: population influx, social health and stability decrease, homogeneousness change, crime increase, job reservation, family health decrease, dust and noise levels increase, negative engagement with different cultures, traffic levels increase and sense of place change. It appears that most of these negative impacts can be mitigated and either is neutralized or reduced to acceptable levels.

The duration of all the impacts during the construction phase will be short term.

The No Go Alternative will have no impact and the temporary positive impacts of the construction phase will be lost.

During the **Operational Phase** the following impacts were identified

Most of the impacts appear to be positive i.e. increased skills levels, image of young women in community and within the family, employment, income, levels of education, local economy including tourism and educational opportunities.

Negative impacts such as population influx, social health, family structure, sense of place and culture can be mitigated and can either be neutralized or reduced to acceptable levels.

The duration of all the impacts during the operational phase will be long term.

The No Go Alternative will have no impact and the positive impacts of the operational phase will be lost.

During the **Decommissioning Phase** the following impacts were identified

The positive impacts are increased skills levels, temporary employment, plant renewal (if considered), increase income and local economic impetus.

Negative impacts are i.e. population influx, dust and noise levels and sense of place can be mitigated and either is neutralized or reduced to acceptable levels.

The duration of all the impacts during the decommissioning phase will be short term.

The No Go Alternative will have no impact and the temporary positive impacts of the decommissioning phase will be lost.

Preliminary Conclusion

From the preliminary assessment it appears that benefits at a local level outweigh the negative impact of which the latter can be mitigated and reduced.

Preliminary Socio-Economic Impact Assessment Report Review

Proposed 2x 75MV Solar Facility on Portion 17 of Farm no 132, Klipdam in the vicinity of Springbok, NamaKhoi Municipality

(DEA Ref 14/12/16/3/3/2/561& 562)

1. Project Overview and Assessment Scope

1.1 Introduction

Footprint Environmental Services was appointed by NK Energie Bpk as Environmental Assessment Practitioners to undertake an Environmental Impact Assessment (EIA) for a proposed solar facility located on Portion 17 of No 132 Klipdam in the NamaKhoi Municipality, Northern Cape. James Thomas and Margie Worthington-Smith Consultants were appointed by NK Energie to undertake a specialist Social Impact Assessment (SIA) as part of the Impact Assessment application. They compiled a draft SIA report as part of the Scoping Phase of the Environmental Impact Assessment. The draft SIA for the scoping phase described the social and economic context and social issues of the receiving environment and the anticipated impacts.

James Thomas sadly passed away earlier this year and Leap Sustainable Development was appointed to complete the studies. This Preliminary Impact Assessment Report is a review of the work done by James Thomas and Margie Worthington.

1.2 Description of the Proposed Development and Alternatives

The proposed solar facility is located approximately 5km north-west of Springbok and is reached via the N7 and the access road to Nababeeb. The exact number and placement of the PV panels will be investigated in more detail during Impact Assessment.

As Independent Power Producer (IPP), the energy generated will be fed into the Eskom grid.

Solar energy facilities, such as those using PV panels, use the energy from the sun to generate electricity through a process known as Photovoltaic Effect. This effect refers to photons of light colliding with electrons, and therefore placing the electrons into a higher state of energy to create electricity. The development will consist of arrays of photovoltaic panels supported by mounting structures, an inverter station, internal access roads, cabling, fencing, a building for a workshop, storage and offices, and an on-site substation with a connection to the Eskom grid.

1.3 Purpose of the Assessment

A Socio-Economic Impact Assessment analyzes (predicting, evaluating and reflecting) and manages the intended and unintended consequences on the human environment of planned interventions (policies, programmes, plans and projects) and any social change processes invoked by those interventions so as to bring about a more sustainable and equitable biophysical and human environment (Vanclay, 2002).

At a broad level the impacts on the overall welfare of a community should be investigated considering the efficiency, equity and sustainability of the project as well as the trade-offs or 'opportunity cost' the various alternatives will yield.

1.4 Approach

The approach to the study (preliminary report and final report) is directed by the requirements for Environmental Impact Assessments and the Guidelines for Social Impact Assessments (SIA) and Economic Impact Assessments commissioned by DEA&DP i.e.:

- Review of project information and preliminary social impact reports (by J. Thomas and M. Worthington-Smith) which included
    - the collection and synthesis of baseline socio-economic data on the area;
    - Identification project results and key social variables, of which the latter was verified through community participation;
- Identification project results and additional social variables, and the impact of the project results on the receiving society and economy as per Guidelines for Social Impacts (preliminary social impact report review);
- Verification of some results, social variables and impacts through communication with the developer, specialists and key project team members as per bibliography;
- Preparation of Preliminary Social Impact Assessment (pSIA);
- Ascertain significance of impacts through a round of interviews and correspondence with registered interested and affected parties, other community members, specialists and key project team members.
- Rate the confirmed impacts as per recommended scale (Addendum A) informed by the results of the interviews with various parties as outlined above.
- Recommending management measures to mitigate the impacts of the proposed development.
- Preparation of Social Impact Assessment (SIA)

1.5 Specialist details

The author of this report is an independent specialists with, 10 years experience in the field of rural development, 7 years in community education, 5 years in project management and coordination, 7 years in town and regional planning (Reg. no: A/1369/2010) and 8 years in socio-economic research.

1.6 Declaration of Independence

This is to confirm that Anelia Coetzee, responsible for conducting the study and preparing the Preliminary and Final Socio Economic Impact Assessment Report, is independent and has no vested or financial interests in the proposed development being either approved or rejected.

1.7 Report Outline

The report is divided into four sections, namely:

- Section 1: Project Overview & Assessment Scope
- Section 2: Socio- Economic Overview of Study Area and Applicable Legal Context
- Section 3: Preliminary Socio-Economic Impacts: Construction, Operations and Demolition Phases

Section 2: Socio- Economic Overview of Study Area and Applicable Legal Context

This section provides an overview of the baseline socio-economic conditions of the receiving environment and the policy context.

2.1 Socio- Economic overview of Springbok

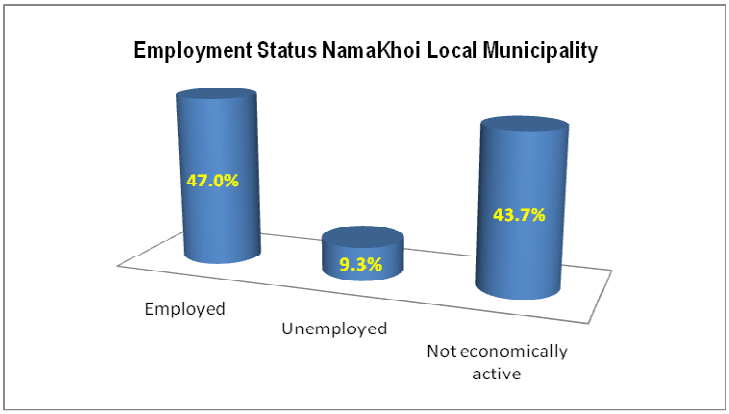
"Springbok is the main town in the area and services half of the Northern Cape. All the regional government services are located here. Nababeep, Okiep, Concordia and Carolusberg were all established as towns to house the people working on the mines. People living in these towns used to receive subsidised housing and free water and electricity when the mines were operating. When the mines closed, 15 years ago, people who were renting mine accommodation had the properties transferred into their names at no cost. Many families have continued to live in these "free houses". There is now very little other work available in these towns and many young adults have sought work elsewhere, either in the big cities or in other mining towns in the Northern Cape, such as Kathu or Aggenys" (Thomas & Worthington-Smith, 2013).

These towns have a total population of twenty six thousand one hundred and five (26 105) persons in 2001 and 30992 in 2011.

Town	Springbok		Nababeep		O'kiep		Concordia		Carolusberg		Totals	
Census	**2001**	**2011**	**2001**	**2011**	**2001**	**2011**	**2001**	**2011**	**2001**	**2011**	**2001**	**2011**
Population	10294	12790	5598	5374	5241	6304	4036	4988	936	1336	26105	30992
Households[1]	2311	2874	1348	1294	1299	1576	1040	1286	455	668	6453	7731
Coloured Population	8170		4943		5004		4018		663		22798	

The sectors of employment in the NamaKhoi Municipality, according to the 2001 Census, are general government (21.7%), community, social and personal services (17.3%), wholesale & retail trade, catering and accommodation (17.3%) and mining (16%).

Seventy three percent (72.9%) are of employable age (between 15 and 65) (Census 2001). Fourty seven percent (47% or 12269 persons) of the employable population are employed, whilst 9.3% (or 2428 persons) are unemployed and discouraged work-seekers. Fourty four percent (43.7% or 11408 persons) of the population is not economically active.



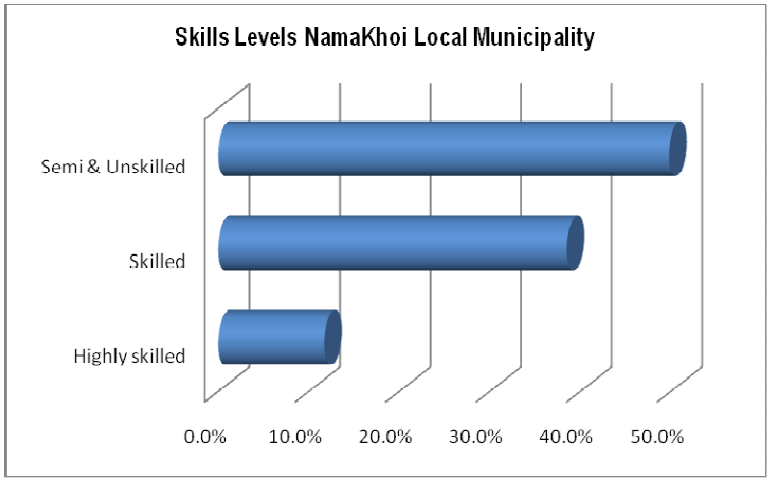
[1] No of families for 2011 calculated based on family size in 2001

Household income overall is low as 51% of the population earns R38 400 (maximum R3 200 per month) and less, whilst 33.4% earns between R 38 401 and R 153 600 (maximum R12 800 per month) and 9% earn more than R12 800 per month.

The high unemployment (9.3%) and economically not active (43.7%) rate together with low monthly household income necessitate economic growth and broadening and extending the skills base.

The majority of the Nama Khoi Local Municipality's population is employed in the following occupations:

- Elementary occupations (21.4%).
- Crafts and related trades (11.9%).
- Service workers, shop and market sales workers (11.4%).



This kind of occupations people take up and their skills levels relates directly to access to education. There are five secondary schools in these towns of which one is in Okiep, one in Concordia and three in Springbok. In 2012 there were nearly seven thousand seven hundred (6699) learners in fourteen schools with two hundred and thirty one teachers. The 14 schools are made up of

a) 6 primary schools
b) 2 intermediate schools
c) 1 combined school and
d) 5 secondary schools

Of note is the nearly one thousand and two hundred (1185) fewer learners that wrote in 2012 than in 2011 (9186 learners vs 10371). The numbers that passed with more than 40% in 2012 were

- Life Sciences 1795 (33% of those who wrote the subject or 19% of matrics)
- Mathematics 1572 (36.5% of those who wrote the subject or 17% of matrics)
- Physical Science 1324 (36.5% of those who wrote the subject or 14% of matrics)

The numbers entering the above subjects is very low and the numbers passing with good grades is even lower. These low numbers are symptomatic of a lack of hope and a doubtful view of the future (Thomas & Worthington, 2013).

According to Thomas and Worthington-Smith (2013) key initial insights of the social status of the receiving communities are that:

- "The communities have a strong sense of family with many out of town workers returning home for weekends and holidays.
- These towns are losing their young people. The headmaster of the Okiep high school reported that grandparents were raising 65% of his learners as the learner's parents had moved away to find work.
- Pupil numbers are declining. The Sacred Heart Primary School reported that their numbers enrolled had been steadily falling since the mine closed. At their heyday they had a staff of 26 but it has now dropped to only 9 staff.
- Employment is a big problem for example Concordia has employment for a limited number of workers in their dressed stone quarry. Carolusberg has virtually no work opportunities and only 2 or 4 shops and a bottle store.
- Almost all workers commute to Springbok. The journey is surprisingly short and is 10 to 15 minutes in most cases".

From the above it appears that there are more work for males than females, leaving women will little hope other than obtaining a grant by having a baby.

2.2 Policy and Planning Context

An analysis of the compatibility of the proposed project with the relevant sector policies and development plans is required. The following policies and plans are considered:

- White Paper on Energy Policy for the RSA (1998);
- White Paper on Renewable Energy (2003);
- National Energy Act (2008);
- National Alternative Energy Strategy (2009);
- National Spatial Development Perspective, 2006 (NSDP);
- Northern Cape Spatial Development Strategy;

2.2.1 National Level

White Paper on Energy Policy for the RSA (1998)

The White Paper on Energy Policy for South Africa (December1998) give recognition to "renewable energy sources in their own right; are not limited to small-scale and remote applications, and have significant medium and long-term commercial potential". "Renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future". As South Africa has a very attractive range of renewable resources, particularly solar and wind, the fact that renewable applications are the least costly particularly when social and environmental costs are considered, is strongly emphasized.

The proposed Klipdam Solar Facility is in line with the principles of the White Paper on Energy Policy for South Africa as it promotes the use of renewable resources to generate energy.

White Paper on Renewable Energy (2003)

As signatory to the Kyoto Protocol, Government is determined to, by means of the White Paper on Renewable Energy (November, 2003):

a) make good the country's commitment to reduce greenhouse gas emissions and
b) ensure energy security through diversification of supply (National Energy Act).

Government's long-term goal is to establish a renewable energy industry that will offer in future sustainable, fully non-subsidised alternatives to fossil fuels. The medium-term (10-year) target set in the White Paper is *10 000 GWh renewable energy contribution to final energy consumption by 2013, to be produced mainly from biomass, wind, solar and small-scale hydro electrical plants.* This target constitutes 4% of the total projected demand. The proposed Klipdam Solar Facility supports government's medium and long term renewable energy goals as it will assist to make good the country's greenhouse gas emissions and ensure energy security.

National Energy Act (2008)

Again, the National Energy Act (Act 34 of 2008) promotes diversification of energy sources and supply including renewable resources, i.e. solar and wind. The diversified energy resources have to be available in sustainable quantities at affordable prices and should support economic growth, poverty alleviation and consider the preservation of the environment.

As the proposed Klipdam Solar Facility enhances energy source diversification, it is thus in line with the National Energy Act.

National Alternative Energy Strategy

South Africa's government has identified around 20GW of pure renewable energy capacity and 4GW of co-generation technologies that may form part of its renewable energy procurement plan under the region's feed-in tariff programme. Concentrated solar power accounted ten percent (10%) of proposed capacity (NewsNet, 2010). The proposed solar facility contributes to this capacity.

National Spatial Development Framework, 2006 (NSDF)

To National Spatial Development Framework serves as instrument to coordinate all government action and to align social, economic and environmental goals. The National Spatial Development Framework provides the basis to maximize the overall social and economic impact of government development investment through interpreting the strategic direction, policy coordination and combining government action into a continuous spatial framework of reference.

The ultimate goal is to provide basic services, to ameliorate poverty and undo uneven and ineffective spatial patterns and address the additional burden on poor people.

The proposed Klipdam Solar Facility, Springbok complies with the normative principles of the National Spatial Development Framework as follows:

NSDF Principles	Proposed Solar Facility Klipdam, Carolusberg
a) Economic growth is a prerequisite to achieve policy objectives;	The proposed project will contribute positively to the GGP of the province.
b) Government spending on fixed investment should therefore be focused on localities of economic growth or economic potential;	The Northern Cape has been earmarked by the National Government for the generation of alternative energy and in particular solar energy. The proposed project is located in the Northern Cape and enhances government spending on localities of economic growth.
c) Efforts to address past and current social inequalities should focus on people not places.	The proposed solar facility create employment and on the job skills development opportunities.
d) To overcome the spatial distortions of apartheid, future settlement and economic development opportunities should be channeled into corridors and nodes that are adjacent to or link the main economic growth centers;	The proposed facility will provide economic development opportunities aligned with growth the corridor and centres in the Northern Cape. .
e) Future urban and rural development in the province should change the current pattern of resource application and investment significantly to ensure a sustainable environment for the future. Infrastructure investment and development spending should primarily support localities that will become major growth nodes in South Africa	The resource application and investment are aligned with national energy strategies and enhance the resource base of the Nama-Khoi Municipality. .

The proposed solar facility is in line with the principles of the National Spatial Development Framework as it promotes alternative energy generation and is within the “Karoo” corridor promoting economic growth.

2.2.2 Provincial and District Level

Northern Cape Provincial Spatial Development Framework, 2012 (NCSDF)

The principles of the National Spatial Development Strategy inform the Northern Cape Provincial Spatial Development Framework. The specific principles of social, economic, biodiversity and technological sustainability within the NCSDF, 2012 are supported by the solar facility:

A. Social Sustainability (refers to need)	Compliance by proposed Klipdam Solar Facility
Improve the quality of human life, including the elimination of poverty.	Indirectly contributing to the elimination of poverty as employment will be created.
Recognize the extent of cultural diversity and respond accordingly.	Not applicable
Protect and promote human health through a healthy environment.	Protect and promote human and environmental health, as the generation of solar energy does not generate greenhouse gasses.
Implement skills training and capacity enhancement for historically disadvantaged people.	The proposed project dedicates 1.5% of its annual revenue to reinvest in social responsibility and in particular to training teachers to teach scarce subjects i.e. mathematics, physical science, science and technology.

B. Economic Sustainability:	Compliance by proposed Klipdam Solar Facility
a) Ensure that new development promotes qualitative urban integration, affordable housing, and densification in a financially viable manner, without undermining existing property values.	Not applicable
b) Ensure that as a whole, the for- and non-profit projects combine into a financially viable local economy that benefits all stakeholders.	The generation of energy has a strong for- and non-profit focus and supports viable economies to the benefit of the stakeholders.
c) Promote employment creation.	Temporary jobs will be created during the construction and demolition phase whilst permanent jobs will be generated during the operational phase.
d) Enhance competitiveness within the context of the promotion of policies and practices that advance environmental sustainability.	Solar energy generation advances environmental sustainability.
e) Invest a meaningful share of the proceeds from the use of non-renewable resources in social and human-made capital, to maintain the capacity to meet the needs of future generations.	Proposed project commits 1.5% of annual revenue to develop human capital and small businesses.
f) Protect and enhance the property and investments of all inhabitants.	Proposed project impacts visually on property of Carolusberg inhabitants. Visual Impact assessments proposed mitigation measures to minimize the impact of the proposed solar facility on the investment of inhabitants of Carolusberg.

	C. Biophysical Sustainability:	Compliance by proposed Klipdam Solar Facility
a)	Minimise the use of the four generic resources, namely energy, water, land and materials.	Minimize the use of materials i.e. coal to generate energy.
b)	Maximize the re-use and/or recycling of resources.	Maximize the re-use of resources such as the energy of the sun.
c)	Use renewable resources in preference to non-renewable resources.	Use renewable resources
d)	Minimise air, land and water pollution.	Minimize air pollution
e)	Create a healthy, non-toxic environment.	Create a healthy, non-toxic environment.
f)	Maintain and restore the Earth's vitality and ecological diversity.	Enhance the Earth's vitality and ecological diversity by making use of renewable sources instead of non-renewable sources.
g)	Minimize damage to sensitive landscapes, including scenic, cultural, and historical aspects.	Mitigation measures ensure minimization of any possible damage i.e. to sensitive scenic, cultural and historic landscapes.

	D. **Technical Sustainability** (to create a *qualitative* cultural environment, in harmony with the natural environment within which it is located)	**Compliance by proposed Klipdam Solar Facility**
a)	Construct durable, reliable and functional structures.	Durable low maintenance structures to generate electricity.
b)	Pursue quality in creating the built environment.	Not applicable.

Other NCSDF directives the proposed Klipdam Solar Facility support, are:

E. *Emerging Growth Centers:*

The two areas identified are Upington and Springbok. Balancing the downscale of export grapes and copper mines industries with the growth prospects in non-traditional sectors i.e. energy generation and science will be the focus. Hence, significant rural-urban shift with some stepwise (onward and outward) migration to other major centers both inside and outside the province may be experienced. This migration will place greater demand for services on local authorities who are not identified as growth nodes. Development priorities in these areas and the proposed solar facility at Klipdam are aligned i.e.:

NCPSDF	Proposed Klipdam Solar Facility
Promoting of emerging growth opportunities to absorb the employment needs of a growing population;	Promote alternative energy, an emerging industry in South Africa
Developing small and medium enterprises in	The photovoltaic energy generation facility will provide

emerging economic sectors;	opportunities for small and medium enterprises to offer their services to the facility.
Re-distribution of service provision to take into account the internal movement of people into these towns from other centers.	The project has a 20-year life span and it is likely to be repeated. Its permanency will enable Nama-Khoi Municipality to comply with its service demands.

F. *Development Corridors and Special Resource Areas:*

There are four discernible development/ transport corridors of which the Orange River corridor (from Springbok through Upington to Kimberley (and the Free State and Gauteng)) is of concern for the proposed solar facility. These corridors aim to link the major economic centers in the province and are vital lifelines from a transport perspective. Hence, flagship economic development projects along these transport/ development corridors are priority. .

The proposed Klipdam Solar Facility is supportive of the majority of the focus area strategies of the Northern Cape Provincial Spatial Development Strategy.

Section 3: Preliminary Impacts

The chapter provides a description of possible impacts preliminary and partially assessed according standard assessment measures (Addendum A). Possible impacts during the construction, operational and decommissioning phases are outlined.

Impact categories considered for each phase are:

- Health and Social Well being
- Quality of living environment
- Economic and Material Well being
- Family and community life
- Cultural Impacts
- Gender relations
- Institutional, Legal, Political systems and Equity

3.1 Construction Phase

The following socio-economic aspects may change during construction: Population numbers, social health, skills levels, stability, homogeneousness, image of young women in the community and in the family, crime, job reservation, employment, job reservation of young women, family health, income, noise and dust levels, sense of place and economic activity. These changes may affect the health and social well being, quality of living environment and economic and material well being of the receiving community.

Variables Impact Category	Population Characteristics	Community & Institutional Arrangements	Political and Social Resources	Individual & Family changes	Community Resources
Health & Social Well Being	Population numbers Social Health/ Self esteem of women	None	Social Amenity use	Family Health	Noise levels Dust levels Cultural differences
Quality of living environment	None	None	None	None	Sense of Place
Economic & Material Well being	Skills levels	Employment	Job reservation	Income	Local Economy
Family and community life	Stability	None	Traffic levels	Levels of Education	Educational Opportunities
Culture	Homogeneousness	None	None	None	Local Economy
Gender Relations	Image of young women	Job reservation for women	None	Image of young women	None
Institutional, Legal, Political systems & Equity	Crime (Stock theft)	None	Pressure on Authority Services	None	None

A summary of the changes, the extent and intensity of the changes follows below:

Proposed Project Results	Description of Proposed Project Results	Extent	Intensity
Population Influx	Contract workers hired Interact with community after hours.	Local	Negative
Social Health decreases	Alcohol abuse may increase specifically amongst women	Local	Negative
Skills levels increases	On the job or formal skill training	Local to National	Positive
Stability decreases	Cohesion in community decrease	Local	Negative
Homogeneousness/ Engagement with different cultures	Influx of different cultures; homogeneousness decrease	Local	Negative
Image of young women	Image of women amongst themselves and in family and community either worsen or improve	Local	To determine
Crime increases	Social crimes increase; Theft increase	Local Local	Negative Negative
Employment	Skilled, semi-skilled and unskilled semi permanent job opportunities	Local to National	Positive
Job reservation for women	Women are employed	Local	Positive
Job reservation	Job uptake by political affiliation	Local	Negative
Traffic levels increase	Increased levels of heavy traffic	Local	Negative
Municipal and Authority services use increase	Using road patrols & traffic services (transport of plant and equipment) Verification of documentation; Obtaining of certificates and licenses. Involvement with social investment	Local	To determine
Income increase	Semi-permanent income	Local to National	Positive
Educational levels increase	Offering subjects in scarce disciplines (providing mathematics, science and technology education and training)	Local to National	Positive
Image of young women	Image in family either worsen or improve	Local	To determine
Noise increase	Increased noise levels and frequency decreasing family health	Local	Negative
Dust increase	Increased dust levels and frequency decreasing family health	Local	Negative
Sense of Place change	From uninterrupted landscape to solar facility	Local	Negative
Local Economy improve	Domestic purchase Project purchases Business opportunities for local businesses/ service providers / subcontractors	Local to National	Positive

Education/ specialization opportunities improve	Offering subjects in scarce disciplines (providing mathematics, science and technology education and training)	Local to National	Positive
Local Economy cease	Strengthening of "Non South African" street traders	Local to International	Negative

Positive impacts are: increased skills levels, employment, job reservation for women, increased income, increased levels of education, local economy improve and educational opportunities increase.

Impacts that can only be decided after further investigation are: image of young women in the community and their family, and the pressure on municipal and authority services.

Negative impacts are: population influx, social health and stability decrease, homogeneousness, crime increase, job reservation, family health decrease, dust and noise levels increase, negative engagement with different cultures, traffic levels increase and sense of place change. It appears that most of these negative impacts can be mitigated and either is neutralized or reduced to acceptable levels.

The duration of all the impacts during the construction phase will be short term.

The No Go Alternative will have no impact and the temporary positive impacts of the construction phase will be lost.

3.3 Operational Phase

3.4

On completion of the solar plant, the operational and maintenance phase of the solar plant will start.

The following socio-economic aspects may change during operations: Population numbers, skills levels, work environment, employment levels, social services use, family health, income, air and noise quality, sense of place, small business activities and economic activity. These changes may affect the health and social well being, quality of living environment and economic and material well being of the receiving community.

Variables **Impact Category**	**Population Characteristics**	**Community & Institutional Arrangements**	**Political & Social Resources**	**Individual & Family changes**	**Community Resources**
Health & Social Well Being	Population numbers Social Health / Self esteem of	None	None	Family Structure	None

	young women				
Quality of living environment	None	None	None	None	Sense of Place
Economic & Material Well being	Skills levels	Employment	None	Income	Culture Local Economy/ Small businesses Tourism
Family and community life	None	None	None	Levels of education	Educational Opportunities/ Specialization
Culture	None	None	None	None	Local Economy cease
Gender Relations	Image of young women	None	None	Image of Young women	None
Institutional, Legal, Political systems & Equity	None	None	None	None	None

It is unlikely that any change in political and social resources will be experience during the operational phase.

A summary of the changes, the extent and intensity of the changes follows below:

Proposed Project Results	Description of Proposed Project Results	Extent	Intensity
Population Influx	Perception that job opportunities exist encourage people to settle in community	Local	Negative
Social Health stay weak	Alcohol abuse stay high specifically amongst women	Local	Negative
Skills levels increase	Opportunity to improve subjects in scarce disciplines (1.5% of revenue/ annum)	Local	Positive
Image of young women	Young women become role models in community	Local	Positive
Employment	Creation of permanent employment opportunities Biannual temporary employment contracts	Local	Positive
Family Structure	No of single families increase	Local	Negative
Income	Minimal increased income.	Local	Positive
Levels of education	Increased levels of education as young people pursue the scarce subjects (specialization in mathematics, science and technology)	Local	Positive
Sense of Place	Permanent change in sense of place	Local	Negative

Culture	Created opportunity for foreign cultures to settle in community	Local to International	Negative
Local Economy	Domestic purchase National and International purchase National and International sales Enterprises are nurtured (0.6% revenue/ annum) Tourism may increase	Local to International	Positive

Most of the impacts appear to be positive i.e. increased skills levels, image of young women in community and within the family, employment, income, levels of education, local economy and educational opportunities.

Negative impacts such as population influx, social health, family structure, sense of place and culture can be mitigated and can either be neutralized or reduced to acceptable levels.

The duration of all the impacts during the operational phase will be long term.

The No Go Alternative will have no impact and the positive impacts of the operational phase will be lost.

3.3 Decommissioning Phase

The life span of the solar plant is 20 years where after it should be decommissioned. The following socio-economic aspects may change during demolition: Population numbers, skills levels, work environment, employment, family health, income, noise and dust levels, sense of place and economic activity. These changes may affect the health and social well being, quality of living environment and economic and material well being of the receiving community.

Variables **Impact Category**	**Population Characteristics**	**Community & Institutional Arrangements**	**Political & Social Resources**	**Individual & Family changes**	**Community Resources**
Health & Social Well Being	Population numbers	None	Use of health services	None	Noise levels Dust
Quality of living environment	None	None	None	None	Sense of Place
Economic & Material Well being	Skills levels	Employment Retrenchments	Renewal of plant	Income	Local Economy Small business support
Family and community life	None	None	Traffic Social Benefits /Educational Opportunities	None	None

Culture	None	None	None	None	None
Gender Relations	None	None	None	None	None
Institutional, Legal, Political systems & Equity	None	None	None	None	Social benefits ceased

Most of the impacts are positive i.e. increased skills levels, temporary employment, and renewal of plant, increased income, conducting local business stimulating the local economy and a restored sense of place.

Negative impacts such as population influx, retrenchment, use of health services, ceasing of educational opportunities, increased noise and dust levels, sense of dereliction and ceasing of social contributions can be mitigated and can either be neutralized or reduced to acceptable levels.

The duration of all the impacts during the demolition phase will be temporary and short term.

A summary of the changes, the extent and intensity of the changes follows below:

Proposed Project Results	Description of Proposed Project Results	Extent	Intensity
Population Influx	Contract workers hired	Local	Negative
Skills levels	On the job or formal skill training	Local to National	Positive
Employment	Skilled, semi-skilled and unskilled temporary job opportunities	Local to National	Positive
Retrenchment	Retrenchment of permanent employees	Local	Negative
Use of Health services	Uses of health services and particular emergency services	Local	Negative
Renewal of Plant	Existing plant is replaced by new plant	Local to National	Positive
Educational Opportunities	Education offered in scarce subjects cease	Local to National	Negative
Income	Temporary income	Local to National	Positive
Noise	Increased noise levels and frequency	Local	Negative
Dust	Increased noise levels and frequency	Local	Negative
Sense of Place	From solar farm to agricultural farm.	Local	Negative
Local Economy	Domestic Purchase Selling of recyclable plant material Business opportunities for subcontractors and service providers	Local to National	Positive
Social benefits	Social contribution to small businesses and education cease.	Local to National	Negative

Most of the impacts appear to be positive whilst the negative impacts i.e. population influx, increased dust and noise levels can be mitigated and either be neutralized or reduced to acceptable levels. The duration of all the impacts during the decommissioning phase will be short term.

The No Go Alternative will have no impact and the temporary positive impacts of the decommissioning phase will be lost.

3.4 Conclusion

From the preliminary assessment it is likely that the proposed solar facility will have an overall positive impact, whilst the No Go Alternative will have no impact.

Addendum A

Assessment Measures

The assessment departs from a factual description of the nature of the impact. This appraisal describes the effect the activity has on the environment. The description should include what is being affected and how it is affected. Assessment Measures are then applied to refine the results.

Extent (A)

This assessment measures the geographical scale of the impact.

Extent of the Impact		
Rating	**Definition of rating**	**Score**
Local	Extending only as far as the activity, Will be limited to the site and its immediate surroundings	**4**
Regional	Will have an impact on the region	**3**
National	Will have an impact on a national scale	**2**
International	Will have an impact across international borders	**1**

The extent of the impact locally has been amplified by rating local impact the highest whilst regional, national or international impacts follows with a lower rating. The rating of extent is thus project specific. .

Duration (B)

This assessment measures the lifetime of the impact.

Duration of the Impact		
Rating	**Definition of rating**	**Score**
Short term	0-5 years	**1**
Medium term	e.g. 5-15 years	**2**
Long term	The impact will cease after the operational life of the activity, either because of natural process or by human intervention.	**3**
Permanent	Where mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient	**4**

The duration of some of the impacts during construction is considered mainly short term, whilst the duration of the impacts during the operational phase is considered long term.

Intensity (C)

Here it should be established whether the impact is destructive or benign and should be indicated as:

Intensity of the Impact		
Rating	**Definition of rating**	**Score**
Low	The impact affects the environment in such a way that natural, cultural and social functions and processes are not affected	**1 (+/-)**
Medium	The affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and	**2 (+/-)**
High	Natural, cultural or social functions or processes are altered to the extent that it will temporarily or permanently cease.	**3 (+/-)**

The intensity of some of the impacts of the proposed project varies. In the case of the proposed project the criteria was customize and refined to their particular study (e.g. a positive impact of "high" significance is when the project could reduce local employment by 5% or more).

Probability (D)

This should describe the likelihood of the impact actually occurring indicated as:

Probability of the Impact		
Rating	**Definition of rating**	**Score**
Improbable	The possibility of the impact to materialize is very low either because of design or historic experience;	**1**
Probable	There is a distinct possibility that the impact will occur;	**2**
Highly probable	It is most likely that the impact will occur,	**3**
Definite	The impact will occur regardless of any prevention measures	**4**

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:

Significance of the Impact: (F)= (A*B*D+E)*C			
Rating	**Definition of rating**	**Score**	
Low	Where it will not have an influence on the decision;	0 to – 40	0 to 40
Medium	Where it should have an influence on the decision unless it is mitigated;	- 41 to - 80	41 to 80
High	Where it would influence the decision regardless of any possible mitigation.	- 81 to - 120	81 to 120
Very High	Where it would influence the decision regardless of any possible mitigation.	> - 120	> 120
The above significance bands have been determined through calculating a maximum potential score of 156 (e.g. positive or negative) applying the above criteria. This was then subdivided into broad bands as indicated above to provide a comparative assessment of all impacts in relation to the maximum possible significance score. The overall status of the impact (after mitigation) for the preferred alternative are also assessed applying the above criteria.			

The above rating scales will be applied to assess the impacts during the construction, operational and decommissioning phase.

References

NamaKhoi Local Municipality, 2012. *Integrated Development Plan 2012- 2017*

Statistics South Africa, 2011. Census 2011.

Thomas, J & Worthington-Smith, M. 2013. *Social Impact Assessment for Klipdam Solar Plant (DEA Ref 14/12/16/3/3/1/974)*

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AGRICULTURAL IMPACT ASSESSMENT
FOR PROPOSED 150MW SOLAR ENERGY FACILITY ON KLIPDAM, FARM 134/17 NEAR SPRINGBOK, NORTHERN CAPE PROVINCE

SCOPING PHASE REPORT

Report by
Johann Lanz

August 2013

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

Proposed Phase 1 – Construction of a 75MW Solar PV on farm 134/17, Klipdam, Springbok within the Nama Khoi Municipality in the Northern Cape Province (DEA Ref 14/12/16/3/3/2/561) and Phase 2 – the construction of a 75MW Solar PV on farm 134/17, Klipdam, Springbok within the Nama Khoi Municipality in the Northern Cape Province (DEA Ref 14/12/16/3/3/2/562)

Specialist:	**Private Soil Science Consultant**	
Contact person:	**Johann Lanz**	
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Professional affiliation(s) (if any)	**South African Council for Natural Scientific Professions**	

Project Consultant:	**Footprint Environmental Services**	
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Telephone:		Fax: **086 608 8304**
E-mail	**charlduplessis2@afrihost.co.za**	

4.2 The specialist appointed in terms of the Regulations

I, **Johann Lanz** , 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):

09 September 2013

Date:

Table of Contents

1 INTRODUCTION

NK Energie (Pty) Ltd is proposing to develop a 150MW Solar Energy Facility on Klipdam, Farm 134/17 approximately 5km north-west of the town of Springbok in the Northern Cape Province (see Figure 1). The development will consist of arrays of photovoltaic panels supported by mounting structures, an inverter station, internal access roads, cabling, fencing, a building for a workshop, storage and offices, and an on-site substation with a connection to the Eskom grid.

The development is currently in the Scoping Phase of the Environmental Impact Assessment and this scoping report describes the soils and agricultural potential of the proposed site and the potential impacts that the development may have on agricultural resources and production. Johann Lanz was appointed by Footprint Environmental Services as an independent specialist to conduct the study on soils and agricultural potential as part of the EIA.

Figure 1. Location map of the proposed site (with red boundary) north-west of Springbok.

2 DESCRIPTION OF THE TERRAIN, SOILS AND AGRICULTURAL CAPABILITY OF THE AFFECTED ENVIRONMENT

All the information on soils and agricultural potential in this report has been obtained from the online Agricultural Geo-Referenced Information System (AGIS) produced by the Institute of Soil, Climate and Water (Agricultural Research Council, undated).

A site plan of the farm is shown in Figure 2. The farm is approximately 1,370 hectares in extent and includes predominantly untransformed mountainous, Namaqualand veld which includes steep slopes and numerous exposed granite outcrops. The development footprint will affect only a portion of the total farm. The farm is bordered in the north by a tar road. Elevation varies between 800 m and 1,100 m above sea level. There are several small and only ephemeral water courses on the farm that run out of the mountains. The Acocks veld type classification for the entire site is Karoo and Karroid type. The biome classification is Succulent Karoo and vegetation type is Namaqualand Klipkoppe Shrubland. The geology of the site is granite and gneiss of the Namaqualand Metamorphic Complex.

The part of the site to the north of the mountainous parts and nearest to the tar road includes an area of flatter land (average slope of approximately 5%) that has been transformed. The old Springbok golf course was located in this area. This is the part of the site that is proposed for the solar development (see Figure 2).

Rainfall for the site is extremely low and is given as 195 mm per annum, with a standard deviation of 66 mm according to the South African Rain Atlas (Water Research Commission, undated). The average monthly distribution of rainfall is shown in Table 1. In terms of the relationship between rainfall and evaporation the site is classified as arid, which is a serious limitation to agriculture.

Table 1. Average monthly rainfall for the site (29° 38' S 17° 50' E) in mm (Water Research Commission, undated)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Tot**
6	7	12	18	27	31	31	25	16	10	7	6	**195**

The land type classification is a nation-wide survey that groups areas of similar soil and terrain conditions into different land types. There is only a single land type, Fc133, across the entire site and surrounding area. A summary detailing soil data for this land type is provided in Table 2.

The land on site is classified as having class 4 susceptibility to erosion. This is land with moderate to high water or wind erosion hazard that has generally moderately to strongly

sloping land and soils that have low to moderate erodibility.

Figure 2. Site plan. The farm boundary is shown in red. Transformed land on less mountainous terrain, that is proposed for the solar panel development, is indicated by green boundaries.

Land capability is the combination of soil suitability and climate factors. The site and surrounding area has a very low land capability. It is classified, on the 8 category scale, as class 7 – non-arable, low potential grazing land. The agricultural limitations are the mountainous terrain, the extremely shallow soils limited in depth by predominantly underlying rock, and the aridity.

Table 2. Land type data for site. Erosion indicates the severity of the erosion hazard on an 8 class system, with 8 being most severe. The '% of terrain unit' column gives the percentages of soil forms for the terrain unit (foot slopes) that is proposed for the location of the solar development.

Land type	Land capability class	Dominant soil forms	Depth (cm)	Clay % A horizon	Clay % B horizon	Depth limiting layer	Erosion hazard class	% of land type	% of terrain unit
Fc133	7	Rock outcrops	0			R	4	48	15
		Hutton	15-30	2-4	3-8	R		17	40
		Mispah	5-15	1-3		R		8	10
		Sterkspruit	20-35	6-15	15-40	pr		8	15
		Swartland	10-25	3-6	20-40	vp		6	10
		Glenrosa	10-25	3-8	4-10	so		6	5

Land capability class 7 = non-arable, low potential grazing land. Depth limiting layers: R = hard bedrock; pr = dense, prismatic clay layer; vp = dense, structured clay layer; so = partially weathered bedrock.

The site is located within a sheep farming agricultural region. There is no cultivation or evidence of past cultivation, apart from the old golf course. The land is used only for the grazing of small stock. The grazing capacity of the site is classified as between 26 and 30 hectares per large stock unit. There is no infrastructure on the site apart from the old golf course facility buildings and some other houses in the northern part of the site.

From an agricultural impact point of view, no sensitive areas were identified during scoping that should be avoided for inclusion in the development. The more level, transformed areas that are more suitable and are proposed for the solar development are also inherently more suitable than other parts of the site for agriculture. However, the agricultural potential is so severely limited, predominantly by the climate, that the loss of these areas to agriculture is not significant.

3 POTENTIAL IMPACTS

The following have been identified as potential impacts on agricultural resources and productivity, the significance of which will be determined during the EIA Phase. All these impacts are local in extent, confined to the site.

- Loss of agricultural land use due to direct occupation by PV panels and other infrastructure, including roads, for the duration of the project (all phases). This will take affected portions of land out of agricultural production.
- Soil erosion due to alteration of the surface run-off characteristics. Alteration of

run-off characteristics may be caused by construction related land surface disturbance, vegetation removal, the establishment of hard standing areas and roads, and the presence of panel surfaces. Erosion will cause loss and deterioration of soil resources and may occur during all phases of the project.

- Degradation of veld due to vehicle trampling and other disturbance, during construction phase.
- Loss of topsoil due to poor topsoil management (burial, erosion, etc) during construction related soil profile disturbance (levelling, excavations, road surfacing etc.) and resultant decrease in that soil's agricultural suitability.
- Generation of alternative land use income for land owners from energy facility rental.
- Cumulative impacts due to the regional loss of agricultural resources and production as a result of other developments on agricultural land in the region.

4 THE POTENTIAL SIGNIFICANCE OF IMPACTS

The significance of agricultural impacts is influenced by the severely limited agricultural potential of the land, which is suitable only for low intensity grazing of small stock. As a result, agricultural impacts are likely to be of low significance. Mitigation measures can also be put in place to reduce the significance of certain of these impacts, such as erosion. A detailed assessment of impacts, and mitigation recommendations will be done in the EIA phase.

5 ASSESSMENT TO BE UNDERTAKEN IN THE EIA PHASE

The following assessments will be undertaken in the EIA phase:

5.1 More detailed assessment of soil conditions

The EIA phase assessment will include a field investigation of soils and agricultural conditions across the site. This field investigation will be aimed at ground proofing the existing land type information and understanding the specific soil conditions on site. It will determine soil depths relevant to topsoil stripping and conservation for rehabilitation. The soil investigation will not be based on a grid spacing of test pits but will comprise a reconnaissance type of soil mapping exercise based on an assessment of surface conditions, topography, and hand augered samples in strategic places, if necessary. Such a soil investigation is considered adequate for the purposes of this study. A more detailed soil investigation is not considered likely to add anything significant to the assessment of agricultural soil suitability for the purposes of determining the impact of

the development on agricultural resources and productivity.

5.2 Assessment of erosion and erosion potential on site

The field investigation will involve a visual assessment of erosion, erosion potential and veld degradation on site, taking into account the specifics of the proposed development layout.

5.3 Assessment of specific on-site agricultural activities

The EIA phase will gather more detail on agricultural activity on the site and identify any locally important soil and agricultural issues. This will be done through interviews with farmers and agricultural role players in the area.

5.4 Terms of reference for EIA study

The terms of reference for the EIA study will include the requirements for an agricultural study as described under point 4 of section C of the National Department of Agriculture, Forestry and Fisheries document: *Regulations for the evaluation and review of applications pertaining to renewable energy on agricultural land***,** dated September 2011.

The above requirements together with requirements for an EIA specialist report may be summarised as:

- Identify and assess all potential impacts (direct, indirect and cumulative) of the proposed development on soils and agricultural potential.
- Describe and map soil types (soil forms) and characteristics (soil depth, soil colour, limiting factors, and clay content of the top and sub soil layers).
- Map soil survey points.
- Describe the topography of the site.
- Describe historical and current land use, agricultural infrastructure, as well as possible alternative land use options.
- Describe the erosion, vegetation and degradation status of the land.
- Determine the agricultural potential across the site.
- Provide recommended mitigation measures, monitoring requirements, and rehabilitation guidelines for all identified impacts.

6 REFERENCES

Agricultural Research Council. Undated. AGIS Agricultural Geo-Referenced Information System available at http://www.agis.agric.za/.

Water Research Commission. Undated. South African Rain Atlas available at http://134.76.173.220/rainfall/index.html.

Proposed Solar PV Facility

Klipdam Farm 134/17 Springbok: A Heritage Impact Assessment

AUGUST 2013

Report prepared for
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by

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Executive Summary

Instructions were given by Footprint Environmental Services for a Heritage Impact Assessment of the farm Klipdam 134/17 Springbok, where a 75 MW solar facility is proposed. A site visit was made on the 26th and 27th July 2013, and conducted in two parts: 1) the power corridor from the substation on the N7 highway to the farm; 2) the Klipdam property itself.

The survey was conducted on foot, inspecting open areas, tracks and erosion gullies where archaeological material might be exposed. A GPS track was made using a Garmin 60 GPS instrument, and any relevant or noteworthy material was marked by a GPS way point.

Powerline Corridor: The existing powerline runs across several sites which included: quartz chips and a core; a stone-walled kraal;; a large boulder below which were stone tools and porcelain; and a stone cairn (possibly a grave).

Klipdam Farm: on the whole the heritage on the farm is primarily historical. This includes the golf clubhouse, which is probably less than 60 years old, and associated infrastructure. The most noteworthy finds were grave markers

The incidence of possible graves needs to be dealt with, by avoidance, if possible. The three historic graves across from Jakkalswater are in a formal graveyard which should be left alone, as this area is probably outside the project plan. Three aboriginal graves are just beyond the golf course boundary, and if any construction takes place nearby, they should probably be fenced off to avoid damage by equipment, and a fourth also needs highlighting to avoid damage during the construction phase. Failing this, exhumation would be needed, and require requisite permits dealing with human remains from SAHRA.

The extremely limited prehistoric signature on the farm itself would indicate a low heritage potential for that part of the heritage. If the graves are highlighted, and avoided, there appears to be no other impediment to the project going ahead, at least from a heritage perspective.

CONTENTS page

List of Figures:

1. INTRODUCTION

Instructions were given by Footprint Environmental Services for a Heritage Impact Assessment of the farm Klipdam 134/17 Springbok where a 75 MW solar facility is proposed.

The farm is located on the south side of the road linking Okiep with Nababeep, (Figure 1) and is identified by the sign 'Klipdam Golf Course', which is now unused. The property has been zoned Agriculture 1. The climate of the farm is relatively dry with the main rains falling between May to August, but seldom exceeding 30mm per month. The basalt batholiths produce sheet runoff across the farm.

A site visit was made on the 26th and 27th July 2013, and conducted in two parts: 1) the power corridor from the substation on the N7 highway to the farm; 2) the Klipdam property itself.

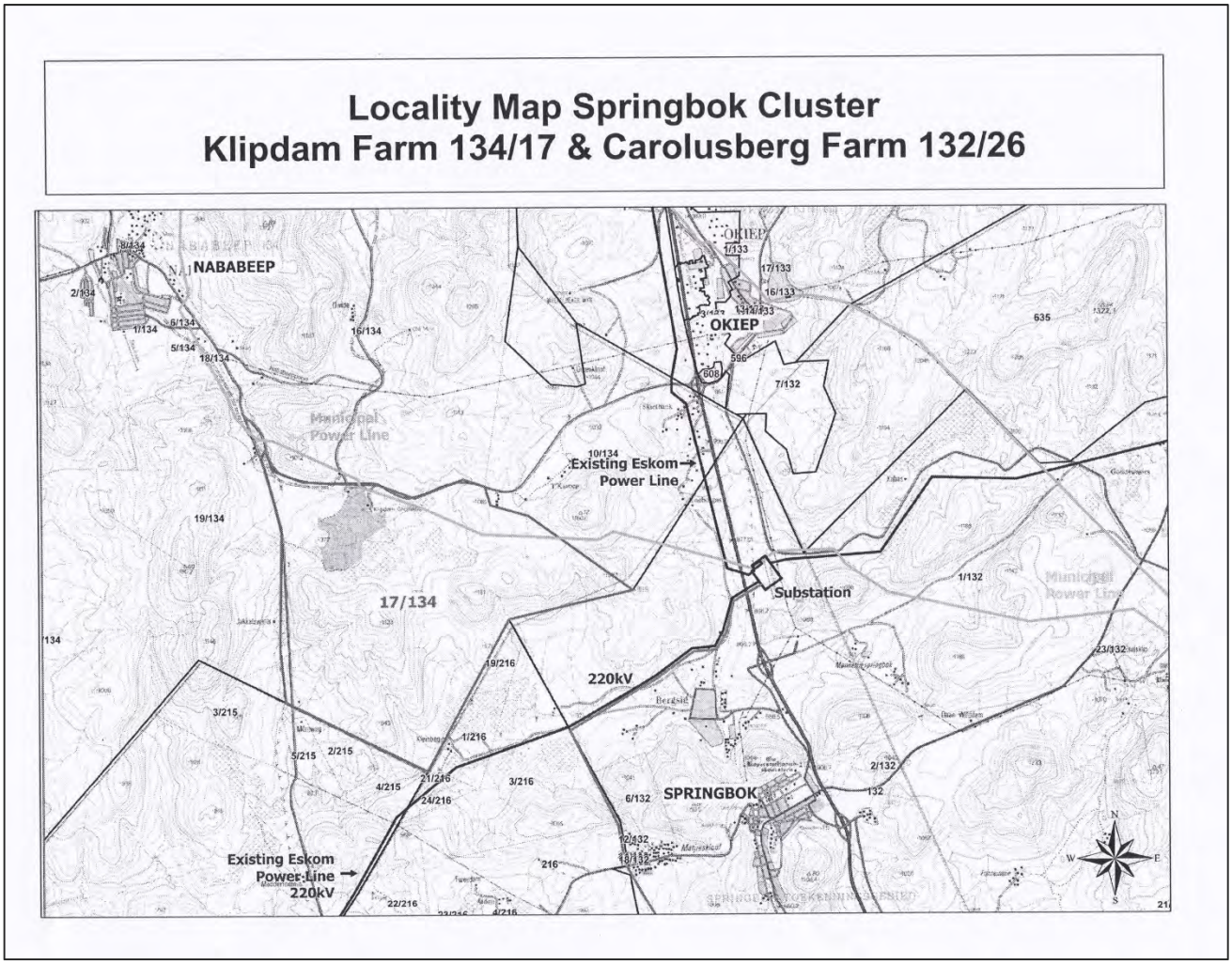

Figure 1: Location of Klipdam Farm 134/17 Springbok

2. METHODOLOGY

The landscape is primarily open veld with vegetation interspersed with granite bedrock exposures situated below steep granite batholiths (Figure 2). The target area on the farm was the vegetated north-facing slopes which would be best position for the solar panels (see green areas on Klipdam Sensitivity Map) (Figure 3). The work was facilitated by open access to the ground due to the relatively sparse vegetation on sandy soil. The survey was conducted on foot, inspecting open areas (Figure 4), tracks and erosion gullies (Figure 5) where archaeological material might be exposed.

Figure 2: Vegetation between granite bedrock exposures

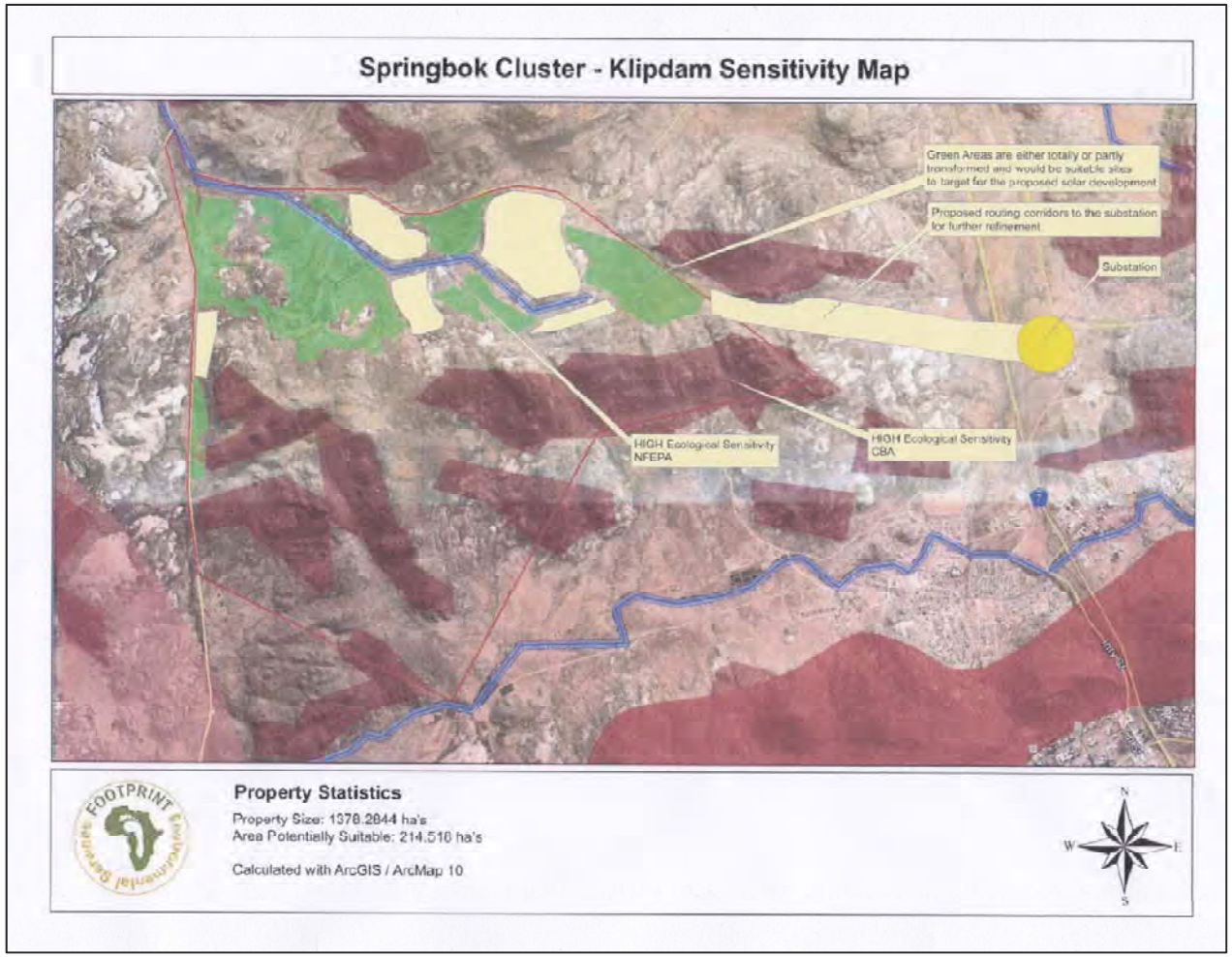

Figure 3: Klipdam sensitivity map (green areas optimal for the solar arrays)

Figure 4: Open area in vegetation

Figure 5: Sand deposit over weathered granite bedrock

A GPS track was made using a Garmin 60 GPS instrument, and any relevant or noteworthy material was marked by a GPS way point (Figure 6).

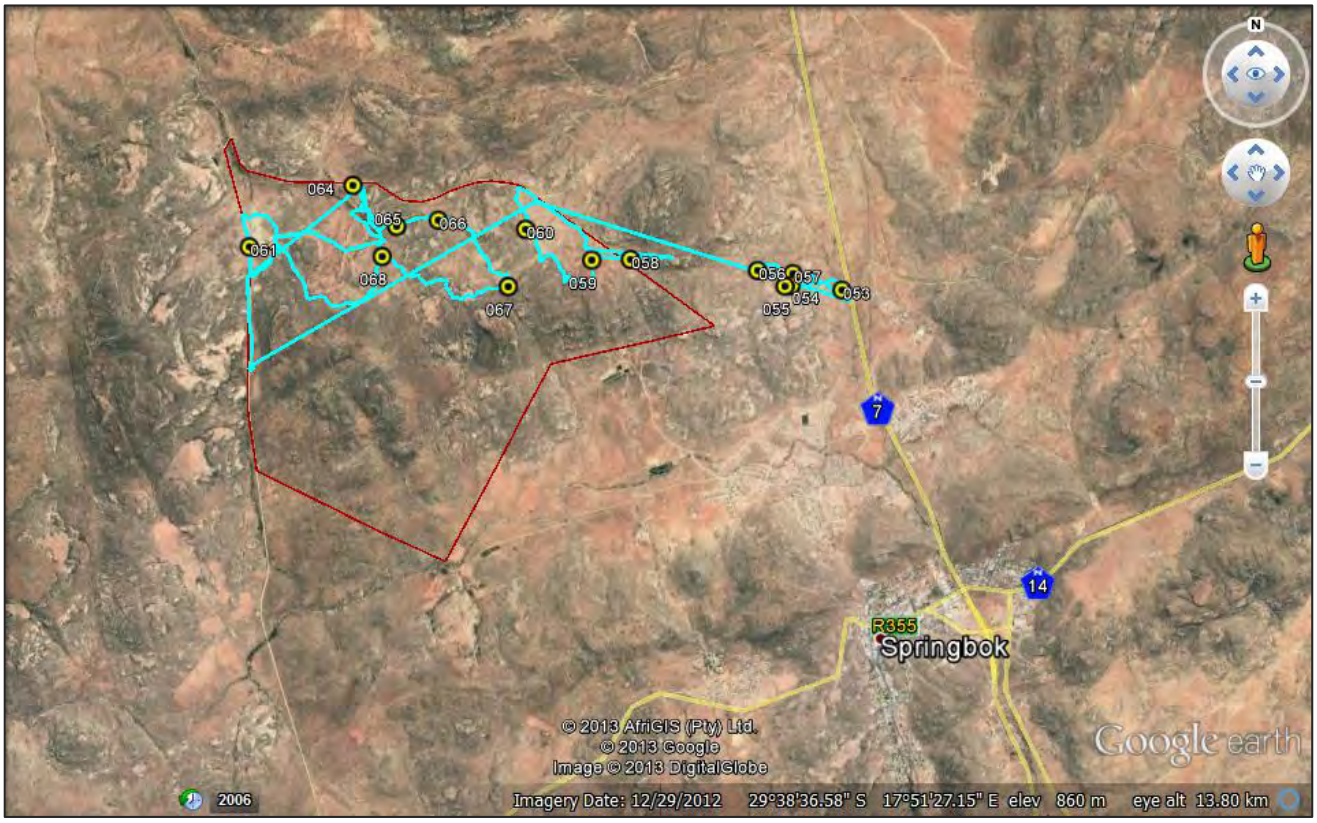

Figure 6: GPS track and waypoints

Table 1: Waypoints

WAYPOINT	COORDINATE	DESCRIPTION
053	S29 37.860 E17 52.740	View across from sub-station on N7
054	S29 37.834 E17 52.379	Quartz chips and core
055	S29 37.838 E17 52.337	Stone-walled kraal
056	S29 37.744 E17 52.142	Stone tools were found below this boulder
057	S29 37.761 E17 52.392	Stone cairn (possibly a grave)
058	S29 37.685 E17 51.251	Loose sands on weathered bedrock
059	S29 37.689 E17 50.982	North-east border fence line from power line
060	S29 37.502 E17 50.521	Quartz flakes
061	S29 37.599 E17 48.569	Historical graveyard on western boundary road
064	S29 37.225 E17 49.301	Klipdam Golf Course gate
065	S29 37.477 E17 49.612	Stone trough
066	S29 37.441 E17 49.906	Stone ring (possibly a grave)
067	S29 37.849 E17 50.400	Deadman bolt ring
068	S29 37.660 E17 49.509	Grave no. 1 near golf course

3. RESULTS

Powerline Corridor (Figure 7): The existing power line runs across several archaeological sites which included: quartz chips and a core (GPS 054: Gallery); a stone-walled kraal (GPS 055) (Figure 8); a large boulder (Figure 8), below which were stone tools and porcelain (GPS 056: Gallery); and a stone cairn (possibly a grave) (GPS 057) (Figure 10).

Figure 7: The power line corridor looking towards the substation

Figure 8: Stone-walled kraal (GPS 055)

Figure 9: Stone tools were found below this boulder(GPS 056)

Figure 10: Stone cairn (possibly a grave) (GPS 057)

Klipdam Farm: On the whole, the heritage on the farm is primarily historical. This includes the golf clubhouse (Figure 11) and associated infrastructure (e.g. garden and the fairways among the blue gum trees, Figures 12 & 13). Currently living on the farm are a caretaker, and a shepherd, the latter has a small house behind the clubhouse, and a small flock of sheep. The most noteworthy finds were grave markers (Historical: Family Dixon, Figure 14, GPS 061), and possibly aboriginal one (GPS 066, Figure 15), and three more (GPS 068, Figures 16, 17 & 18).

Figure 11: Golf clubhouse

Figure 12: Golf clubhouse garden

Figure 13: Golf club fairways among the blue gum trees.

Other historical material included a deadman ring, presumably for supporting a structure (but no structure is evident) (GPS 067: Gallery), and a stone trough (GPS 065: Gallery), located about 150m downslope from a current windmill.

It is noteworthy that very few prehistoric stone tools were seen on the farm, in spite of the information received that there were water seeps and springs below the high berg which would have always been attractive for human occupation.

I was informed by the caretaker on the property, Vic Bourne, that there had existed a narrow gauge railway in the northwest corner of the farm. The sleepers from the tracks have been collected, and are stacked on the stoep of the clubhouse.

Figure 14: Historical graveyard on western boundary road (GPS 061)

Figure 15: Stone ring (possibly a grave)(GPS 066)

Figure 16: Grave no. 1 near golf course (GPS 068)

Figure 17: Grave no. 2 near golf course

Figure 18: Grave no. 3 near golf course

4. DISCUSSION AND CONCLUSIONS

The only limitation to the survey was a lack of a development footprint. As far as observations were concerned, open areas were easily seen for prehistoric material, and historical sites could be identified. Within the power line corridor, there is an existing power line which runs across the

heritage sites identified in this report. Any additional power structures which might be built need to be aware of these sites, and to avoid them.

The incidence of possible graves needs to be dealt with, by avoidance, if possible. The three historic graves across from Jakkalswater (GPS 061, along the boundary road) are in a formal graveyard which should be left alone, as this area is probably outside the project plan. The three aboriginal graves (GPS 068) are just beyond the golf course boundary, and if any construction takes place nearby, they should probably be fenced off to avoid damage by equipment. The fourth (GPS 066) also needs highlighting to avoid damage during the construction phase. Failing this, if indeed these are graves, excavation and exhumation would be required. This would require the requisite permits dealing with human remains from the South African Heritage Resources Agency (SAHRA), and appointment of a qualified archaeologist.

Although the golf course existed prior to WWII, the clubhouse is much younger, and is probably less than 60 years old, so has limited heritage value.

The extremely limited prehistoric signature on the farm itself would indicate a low heritage potential for that part of the heritage.

If the graves are highlighted, and avoided, there appears to be no other impediment to the project going ahead, at least from a heritage perspective.

5. GALLERY

Quartz chips and core: GPS 054

Porcelain and quartz chips: GPS 056

Quartz flakes; GPS 060

Stone trough: GPS 065

Deadman ring: GPS 067

APPENDIX E – PUBLIC PARTICIPATION

BACKGROUND INFORMATION DOCUMENT
PROPOSED PHOTOVOLTAIC (PV) SOLAR ENERGY FACILITY (150MW) ON KLIPDAM, FARM 134/17, SPRINGBOK NORTHERN CAPE ROVINCE

DEA Ref. nr: 14/12/16/3/3/2/561 (Phase 1:75MW) and 14/12/16/3/3/2/562 (Phase 2:75MW)

Applicant : NK Energie (Pty) Ltd.

Project location: The Klipdam PV solar facility is proposed for Farm 134/17, Springbok (GPS 29^0 37'40.52"S & 17^0 49'10.07"). This is the old Nababeep golf course.

Project description: The proposed Klipdam PV Solar Energy Facility will have an electricity generation capacity of up to 150MW and will be developed in two phases. Each phase will have the capacity of 75 MW and will occupy and area greater that 20 hectares. The development will include an array of photovoltaic (PV) panels; mounting structures, underground cabling, internal routes and fences; a workshop and a substation.

Notice is given of a Public Participation Process in terms of the Environmental Assessment Regulations (GN No's R543, R554, R545 & R546) of 18 June 2010, promulgated under National Environmental Management Act (NEMA), Act 107 of 1998 as amended.

Listed Activities: The proposed Klipdam PV energy facility requires the undertaking of an Environmental Impact Assessment (EIA) Process. This process consists of a Scoping and Impact Assessment whereby environmental impacts are identified and assessed trough specialist studies and public participation. This process is applicable to both Phase 1 en 2 of the Klipdam PV Solar Energy Facility. Environmental authorization is required for Activities 1,10,11,13,18 (Government Notice 544), Activities 1,18,15 (Government Notice 545) and Activity 14 of Government Notice 546) of NEMA.

Public Participation Process:

Draft Scoping Report: Will be available at the Springbok Public Library and at the Nama-Khio Municipal offices at Nababeep.

Notification of the proposed development: 27th February 2014.

Initial registration as Interested and Affected Parties and commenting period: 3rd March 2014 – 14th April 2014.

Public Meeting: Will take place during the period of 5th June – 30th June 2014.

Final Environmental Impact Assessment Report (EIA) Report: Will be available at the Springbok Public Library and at the Nama-Khio Municipal offices at Nababeep.

Final commenting: 9th -30th June 2014.

Environmental Impact Assessment Report (EIA) Report: FES will compile final report and will submit it to DEA for the Record of Decision (RoD).

RoD: FES will circulate the RoD to all Registered I&AP.

Appeal: Opportunity for I&AP's to appeal the decision

Invitation to provide comments for the proposed development

Interested and Affected Parties (I&AP) are hereby requested to provide the following information to FOOTPRINT Environmental Services: Name, Surname, Postal Address, Tel no., Cell no., e-mail address and please also indicate your chosen means of communication with the EAP's. Please indicate any interest you may have in the project either direct business, financial and personal or any other interest in the proposed development. We require this information for inclusion in the I&AP's database. Always refer to **DEA Ref. nr: 14/12/16/3/3/2/561 (Phase 1:75MW) and 14/12/16/3/3/2/562 (Phase 2:75MW)**

Closing Date – 14th April 2014

FOOTPRINT Environmental Services (FES) has been appointed by the applicant as the independent Environmental Assessment Practitioners (EAP) to undertake the Scoping – EIA Process.

CONTACT DETAILS: FES, PO BOX 454, Porterville, 6810. charlduplessis2@afrihost.co.za. 079 17 24340 (Cell) and 086 608 8304 (Fax)

INLIGTING DOKUMENT

VOORGESTELDE FOTOVOLTAÏESE (PHOTOVOLTAIC) SOLAR ENGERGIE FASILITEIT (150MW) OP KLIPDAM, PLAAS 134/17, SPRINGBOK IN DIE NOORD KAAP

DOS Verw.nr. 14/12/16/3/3/2/561 (Fase1:75MW) en 14/12/16/3/3/2/562 (Fase 2:75MW)

Aansoeker : NK Energie (Pty) Ltd.

Projek ligging : Die voorgestelde son energie ontwikkeling word beplan vir Klipdam, Plaas 134/17, Springbok (GPS . 29^0 37'40.52"S & 17^0 49'10.07"). Dit is die eiendom waarop die ou Nababeep Golfbaan geleë is.

Projek beskrywing: Die voorgestelde fotovoltaïese (FV) sonkrag energie fasiliteit sal elektrisiteit genereer met 'n kapasiteit van 150MW. Die ontwikkeling sal in twee fases geskied, elke fase sal oor 'n kapasiteit van 75MW beskik terwyl elk ook meer as 20 hektaar sal beslaan. Die fasiliteit sal bestaan uit 'n groep sonpanele, steunpilare wat uit staal of beton sal bestaan, ondergronde kabels wat die verskillende komponente met mekaar verbind, 'n werkswinkel wat sal voorsien aan stoor-, kantoor- en ablusie behoeftes asook 'n substasie vanwaar die elektrisiteit in die ESKOM netwerk geplaas kan word deur die bestaande kraglyn op die eiendom.

Kennis vir publieke deelname proses word gegee in terme van die Wet op Nasionale Omgewingsbestuur (WNOB) (Wet no 107 van 1998) (soos gewysig) soos uiteengesit in Goewerment Kennisgewings (GK) Nommers R543, R544, R545 en R546 op 18 Junie 2010.

Toepaslike NEMA Regulasies: Die beplande Klipdam FV energie fasiliteit is onderworpe aan 'n Bestekopname en 'n Impak-evaluering proses. Dit behels die identifisering en evaluering van omgewingsimpakte deur spesialisstudies en openbare deelname. Hierdie proses is van toepassing op die voorgestelde fase 1 en fase 2 van die Klipdam FV Sonkrag energie fasiliteit. Aansoek word gedoen vir Aktiwiteite 1,10,11,13,18 (Goewerment Kennisgewing R544), Aktiwiteite 1,8,15 (Goewerment Kennisgewing R545) en Aktiwiteit 14 van (Goewerment Kennisgewing R546), in terme van WNOB.

Onafhanklike Omgewingsbepalings Praktisyns: FOOTPRINT Environmental Services (FES).

Publieke deelname proses:

Konsep Bestekopname Verslag: Is beskibaar by die Springbok Openbare Biblioteek (langs die Poskantoor) en by die Nama-Khio Munisipaliteit te Nababeep.

Kennisgewing oor die beplande ontwikkeling: Geskied op 27 Februarie 2014.

Aanvanklike kommentaar en registrasie as 'n Geïnteresseerde en Geaffekteerde Party:
3 Maart 2014 en sluit op 14 April 2014.

Sluitingsdatum: 14 April 2014

Publieke vergadering: Sal gedurende die tydperk van 9 -30 Junie 2014 plaasvind.

Finale konsep Bestekopname en 'n Impak-evaluering verslag: Sal by die Springbok Openbare Biblioteek en Nama-Khio Munisipaliteit te Nababeep beskikbaar gestel word op 9 Junie 2013.

Finale kommentaar en insette: Geskied vanaf 9 – 30 Junie 2014.

Bestekopname en 'n Impak-evaluering Verslag: FES finaliseer verslag en stuur aan DOS vir oorweging en besluitnemening.

Rekord van besluitneming : FES kommunikeer dit met alle Registreerde Geïnteresseerde en Geaffekteerde Partye:

Appél: Binne 20 dae na die besluitneming gekkomunikeer is.

Uitnodiging om kommentaar te lewer:

Geïnteresseerde en Geaffekteerde Party word vriendelik versoek om u naam, posadres, faks en e-pos en u verkose kommunikasie meganisme aan onderstaande adres te stuur. Alle Geïnteresseerde en Geaffekteerde Partye word vriendelik versoek om kommentaar te lewer oor die voorgestelde projek of om kwessies te identifiseer wat u in die verslag wil laat aanspreek. Dui ook asseblief aan van enige direkte sake-, finansiële, persoonlike of ander belang wat u in die aansoek mag hê. Meld asseblief ten alle tye in u korrespondensie **DOS Verw.nr. 14/12/16/3/3/2/561 (Fase1:75MW) en 14/12/16/3/3/2/562 (Fase 2:75MW)**.

Kontakbesonderhede: FOOTPRINT Environmental Services**,** Posbus 454, Porterville 6810, Faks 086608304, Sel 079 17 24340 en e-pos charlduplessis2@afrihost.co.za

NOTIFICATION

PROPOSED 150 MW PHOTOVOLTAIC (PV) SOLAR ENERGY FACILITIES on KLIPDAM, FARM 134/17, SPRINGBOK IN THE NORTHERN CAPE

KENNISGEWING

VOORGESTELDE 150 MW FOTOVOLTAïESE (PHOTOVOLTAIC) SOLAR ENGERGIE FASILITEIT OP KLIPDAM, PLAAS 134/17, SPRINGBOK IN DIE NOORD KAAP

Indien u enige kommentaar het en wil registreer as 'n Geïnteresseerde en Geaffekteerde Party, voltooi asseblief die vorm en stuur terug aan ***FOOTPRINT Environmental Services voor of op 14 April 2014.***

Should you have any comments and would like to register as ad Interested and Affected Party ("IAP"), please complete this Form and return to ***FOOTPRINT Environmental Services on 14th April 2014.***

Kontakbesonderhede / Contact details:

Posbus / PO Box 454, Porterville, 6810; 086 6088304 (faks / fax); e-pos / e-mail charlduplessis2@afrihost.co.za

Titel en Naam (Title and Name)	
Adres / Address	
Tel en Faks (Tel and Fax)	
Sel / Cell	
E-pos / E-Mail	

U KOMMENTAAR / YOUR COMMENTS

1. Die volgende kwessies moet aangespreek word in die verslag / The following issues should be addressed in the report.

2. Die volgende kommentaar word gelewer / The following comments are made.

3. Enige persoonlike, besigheid, finansiele of ander belange by die aansoek. Any personal, business, financial or other interests regarding this application.

DANKIE VIR U DEELNAME / THANK YOU FOR YOUR PARTICIPATION

PROPOSED PHOTOVOLTAIC (PV) SOLAR ENERGY FACILITIES on KLIPDAM, FARM 134/17, SPRINGBOK IN THE NORTHERN CAPE

DEA REFERENCE NUMBERS: 14/12/16/3/3/2/561 (Phase 1 - 75MW) and 14/12/16/3/3/2/562 (Phase 2 – 75MW)

DRAFT SCOPING REPORT & NOTIFICATION SENT TO KEY STAKEHOLDERS

XXXXXXXX 2013

Group	Organisation / Department	Title	Initials	Surname	Postal	Town	Code	Contact number
Authorities (Neighbor)	Nama-Khoi Municipality	Mr	A	Baartman	PO Box 17	Springbok	8240	027 7188100
Authorities	Namakwa District Municipality	Ms	M	Brandt	Private Bag X 20	Springbok	8240	027 7182000
Authorities	Northern Cape Department of Environmental and Nature Conservation	Ms	T	Makaudi	90 Long street, Sasko Building,	Kimberley,	8301	053 8077430 T 053 8313530 F
Authorities	ESKOM	Mr	K	Leask	PO Box 1091,	Johannesburg	2000	011 800811
Authorities	National Department of Agriculture, Forestry and Fisheries. (Delegate of the Minister Act 70 of 1970)	Ms	M	Marubini	Private Bag X120,	Pretoria	0001	012 3197619
Authorities	National Department of Agriculture, Forestry and Fisheries. (AgriLand Liaison Officer)	Mr	T	Buthelezi	Private Bag X120,	Pretoria	0001	012 3197634
Authorities	NERSA	Mr	S	Khumalo	PO Box 40343	Arcadia	0007	
Authorities	Department of Water Affairs	Mr	A	Abrahams	P/Bag X1601	Kimberley	8300	053 8308803 T 053 8314534
Authorities	SKA – Project office	The		Manager	PO Box 522940	Saxonwold	2132	011 442 2434 011 422 2454
Civil Society	Ward Councilor - Nababeep (Nama-Khoi Municipality)				PO Box 17	Springbok	8240	027 7188100
Landowner	Klipdam, Farm 134/7	Dr	V	Vaughan	PO Box 238	Nababeep	8265	
Neighbor	O'Kiep Copper Company		The	Manager	PO Box 17	Nababeep	8265	027 713 2239 T 027 713 2202 F
Neighbor	Oumenshoogte Community	Mr	Michael	Van der Poll		Springbok	8240	Nr nie gelys
Neighbor	Jakkalswater	Mr	L	Jordaan	Posbus 272	Springbok	8240	0832348010
Neighbor	Moreweg	Mr	Lien	Mostert	PO Box 150	Lutzville	8165	0767643977

Neighbor	Modderfontein	Mr	Coenie	Rossouw	Posbus 27	Springbok	8240	0277121764
Neighbor	Farm 215/4	Mr		Hahnel	Werk by sapd	Springbok	8240	027 7189130
Neighbor	Kleingeluk (216/21)	Mr	Eric	Obermeyer	Posbus 162	Springbok	8240	02771812 78
Neighbor	216/1	Mr		Kleinbegin		Springbok	8240	Nie gelys
Neighbor	216/19	Mr	Eduard	Mostert	PO Box 382	Springbok	8240	027 7121410

NOTIFICATION

PROPOSED 150 MW PHOTOVOLTAIC (PV) SOLAR ENERGY FACILITIES on KLIPDAM, FARM 134/17, SPRINGBOK IN THE NORTHERN CAPE

KENNISGEWING

VOORGESTELDE 150 MW FOTOVOLTAïESE (PHOTOVOLTAIC) SOLAR ENGERGIE FASILITEIT OP KLIPDAM, PLAAS 134/17, SPRINGBOK IN DIE NOORD KAAP

Indien u enige kommentaar het en wil registreer as 'n Geïnteresseerde en Geaffekteerde Party, voltooi asseblief die vorm en stuur terug aan ***FOOTPRINT Environmental Services voor of op 14 April 2014.***

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Kontakbesonderhede / Contact details:

Posbus / PO Box 454, Porterville, 6810; 086 6088304 (faks / fax); e-pos / e-mail charlduplessis2@afrihost.co.za

Titel en Naam (Title and Name)	
Adres / Address	
Tel en Faks (Tel and Fax)	
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U KOMMENTAAR / YOUR COMMENTS

1. Die volgende kwessies moet aangespreek word in die verslag / The following issues should be addressed in the report.

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DANKIE VIR U DEELNAME / THANK YOU FOR YOUR PARTICIPATION

VOORGESTELDE FOTOVOLTAïESE SOLAR ENGERGIE FASILITEIT (150MW) OP KLIPDAM, PLAAS 134/17, SPRINGBOK IN DIE NOORD KAAP

DOS Verw.nr. 14/12/16/3/3/2/561 (Fase 1:75MW) en 14/12/16/3/3/2/562 (Fase 2: 75MW)

Aansoeker : NK Energie (Pty) Ltd

Konsultante: FOOTPRINT Environmental Services

Kennis vir publieke deelname proses word gegee in terme van die Wet op Nasionale Omgewingsbestuur (WNOB) (Wet no 107 van 1998) (soos gewysig) soos uiteengesit in Goewerment Kennisgewings (GK) Nommers R543, R544, R545 en R546 op 18 Junie 2010.

Projek ligging : Die voorgestelde son energie ontwikkeling word beplan vir Klipdam, Plaas 134/17, Springbok (GPS . 29^0 37'40.52"S & 17^0 49'10.07").

Projek beskrywing: Die voorgestelde fotovoltaïese (FV) sonkrag energie fasiliteit sal elektrisiteit genereer met 'n kapasiteit van 150MW. Die ontwikkeling sal in twee fases geskied, elke fase sal oor 'n kapasiteit van 75MW beskik terwyl elk ook meer as 20 hektaar sal beslaan. Die fasiliteit sal bestaan uit 'n groep sonpanele, steunpilare, ondergronde kabel, paaie en sekuriteit heinings, 'n werkswinkel en 'n substasie.

Gelyste aktiwiteite: Die beplande Klipdam FV energie fasiliteit is onderworpe aan 'n Bestekopname en 'n Impak-evaluering proses. Aansoek word gedoen vir Aktiwiteite 1,10,11,13,18 (Goewerment Kennisgewing R544), Aktiwiteite 1,8,15 (Goewerment Kennisgewing R545) en Aktiwiteit 14 van (Goewerment Kennisgewing R546), in terme van WNOB.

Registrasie van Geïnteresseerde en Geaffekteerde Partye (GGP). 'n Konsep Bestekopname verslag sal vanaf **3 Maart 2014** by die Openbare Biblioteek op Springbok en by die Nama-Khio Munisipaliteit te Nababeep beskikbaar wees. Om te registreer as GGP, voorsien asb. naam, posadres, faks en e-pos en meld u verkose kommunikasie meganisme skriftelik aan die konsultante. Dui ook asseblief aan enige direkte sake-, finansiële, persoonlike of ander belang in die goedkeur of afkeur van die aansoek. Meld ten alle tye die DOS Verw. 14/12/16/3/3/2/561 (Fase 1 - 75MW) en 14/12/16/3/3/2/562 (Fase 2 – 75MW)

Sluitingsdatum – 14 April 2014

PROPOSED PHOTOVOLTAIC (PV) SOLAR ENERGY FACILITY (150MW) ON KLIPDAM, FARM 134/17, SPRINGBOK IN THE NORTHERN CAPE

DEA Ref. nr: 14/12/16/3/3/2/561 (Phase 1:75MW) and 14/12/16/3/3/2/562 (Phase 2:75MW)

Applicant: NK Energie (Pty) Ltd.

Consultants: FOOTPRINT Environmental Services

Notice is given of a Public Participation Process in terms of the Environmental Assessment Regulations (GN No's R543, R554, R545 & R546) of 18 June 2010, promulgated under National Environmental Management Act (NEMA), Act 107 of 1998 as amended.

Project location: The Klipdam PV solar facility is proposed for Farm 134/17, Springbok (GPS 29^0 37'40.52"S & 17^0 49'10.07").

Project description The proposed Klipdam PV Solar Energy Facility will have an electricity generation capacity of up to 150MW and will be developed in two phases. Each phase will have the capacity of 75 MW and will occupy and area greater that 20 hectares. The development will include an array of photovoltaic (PV) panels; mounting structures, underground cabling, internal routes and fences; a workshop and a substation.

Listed Activities: The proposed Klipdam PV energy facility requires the undertaking of an Environmental Impact Assessment (EIA) Process. This process is applicable to both Phase 1 en 2 of the Klipdam PV Solar Energy Facility. Environmental authorization is required for Activities 1,10,11,13,18 (Government Notice 544), Activities 1,18,15 (Government Notice 545) and Activity 14 of Government Notice 546) of NEMA.

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Closing date – 14 April 2014

Sean Ranger
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Fax: 086 655 8060
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3 Laborie St, Courtrai
South Paarl 7646

FOOTPRINT Environmental Services
www.footprintservices.co.za

Charl du Plessis
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charlduplessis2@afrihost.co.za
PO Box 454
Porterville 6810

KENNISGEWING – PUBLIEKE DEELNAME

VOORGESTELDE FOTOVOLTAÏESE (PHOTOVOLTAIC) SOLAR ENGERGIE FASILITEIT (150MW) OP KLIPDAM, PLAAS 134/17, SPRINGBOK IN DIE NOORD KAAP

DOS Verw.nr. 14/12/16/3/3/2/561 (Fase1:75MW) en 14/12/16/3/3/2/562 (Fase 2:75MW)

Aansoeker : NK Energie (Pty) Ltd

Konsultante: FOOTPRINT Environmental Services

Kennis vir publieke deelname proses word gegee in terme van die Wet op Nasionale Omgewingsbestuur (WNOB) (Wet no 107 van 1998) (soos gewysig) soos uiteengesit in Goewerment Kennisgewings (GK) Nommers R543, R544, R545 en R546 op 18 Junie 2010.

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Registrasie van Geïnteresseerde en Geaffekteerde Partye (GGP). 'n Konsep Bestekopname verslag sal vanaf 3 Maart 2014 by die Openbare Biblioteek op Springbok en by die Nama-Khio Munisipaliteit te Nababeep beskikbaar wees. Om te registreer as GGP, voorsien asb. naam, posadres, faks en e-pos en meld u verkose kommunikasie meganisme skriftelik aan die konsultante. Dui ook asseblief aan enige direkte sake-, finansiële, persoonlike of ander belang in die goedkeur of afkeur van die aansoek. Meld ten alle tye die DOS Verw. 14/12/16/3/3/2/561 (Fase 1 - 75MW) en 14/12/16/3/3/2/562 (Fase 2 – 75MW)

Sluitingsdatum – 14 April 2014

NOTIFICATION – PUBLIC PARTICIPATION

PROPOSED PHOTOVOLTAIC (PV) SOLAR ENERGY FACILITY (150MW) ON KLIPDAM, FARM 134/17, SPRINGBOK IN THE NORTHERN CAPE

DEA Ref. nr: 14/12/16/3/3/2/561 (Phase1:75MW) and 14/12/16/3/3/2/562 (Phase 2:75MW)

Applicant: NK Energie (Pty) Ltd.

Consultants: FOOTPRINT Environmental Services

Notice is given of a Public Participation Process in terms of the Environmental Assessment Regulations (GN No's R543, R554, R545 & R546) of 18 June 2010, promulgated under National Environmental Management Act (NEMA), Act 107 of 1998 as amended.

Project location: The Klipdam PV solar facility is proposed for Farm 134/17, Springbok (GPS 29^0 37'40.52"S & 17^0 49'10.07").

Project description The proposed Klipdam PV Solar Energy Facility will have an electricity generation capacity of up to 150MW and will be developed in two phases. Each phase will have the capacity of 75 MW and will occupy and area greater that 20 hectares. The development will include an array of photovoltaic (PV) panels; mounting structures to be either rammed steel pipes or piles with pre-manufactures concrete footings, underground cabling between to different components, internal routes and fences; a workshop area that will cater for storage, offices, ablution facilities and a substation to evacuate the power from the facility into the ESKOM grid via the existing power line that transverse the site.

Listed Activities: The proposed Klipdam PV energy facility requires the undertaking of an Environmental Impact Assessment (EIA) Process. This process consists of a Scoping and Impact Assessment whereby environmental impacts are identified and assessed trough specialist studies and public participation. This process is applicable to both Phase 1 en 2 of the Klipdam PV Solar Energy Facility. Environmental authorization is required for Activities 1,10,11,13,18 (Government Notice 544), Activities 1,18,15 (Government Notice 545) and Activity 14 of Government Notice 546) of NEMA.

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Closing date – 14 April 2014

Sean Ranger

Cell: 083 294 8776
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FOOTPRINT Environmental Services

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Charl du Plessis

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charlduplessis2@afrihost.co.za
PO Box 454
Porterville 6810

MAIL DROP AT OUMENSHOOGTE, NABABEEP

MARCH 2014

NAAM & VAN	POS ADRESS	DATUM	HANDTEKENING

APPENDIX F – DETAILS OF EAP AND EXPERTISE

Sean Ranger holds an MSc in Sustainable Environmental Management the thesis dealing with a Bayesian GIS model for species distributions in the Western Cape. On leaving University he gained eight years experience in Research & Development for Bayer (Pty) Ltd and five years of contractual experience in Stewardship and the varied fields of conservation development & strategic planning, implementation and management and has successfully co-founded and co-managed FOOTPRINT Environmental Services that is now nearing its third year.

He has been very active in the Stewardship Arena for a number of years and was a team member on the first Stewardship Pilot Project that was initiated in 2001/2002 in the Western Cape. He managed the Agter Groenberg Pilot Site one of two pilot sites identified through use of the CAPE Lowlands Fine-scale Conservation Plan. The pilot phase of stewardship was regarded as a highly successful project and produced some of the first Contract Nature Reserves in South Africa. One of them, the Elandsberg Nature Reserve an in perpetuity contract which saw the conservation of significant sections of Critically Endangered Swartland Shale Renosterveld. The experience gained during this period included the use fine scale conservation plans (at that time the CAPE Lowlands Project) to identify priority sites for stewardship interventions, designing pamphlets and presentations on stewardship for the intervention, succeeding in on the ground negotiation with landowners in an agricultural setting for the establishment of stewardship sites, including testing and refining contractual agreements with landowners, assisting with the development of the stewardship database, developing Environmental Management Plans and contributing to the Stewardship Operational Manual for the CapeNature Stewardship program.

From here he joined the Greater Cederberg Biodiversity Corridor (CAPE Landscape Scale Conservation Intervention) as a project manager, an in this capacity used the initial experience gained from the Stewardship Pilot Project to develop a stewardship implementation methodology in a landscape scale conservation intervention context and undertook the development of framework for the engagement of the agricultural sector to mainstream biodiversity conservation. Here the stewardship focus was on the establishment of biodiversity corridors in two key areas, the Sandveld Core Corridor and the Cederberg Core Corridor. The character of these two sites differed dramatically in that the Sandveld Core Corridor is an area that was rapidly transformed for Potato & Rooibos production, while the Cederberg Core Corridor was based within the boundaries of a well established conservancy, the Cederberg Conservancy. Additional experience gained here included developing a strategic approach to stewardship within a broadly focussed landscape initiative, this included the integration of an Area-wide planning process with stewardship, developing and initiating the core corridor concept, developing a corridor database, the development of a 12-step negotiation process for stewardship, refinement of

Environmental Management Plans, co-authoring the first drafts of an operational approach to corridor formation, chairing multi-stakeholder task teams (Sandveld Task Team) and later as a Senior project Manager and as the Acting Co-ordinator of the GCBC exposure to the strategic management of a large landscape scale conservation intervention with all that entails, this project had an operating budget of approx, R 16 million at the time.

As the owner of Ranger Consulting he has contributed to the development of a biodiversity best practices guideline for both the potato and Rooibos tea industries this built on initial experience obtained on the Steering Committee of the Biodiversity and Wine initiative. The mainstreaming of biodiversity conservation into the economic sector, in this case the agric. sector is fundamentally important in ensuring sustainable outcomes at regional scales. It included the development of the terms of reference for the consultants and later the development of an implementation strategy for the potato best practices project and the development of an Environmental Management Plan, Project plans and an auditing system. He has been responsible for the piloting and implementation of these guidelines since March 2008 on 35 producer farms. Currently the project is focussed on developing recommendations for the implementation of a law enforcement strategy for alleged illegal development on the West Coast, these recommendations will feed into a broader law enforcement strategy being developed by the Department of Environment and Development Planning. The project is ongoing.

As a Director of FOOTPRINT Environmental Services a broad range of projects have been undertaken including: Biodiversity Report for the Bergrivier Municipality, Operational Management Plan for the Cederberg Conservancy, Rehabilitation and Erosion Management Plan for the Grootwinterhoek Wilderness Area, Environmental Assessments for Ecotourism Developments, Environmental Assessments for Agricultural Developments (x4), Environmental Assessments for Bulk Water Supply for the Department of Public Works (x3),Environmental Assessments for the construction of weirs (x2), Environmental Assessment for the construction of a Hospital in Saldanha for the Dept of Public Works, Environmental Assessment for PV Solar - Ceres, S24G Rectification Applications (x2), a number of Integrated Fire and Alien Clearing Plans, Integrated Environmental Management Plans aligned to international certification organisations in the agricultural sector, GIS based Area-wide Planning for the Nieuwoudtville Plateau. See also www.footprintservices.co.za

APPENDIX G – ADDITIONAL INFORMATION

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NOTICE OF INTENT TO LANDOWNER

Gedeelte 17 van plaas 134 Nababeep
Klipdam Bewaringsgebied (Edms)Bpk - 2006/011026/07

Proposed Solar PV Facility

Notice is hereby given of an Environmental Impact Assessment process in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA). According to the Regulations contained in Article 24(5) of NEMA dated August 2010 and Government Notice 718 of the National Environmental Management Waste Act 2008 (Act 59 of 2008), an environmental impacts assessment process must be undertaken when seeking an environmental authorisation from the competent authority before commencement of listed activities associated with the proposed development.

As the owner of Gedeelte 17 van plaas 134 Nababeep Nama Khoi Munisipaliteit Provinsie Noord-Kaap this letter serves as a formal notice to inform you that Cedarberg Conservation Services CC, trading as FOOTPRINT Environmental Services (FES), have been appointed by NK Energie to undertake an Environmental Impact Assessment process for a proposed Solar PV Development on the property

Please be advised that a mandatory public participation process will be undertaken as part of the Environmental Impact Assessment process and that you have the right to participate in this process as a key stakeholder. Please acknowledge that permission has been granted to NK Energie to proceed with the Environmental Impact Assessment process for the Proposed Solar PV Development on the identified property. Please sign the acknowledgement below and forward an original hardcopy of the signed document to the FES postal address provided above. Additionally please forward a fax and/or a scanned electronic copy to FES (*the contact details are provided in the letterhead above*).

Regards

K.S Ranger
Director FES

C.P du Plessis
Director FES

ACKNOWLEDGEMENT OF THIS NOTICE AND THE INTENT TO UNDERTAKE AN ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

As required in terms of Chapter 3 of the Environmental Impact Assessment Regulations of 2010.

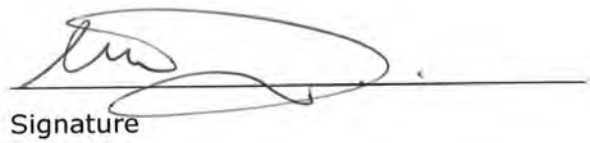
Klipdam Bewaringsgebied (Edms)Bpk - 2006/011026/07 as the lawful owner of Gedeelte 17 van plaas 134 Nababeep Nama Khoi Munisipaliteit Provinsie Noord-Kaap is aware and have provided permission to NK Energie to undertake an Environmental Impact Assessment process for the Proposed Solar PV Development on Gedeelte 17 van plaas 134 Nababeep Nama Khoi Munisipaliteit Provinsie Noord-Kaap. Furthermore I acknowledge that I have been informed of my rights to participate in the public participation process.

VICTOR Hugo VAUGHAN

Full Name

5810045101 083

ID Number



Signature

9/3/2013

Date