ORLIGHT SA (PTY) LTD

DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

FOR THE

PROPOSED DEVELOPMENT OF THE AGGENEYS SOLAR PHOTOVOLTAIC POWER PLANT IN THE NORTHERN CAPE PROVINCE

APPLICANT:

ORLIGHT SA (PTY) LTD

MAY 2012

DEA REFERENCE NO: 12/12/20/2630

NEAS REFERENCE NO: DEA/EIA/0000818/2011

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DIGBY WELLS ENVIRONMENTAL

This document has been prepared by **Digby Wells Environmental**.

Report title: Orlight SA (Pty) Ltd – Draft EIA Report for the proposed development of the Aggeneys Solar PV Power Plant in the Northern Cape Province

Project number: BSG1384

NAME	RESPONSIBILITY	SIGNATURE	DATE
Marike de Klerk	Project administrator and report compiler		26 April 2012
Mia Ackermann	Project manager and report compiler		17 May 2012
Grant Beringer	Project sponsor and report review		28 March 2012
Graham Trusler	Report review		02 May 2012

INFORMATION REQUIREMENTS OF THE DEPARTMENT OF ENVIRONMENTAL AFFAIRS

CONTENT/SPECIFICATIONS	REFERENCE
1. GENERAL SITE INFORMATION	
Descriptions of all affected farm portions.	Refer to Section 1.1 – Portion 1 of the farm Aroams 57 RD Section 5 – Status of baseline environment
21 digit Surveyor General codes of all affected farm portions	Refer to Section 1.1 – SG code C053-000-000-000-057-00001
Copies of deeds of all affected farm portions	Refer to Appendix B – Title deeds
Photos of areas that give a visual perspective of all parts of the site	Refer to Figure 1-1: General site characteristics of the proposed Aggeneys Solar PV Power Plant
Photos from sensitive visual receptors (tourism routes, tourism facilities, etc.)	Refer to Figure 1-1: General site characteristics of the proposed Aggeneys Solar PV Power Plant Refer to Figure 5-8: View of project site from main tourist route
Solar Plant design specifications including: • Type of technology • Structure height • Surface area to be covered (including associate infrastructure such as roads) • Structure orientation • Laydown area dimensions	Refer to Section 1.1 – Project overview Refer to Section 4.1 – Description of the proposed project
Generation capacity of the facility as a whole at delivery points.	Refer to Section 1.1 – Project overview Refer to Section 4.1 – Description of the proposed project
2. SITE MAPS AND GIS INFORMATION	
All maps/information layers must also be provided in ESRI Shapefile format	Refer to Compact Disc submitted as part of this report.
All affected farm portions must be indicated	Refer to Plan 1a – Land tenure
The exact site of the application must be indicated (the areas that will be occupied by the application)	Refer to Plan 2a – Site layout

A status quo map/layer must be provided that includes the following:
• Current use of land on the site including:
  ○ Buildings and other structure
  ○ Agricultural fields
	Refer to Plan 3a – Land use
	Refer to Plan 7a – Vegetation types
	Refer to Plan 8a – Ecological

CONTENT/SPECIFICATIONS	REFERENCE
○ Grazing areas ○ Natural vegetation areas with an indication of the vegetation quality as well as fine scale mapping in respect of Critical Biodiversity Areas and Ecological Support Areas ○ Critically endangered and endangered vegetation areas that occur on the site ○ Bare areas which may be susceptible to soil erosion ○ Cultural historical sites and elements • Rivers, streams and water courses • Ridgelines and 20 m continuous contours with height reference in the GIS database • Fountains, boreholes, dams (in-stream as well as off-stream) and reservoirs • High potential agricultural areas as defined by the Department of Agriculture, Forestry and Fisheries • Buffer zones (also where it is dictated by elements outside the site); ○ 500 m from any irrigated agricultural land ○ 1 km from residential areas • Indicate isolated residential, tourism facilities on or within 1 km of the site	sensitivity Refer to Plan 12a – Heritage aspects
A slope analysis map/layer that include the following slope ranges: • Less than 8% slope • Between 8% and 12% slope • Between 12% and 14% slope • Steeper than 18% slope	Refer to Plan 5a – Slope analysis **The slopes are generally less than 8% and therefore, further categories have been mapped.*
A map/layer that indicate locations of birds and bats including, roosting and foraging areas.	Refer to Plan 9a – Important birding areas
A site development proposal map(s)/layers(s) that indicate: • Positions of solar facilities • Foundation footprint • Permanent laydown area footprint • Construction period laydown footprint • Internal roads indicating width and with numbered sections between the other site elements which they serve • River, stream and water crossing of roads and cables indicating the type of bridging structures that will be used **Not applicable* • Substation(s) and/or transformer(s) sites including their entire footprint. • Cable routes and trench dimensions (where they are not along internal roads) • Connection routes to the distribution/transmission network • Cut and fill areas along roads and at substation/transformer sites indicating	Refer to Plan 2a – Site layout

CONTENT/SPECIFICATIONS	REFERENCE
the expected volume of each cut and fill **Not applicable* • Borrow pits **To be confirmed* • Spoil heaps **To be confirmed* • Buildings including accommodation. **Within construction laydown yard footprint.*	
3. REGIONAL MAP AND GIS INFORMATION	
All maps/information layers must also be provided in ESRI Shapefile format	Refer to Compact Disc.
Indicate the following: • Roads including their types (tarred or gravel) and category (national, provincial, local or private) • Railway lines and stations • Industrial area • Harbours and airports • Electricity transmission and distribution lines and substations • Pipelines • Water sources to be utilised during the construction and operational phases • A visibility assessment of the areas from where the facility will be visible • Critical Biodiversity Areas and Ecological Support Areas • Critically Endangered and Endangered vegetation areas • Agricultural fields • Irrigated areas • An indication of new road or changes and upgrades that must be done to existing roads in order to get equipment onto the site including cut and fill areas and crossings of rivers and streams.	Refer to Plan 3a – Land use Refer to Plan 7a – Vegetation types Refer to Plan 8a – Ecological sensitivity Refer to Plan 10a – Viewshed Refer to Plan 12a – Heritage aspects

INFORMATION REQUIREMENTS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT 107 OF 1998)

CONTENT/SPECIFICATIONS	REFERENCE
(2) AN EIA REPORT MUST CONTAIN ALL INFORMATION THAT IS NECESSARY FOR THE COMPETENT AUTHORITY TO CONSIDER THE APPLICATION AND TO REACH A DECISION CONTEMPLATED IN REGULATION 35, AND MUST INCLUDE	
(a) Details of: (i) the EAP who compiled the report; and (ii) the expertise of the EAP to carry out an environmental impact assessment;	Refer to Section 1.3 – Details of the EAP
(b) A detailed description of the proposed activity;	Refer to Section 4 – Project description
(c) A description of the property on which the activity is to be undertaken and the location of the activity on the property, or if it is (i) a linear activity, a description of the route of the activity; or (ii) an ocean-based activity, the coordinates where the activity is to be undertaken;	Refer to Section 1.1 – Portion 1 of the farm Aroams 57 RD Refer to Plan 1a – Land tenure
(d) A description of the environment that may be affected by the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity;	Refer to Section 5 – Status of baseline environment
(e) Details of the public participation process conducted in terms of sub-regulation (1), including— (i) steps undertaken in accordance with the plan of study; (ii) a list of persons, organisations and organs of state that were registered as interested and affected parties; (iii) a summary of comments received from, and a summary of issues raised by registered interested and affected parties, the date of receipt of these comments and the response of the EAP to those comments; and (iv) copies of any representations and comments received from registered interested and affected parties;	Refer to Section 2.2 – Public participation process Refer to Section 2.3 – Public review of reports Refer to Section 6.1 – Findings of the Public Participation Process Refer to Appendix D – Public Participation Process Report
(f) A description of the need and desirability of the proposed activity;	Refer to Section 4.2 – Need and desirability
(g) A description of identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity;	Refer to Section 4.3 – Project alternatives and the project design process
(h) An indication of the methodology used in determining the significance of potential environmental impacts;	Refer to Section 6 – Environmental Impact Assessment Refer to Appendix K – Impact assessment methodology
(i) A description and comparative assessment of all alternatives identified during the environmental impact assessment process;	Refer to Section 4.3 – Project alternatives and the

CONTENT/SPECIFICATIONS	REFERENCE
	project design process
(j) A summary of the findings and recommendations of any specialist report or report on a specialised process;	Refer to Executive summary Refer to Section 7 – Environmental Impact Statement
(k) A description of all environmental issues that were identified during the environmental impact assessment process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures;	Refer to Section 6 – Environmental Impact Assessment
(l) An assessment of each identified potentially significant impact, including: (i) cumulative impacts; (ii) the nature of the impact; (iii) the extent and duration of the impact; (iv) the probability of the impact occurring; (v) the degree to which the impact can be reversed; (vi) the degree to which the impact may cause irreplaceable loss of resources; (vii) the degree to which the impact can be mitigated;	Refer to Section 6 – Environmental Impact Assessment
(m) A description of any assumptions, uncertainties and gaps in knowledge;	Refer to Section 2.5 – Assumptions and limitations
(n) A reasoned opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	Refer to Executive summary Refer to Section 7 – Environmental Impact Statement
(o) An environmental impact statement which contains— (i) a summary of the key findings of the environmental impact assessment; (ii) a comparative assessment of the positive and negative implications of the proposed activity and identified alternatives;	Refer to Executive summary Refer to Section 7 – Environmental Impact Statement
(p) A draft environmental management programme containing the aspects contemplated in regulation 33;	Refer to Appendix J
(q) Copies of any specialist reports and reports on specialised processes complying with regulation 32;	Refer to Appendix D to Appendix K
(3) The EAP managing the application must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) of the Act and motivation if no reasonable or feasible alternatives, as contemplated in sub-regulation 31(2)(g), exist.	Refer to Section 2.5.1 – Assumptions Refer to Section 4.3 – Project alternatives

EXECUTIVE SUMMARY

Orlight SA (Pty) Ltd (Orlight SA) is proposing to develop a Solar Photovoltaic (PV) Power Plant on a site in the vicinity of the town of Aggeneys in the Namakwa District Municipality of the Northern Cape Province. The proposed site for development is located on Portion 1 of the farm Aroams 57 RD.

Digby Wells Environmental (Digby Wells) was appointed as independent Environmental Assessment Practitioner (EAP) to conduct the Environmental Impact Assessment (EIA) process for the proposed Aggeneys Solar PV Power Plant and associated activities in accordance with the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA).

A study area of 872.21 ha was considered throughout the EIA process and an available surface area of 322 ha in extent was delineated for the development of the proposed project, based on the avoidance of the following environmentally sensitive and other no-go areas:

- *Drainage line* – The main drainage line and associated system should be avoided, owing to the sensitivity of the benefiting ephemeral river systems and the largely natural state of these systems. A buffer zone of 50 m is prescribed around the main drainage system, with 30 m buffer zones around its tributaries;
- *Ecologically sensitive areas* – Consists of the drainage line running through the project area, sensitive habitat on ridges and areas which include protected and red data species;
- *N14 road reserve* – A 30 m buffer zone around the N14 national road has been delineated;
- *Visual sensitivity* – Areas north of the drainage line should be avoided due to their high visual sensitivity and proximity to the Gamsberg; and
- *Eskom transmission line servitudes* – The existing 220 kV line has a servitude width of 47 m, while the existing 66 kV line has a servitude width of 22 m. No construction will take place within these servitudes

Based on an estimated requirement of 4 ha surface area per MW generation capacity, the optimal generation capacity of the power plant that can be accommodated in the available area was determined to be 80 MW.

The proposed power plant will make used of Solar PV technology and will be comprised of the following infrastructure:

- Solar PV panels;
- Support structures;
- Foundations;
- Electrical cabling;
- On-site substation;
- Transmission line;
- Access roads;
- Temporary construction lay-down yard; and
- Access control and fencing of the site.

Development of the project components require environmental authorisation in terms of NEMA and an EIA application for the proposed project was submitted to the Department of Environmental Affairs (DEA) on 24 November 2011.

Reference numbers 12/12/20/2630 (DEA) and DEA/EIA/0000818/2011 (NEAS) were assigned to the application on 8 December 2011.

The objectives of the EIA process for the proposed Aggeneys Solar PV Power Plant were to:

- Undertake a Public Participation Process (PPP) to ensure that Interested and Affected Parties (I&APs) can participate in the EIA process;
- Prepare integrated sensitivity maps for the study area based on the findings of environmental, socio-economic and cultural assessments as input into the project design process;
- Identify and assess the significance of potential impacts associated with the projects; and
- Recommend mitigation and enhancement measures to ensure that the development is undertaken in such a way as to promote the positive impacts and to minimise the negative impacts.

The following potentially significant positive impacts were identified during the EIA process:

- *Employment opportunities* – An estimated 280 employment opportunities will be created during construction of which some will be for unskilled labourers sourced from the local area. The majority of youth in this area have low educational and skills levels, thus many are unemployed and well suited to unskilled labour.
- *Procurement of goods and services* – The project will necessitate procurement of goods and services, many of which could be sourced from local companies, Small, Medium and Micro Enterprises (SMMEs) or entrepreneurs, thereby enhancing the socio-economic benefits associated with the project's construction phase.
- *Skills training and capacity building* – Both local employees and entrepreneurs, SMMEs and businesses will likely gain significantly from appropriate skills training and capacity building.
- *Tourism* – The Aggeneys town itself is not a major tourist attraction. The tourism industry present in the area will most likely change its focus from eco-tourism to energy tourism, due to the development of solar PV projects in the vicinity of Aggeneys. The development of solar PV power plants in the area may become a unique tourist attraction for this area.

The following potentially significant negative impacts were identified during the EIA process:

- *Ecological impacts* – Ecologically sensitive areas were delineated as no-go areas during the site layout design process and will not be directly impacted by development. The project development footprint consists of indigenous natural vegetation and is still considered significant in terms of regional biodiversity programmes. During site preparation activities, 93% of this vegetation will be removed. There is also a possibility that Red Data or protected plant species that have not been identified in these areas during dry-season surveys could be destroyed. It is also likely that alien invasive and weed species will propagate on disturbed areas. The erection of fences will further prevent naturally occurring fauna species to move freely across the project site. A possible cumulative impact of other renewable energy projects in the area that should be considered is the loss of capacity of the area to perform provisioning, regulating, supporting and cultural ecosystem functions.

Mitigation: The opportunity to maintain or increase the ecological functioning of the study area exists, thereby indirectly supporting the population of animal species possibly reliant on this area for services. By increasing the natural habitat types in the no-go areas and removing the threats (i.e. grazing by livestock and alien species invasion), the ecological functioning of the area will be positively affected, thereby increasing the suite of ecological services offered to animals, making the area an attractive option for animals to re-colonise.

Therefore, it is recommended that a management plan be implemented which will firstly monitor ecological status of the project site and secondly, that the destruction of the sensitive species and landscapes areas such as drainage lines, ridges and plains should be avoided. An alien invasive and weed control programme will be an integral part of the success of efforts to increase the ecological functioning of the study area.

- *Influx of job-seekers* – News of the proposed project and employment opportunities may result in an influx of job-seekers into the area which could results in negative social impacts such as informal settlements, social conflict between the incumbent and migrant populations, an increase in social pathologies, petty crimes and stock theft.

Mitigation: An influx of job-seekers should be proactively discouraged by being transparent about the local employment policy and by requiring employees to verify their local residence status. The establishments of informal housing/ or settlements should be actively prevented by implementing an effective system through which the erection of such

structures can be reported and dismantled as soon as possible. Adequate accommodation and ablution facilities for employees should be made available in town. A code of conduct should be developed and the construction workforce should be contractually bound to it.

- *Cumulative impacts on water availability* – There are at least two other solar PV project proposed in the vicinity of Aggeneys. These projects and future expansion of the Black Mountain Mine will place increasing demand on water resources in a water scarce area.

Mitigation: The project area is water scarce and very few water supply alternatives are available. The projects should therefore consider recycling water, or using treated effluent from the municipality for washing the solar PV panels.

- *Cumulative visual impacts* – There are at least two other solar PV project proposed in the vicinity of Aggeneys. These projects will introduce potentially significant cumulative impacts on receptors traveling on the N14 national road. The solar PV development will alter the sense of place and sense of remoteness of the visual landscape, since the solar panels of the proposed parks will be new, industrial and dominant structures within the scenery. They may however be a good symbol for progress as South Africa taps into its natural legacy of solar power and renewable energy production.

Mitigation: Orlight SA may consider the establishment of a visitor's centre at the proposed project, or alternatively, contribute to the establishment of a visitors centre in the town with educational opportunities on solar energy for tourists that visit the area.

The main issues and concerns that were raised by I&APs and the effect of that addressing of these concerns has had on the project design and environmental management objectives of the project are:

- *Water utilisation and storm water management* – Orlight SA has applied for water provision from the Khai Ma Local Municipality. Water provision has not yet been approved. Objectives for storm water management and design measures have been included in the Environmental Management Programme (EMP);
- *Requirement for a rezoning application for affected land* – The rezoning process for the project site is in process. Consultation with the municipality has been completed;
- *Impacts on existing Eskom transmission line servitudes* – The transmission line servitudes have been delineated as no-go areas. Eskom will retain access to these servitudes during the project life;
- *Visual impacts of infrastructure on motorists using national and district roads* – Due to the nature of the project and its location in terms of the N14 national road, the visual impact cannot be avoided. Some of the areas that have high visual sensitivity have been defined as no-go areas.

To summarise, I&APs generally had no objections regarding the proposed project and feel that the proposed project will benefit them in terms of the supply of renewable energy to an area where it is much needed and through local socio-economic development.

Based on the nature and extent of the proposed project and the understanding of the significance of anticipated impacts that will be experienced, the EAP is of the opinion that the predicted impacts can be mitigated to an acceptable level. The EAP and specialist team supports the decision for an environmental authorisation.

The following conditions would be required in the environmental authorisation for the proposed project:

- All mitigation measures described in this report and in the EMP (Appendix J) should be implemented to ensure that the negative impacts of the project are mitigated and that positive impacts are enhanced.

- All no-go areas, sensitive areas and prescribed buffer zones that were defined unsuitable for development purposes should be avoided.
- A flora survey of the project development footprint should be undertaken during the wet-season to try and identify Red Data and protected plant species that might not have been identified during dry-season surveys. If found, the necessary permits should be obtained prior to the removal or destruction of these species.
- The implementation of the EMP (Appendix J) is considered a key factor to the achievement of the environmental standards and long-term sustainability of the project. For this purposed, the EMP should form part of the contractual agreement with the contractors that are appointed for development and operation of the proposed project.
- The EMP (Appendix J) should be considered a living document and should be updated during the project phases as more information on the significance of impacts and effectiveness of mitigation measures becomes known.

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ABBREVIATIONS

AC	Alternating current
AIA	Archaeological Impact Assessment
BA	Basic Assessment
BID	Background Information Document
BSGR	BSG Resources Limited
CAA	Civil Aviation Authority
CARA	Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)
CBA	Critical Biodiversity Area
CBO	Community Based Organisation
CEPF	Critical Ecosystem Partnership Fund
CITES	Convention on International Trade in Endangered Species
COP15	15th Conference of Parties
CRM	Cultural Resource Management
DAFF	National Department of Agriculture, Forestry and Fisheries
DC	Direct current
DEA	National Department of Environmental Affairs
DEANC	Northern Cape Department of Environmental Affairs and Nature Conservation
Digby Wells	Digby Wells Environmental
DoE	Department of Energy
DWA	Department of Water Affairs
EAP	Environmental Assessment Practitioner
EHS	Environmental, Health and Safety
EIA Regulations	GN Regulations 543 to 546 (18 June 2010)
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
ELC	European Landscape Convention
EMP	Environmental Management Programme
ESA	Ecological Support Area
FEPA	Freshwater Ecological Priority Area
GHG	Greenhouse Gas

GIS	Geographic Information System
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IFC	International Finance Corporation
IPP	Independent Power Producers
IRP	Integrated Resources Plan
IUCN	International Union for Conservation of Nature and Natural Resources
LED	Local Economic Development
LSA	Later Stone Age
LUPO	Land Use Planning Ordinance, Ordinance 15 of 1985
MSA	Middle Stone Age
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
NGO	Non-Governmental Organisation
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NID	Notice of Intent to Develop
NWA	National Water Act, 1998 (Act No. 36 of 1998)
Orlight SA	Orlight SA (Pty) Ltd
PPP	Public Participation Process
PV	Photovoltaic
RE	Remaining Extent
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency Limited
SKA	Square Kilometre Array
SKEP	Succulent Karoo Ecosystem Programme
SMME	Small, Medium and Micro Enterprise
TIA	Traffic Impact Statement
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
VIA	Visual Impact Assessment
WMA	Water Management Area

WULA	Water Use License Application
WWF	World Wildlife Foundation

1 INTRODUCTION

In line with the growing need for electricity supply and cleaner energy production in South Africa, the Orlight SA (Pty) Ltd (Orlight SA) Solar Photovoltaic (PV) Project was initiated by its holding company, BSG Resources Limited (BSGR). BSGR is an international natural resources company that operates in the fields of mining and energy. BSGR established a new company, Orlight SA, for the construction and operation of five new proposed Solar PV Power Plants in the Western Cape and Northern Cape Provinces (Plan 14 – Appendix A).

Digby Wells Environmental (Digby Wells) was appointed as independent Environmental Assessment Practitioner (EAP) to conduct the Environmental Impact Assessment (EIA) process for the proposed Aggeneys Solar PV Power Plant and the associated activities in accordance with the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA).

1.1 Project Overview

The proposed project site for development of the Aggeneys Solar PV Power Plants is located on Portion 1 of the farm Aroams 57 RD [SG code C053-000-000-000-057-00001] in the vicinity of the town of Aggeneys in the Namakwa District Municipality of the Northern Cape Province (Plan 1a – Appendix A). Copies of the title deeds of the affected property are attached as Appendix B.

The project site is located in an area characterised by low population density, high solar irradiation and in close proximity to the existing Eskom Aggeneys substation and existing 220 kV and 66 kV transmission lines, which allows for easy integration into the national electricity grid. The general site characteristics are illustrated in Figure 1-1.

Figure 1-1: General site characteristics *(Clockwise from top left: Looking north; looking northwest; looking over a rocky outcrop to existing transmission lines; and looking northeast from the approximate centre of the project site)*

A study area of 872.21 ha was considered throughout the EIA process, although the actual development footprint of the proposed project would be smaller in extent. The objective was to determine the optimal generation capacity that could be accommodated in the study area, by configuring the placement of infrastructure in such a way as to avoid environmentally sensitive and other problematic areas.

The proposed power plant will make use of Solar PV technology and will be comprised of the following infrastructure:

- *Solar PV panels* – An array of solar PV panels with a generating capacity of up to 80 MW will be installed over an area of 312.7 ha;
- *Support structures* – The solar PV panels will be mounted on steel support structures to a maximum height of 7 m and tilted approximately 25° from the horizontal plane, facing to the north and may be on tracking systems to adjust the angle of the panels to the summer or winter solar radiation characteristics;
- *Foundations* – The panel foundations will be either hammered into the ground or have concrete foundations excavated to a depth of approximately 1.5 m, depending on the terrain characteristics determined through geotechnical studies;
- *Electric cabling* – The solar PV arrays will be connected via electric cabling which will be laid underground in trenches of approximately 1 m deep and 0.6 m wide;
- *On-site substation* – The substation will occupy a surface area of approximately 0.7 ha and will include invertors to convert the electricity generated by the solar PV arrays from direct current (DC) to alternating current (AC);
- *Transmission line* – The proposed power plant will be connected to the Eskom Aggeneys substation with overhead transmission lines;
- *Access roads* – Access to the proposed project site will be from an existing farm road that joins up with the N14 national road. An internal network of roads will be required to access the different components of the proposed project;
- *Temporary construction lay-down yard* – The construction lay-down yard will occupy a surface area of 9.1 ha and will include a site office, mobile toilets and bathroom facilities, a car parking yard and the hydrocarbon management facility; and
- *Access control and fencing of the site* – The site must be secured against theft from outside and for this purpose, fencing will be installed.

The available surface area that was delineated for the development of the proposed project is approximately 322 ha in extent and therefore, the optimal generation capacity of the power plant based on an estimated requirement of 4 ha surface area per MW generation capacity was determined to be 80 MW. The site layout is illustrated in Plan 2a.

1.2 Objectives of the EIA process

The objectives of the EIA process for the proposed Aggeneys Solar PV Power Plant were to:

- Undertake a comprehensive and fully transparent Public Participation Process (PPP) to ensure that Interested and Affected Parties (I&APs) were afforded the opportunity to participate in the EIA process;
- Prepare integrated sensitivity maps for the study area based on the findings of environmental, socio-economic and cultural assessments undertaken for the project as input into the project design process;
- Identify and assess the significance of potential impacts associated with the projects; and

- Recommend mitigation and enhancement measures that should be implemented to ensure that the development is undertaken in such a way as to promote the positive impacts and to minimise the negative impacts.

1.3 Details of the EAP

Digby Wells is a South African company with international expertise in delivering comprehensive environmental and social solutions for clients in diverse sectors including the energy, minerals and mining industries. The names and expertise of the project team members are provided in Table 1-1. A company profile and the Curricula Vitae (CVs) of the project team have been attached to this report as Appendix C.

Table 1-1: Names and expertise of the project team

ASPECT	SPECIALIST	QUALIFICATIONS AND COMPETENCY
Project sponsor	Grant Beringer	2004 – 2006: MSc Environmental Management –UJ 2002 – 2003: BSc (Honours) Geography and Environmental Management (*Cum Laude*) – RAU 2000 – 2002: BSc Earth Sciences – RAU
Project manager	Mia Ackermann	2008: MSc Geography – UJ 2006: BSc (Honours) Geography and Environmental Management (*Cum Laude*) – UJ 2003 – 2005: BSc Geography and Environmental Management – UJ
Project administrator	Marike de Klerk	2005 – 2006: MA Sustainable Development – UJ 2000 – 2002: BhcS (*Cum Laude*) – UP 2003 – 2004: BhcS (Honours) (*Cum Laude*) – UP
Public Participation	Sibongile Bambisa	2010: BA (Honours) Anthropology – UJ 2009: BA Health Psychology – UJ

1.4 Overview of the EIA process

This section provides an overview of the EIA process that was undertaken for the proposed project. The approach to undertaking the EIA process and details of the activities undertaken during each phase of the process is described in Chapter 2 of this report.

1.4.1 Screening phase

An environmental screening assessment was undertaken in December 2011 by a team of environmental and cultural specialists from Digby Wells with the aim of determining the suitability of the study area for development, taking into consideration the general characteristics of the study area and the anticipated impacts of project activities on natural or cultural resources.

The findings of the screening assessment concluded that the proposed project has no fatal flaws, pending further assessment of identified environmental features within the study area.

1.4.2 Application phase

An EIA application for the proposed project was submitted to the relevant competent authority, namely the Department of Environmental Affairs (DEA) on 24 November 2011. The applicable listed activities of the proposed project in terms of the EIA Regulations are detailed in Table 1-2 below.

Table 1-2: Listed activities applicable to the proposed project

GN. R	ACTIVITY	DESCRIPTION
544	10	The construction of transmission lines to connect the proposed Solar PV Power Plant to an existing 66 kV Eskom transmission line[1].
545	1	The construction of a Solar PV Power Plant. The power plant infrastructure will consist of a ground mounting system, solar PV panels, inverters, switchboards and transformer/s.
545	15	The physical alteration an area greater than 20 ha agricultural land for the purposes of constructing a Solar PV Power Plant.
546	12	The clearance of more than 300 m^2 of land consisting of 75% or more indigenous vegetation in a Critical Biodiversity Area (CBA) as identified in the CBA map for the Namakwa District Municipality.
546	14	The clearance of approximately more than 5 ha land consisting of 75% or more indigenous vegetation.

Copies of the EIA application form were sent to the relevant provincial authority, namely the Northern Cape Department of Environmental Affairs and Nature Conservation (DEANC). In view of the urgency of developing renewable energy projects in South Africa and to aid in fulfilling the country's demand for electricity, as well as the stringent timeframes imposed on parties intending to bid as Independent Power Producers (IPPs), the EAP lodged a request with the provincial department that the responsibility for processing and evaluating the application is succeeded to the national DEA.

The request was granted and during the EIA Phase, the provincial department was involved as a stakeholder and they were given the opportunity to comment on all environmental documentation.

Reference numbers 12/12/20/2630 (DEA) and DEA/EIA/0000818/2011 (NEAS) were assigned to the application on 8 December 2011.

[1] In the event that an 80 MW power plant is constructed, a new 66 kV transmission line will be required to connect the Solar PV Power Plant to the Eskom Aggeneys Substation. The Basic Assessment (BA) process for this line is being undertaken as a separate application, but is running concurrent to the EIA process for the PV facility.

1.4.3 Scoping Phase

The objectives of the Scoping Phase for the proposed project were to:

- Consult with stakeholders during the first phases of the project to ensure that they are given an opportunity to comment on the proposed projects;
- Define the scope of the EIA process, based on the main issues identified during stakeholder engagement and a screening of potential impacts;
- Define the methodology for the EIA Phase; and
- Describe a Plan of Study for the EIA Phase.

The Scoping Phase was initiated with the distribution of information sharing documents, including a Background Information Document (BID) and I&AP registration form, newspaper advertisements and site notices to the identified stakeholders. An information sharing meeting was held on 10 January 2012 in the town of Aggeneys with the objective of presenting stakeholders with information regarding the proposed project and the EIA process to undertaken and to provide I&APs with a platform to raise their issues and comments regarding the proposed project.

A draft Scoping Report was subsequently compiled to present the results of the public consultation process and other environmental, social and cultural assessments that were undertaken during this phase and the report was made available to all I&APs for review for a period of 40 days from 26 January 2012 to 06 March 2012.

The draft Scoping Report was updated to address the comments that were received from the public and authorities. The final Scoping Report was submitted to the DEA on 04 April 2012.

The main findings of the Scoping Phase, based on stakeholder engagement and environmental screening, as well as the recommended scope for the EIA phase of the proposed project are summarised below:

- *Drainage lines within the site* – Suitable buffer zones must be established around these drainage lines, within which no construction activities will be allowed. A storm water management plan must be implemented to minimise impacts of the project on drainage lines and water quality in the catchment;
- *Water availability* – The project is located in a water scarce area and alternative options for supply of water during construction and operation must be investigated;
- *Ecological sensitivity* – The project is located in a Critical Biodiversity Area (CBA). Baseline characterisation of the ecological environment is required through comprehensive flora and fauna studies to delineate sensitive areas that should be avoided;
- *Visual impacts on motorists* – The project could have a potentially significant impact on motorists using the N14 highway. A Visual Impact Assessment (VIA) must be conducted to determine the full range of visual impacts that the project will have on the surrounding visual environment and to inform the site layout design process. A 30 m buffer zone around the N14 highway was recommended;
- *Soil erosion and impacts on land capability* – The soils present in the study area have inherent low agricultural potential. A soil and land capability assessment must be undertaken to identify measures to prevent or mitigate soil erosion for different soil types;
- *Tourism* – The tourism industry in the larger project area is mainly dependent on natural and cultural resources such as seasonal flowers, vast open areas and outdoor activities such as hiking and 4x4 routes. A Tourism Screening Assessment is required to assess the potential impacts the project may have on tourist attractions;

- *Socio-economic benefits of the project* – These benefits should be optimised and the negative impacts must be prevented or mitigated through the implementation of effective social management plans and programmes;
- *Heritage resources* – No significant heritage resources were identified during this phase, but it was recommended that a Phase 1 Archaeological Impact Assessment (AIA) and a Paleontological Impact Statement be prepared to assess potential impacts on heritage resources;
- *Transmission line servitudes* – There are existing Eskom transmission lines that run across the property. No project infrastructure may be located within the servitudes and Eskom must be assured that access to these transmission lines will be maintained;
- *Rezoning and land use* – The project will require the appropriate rezoning of land in accordance with provincial legislation.

The Final Scoping Report for the Aggeneys Solar PV Power Plant was approved on 17 May 2012. All requirements stipulated by the DEA will be addressed in the Final EIA report to be submitted for the proposed project.

The EIA phase of the proposed project was undertaken in accordance with the main in findings of the Scoping Phase listed above.

1.4.4 EIA Phase

The objectives of the EIA phase of the proposed project were to:

- Undertake specialist environmental assessments in order to determine the significance (i.e. duration, spatial extent, severity and probability) of potential impacts associated with the construction, operational and decommissioning phases of the proposed project;
- Provide input into the project design process by delineating no-go areas within which no development should be undertaken;
- Address the environmental impacts associated with proposed project as part of an Environmental Management Programme (EMP) that specifies measures to mitigate negative and enhance positive environmental impacts; and
- Provide stakeholders with an opportunity to verify whether all issues and concerns have been captured and adequately addressed in the EIA report.

The findings of the EIA phase for the proposed project are integrated into the relevant chapters of this EIA report. Please refer to the executive summary for a concise description of the main findings of this EIA process.

2 APPROACH TO UNDERTAKING THE EIA PROCESS

This section describes the approach that was followed in undertaking the EIA process for the proposed project and details of the activities undertaken throughout the process, including activities undertaken in support of the PPP.

2.1 Requirements for the EIA process

The proposed development of the proposed project is subject to the requirements of GN Regulations 543 to 546 (18 June 2010) ("EIA Regulations") published in terms of NEMA.

To achieve the objective of cooperative environmental governance and integration of all social, economic and biophysical factors into planning, implementation and decision-making, NEMA makes provision for the use of the EIA process as its main planning and decision-making tool.

The PPP is one of the most important aspects of the EIA process. It involves communication and disclosure of relevant project information and provides those interested in, or affected by, a proposed development with an opportunity to provide input into the decision making process. It is a legislative requirement to undertake PPP for any development that requires environmental authorisation.

Failure to undertake public participation may create significant risks to the project as members of the public could mobilise against the project if they have not been given the opportunity to participate The PPP for the proposed project was undertaken in an effort to ensure that all I&APs were given a platform to raise their issues and comments regarding the proposed project.

Through compliance with the requirements of the EIA Regulations, the decision-maker is given the opportunity to consider the potential environmental impacts associated with a project early in its development process and evaluate whether these impacts can be avoided, mitigated or enhanced to an acceptable level.

The approach that was followed in undertaking the EIA process for the proposed project was in accordance with the EIA Regulations.

2.2 Public Participation Process

A comprehensive PPP Report was compiled to document the activities undertaken as part of the PPP for the proposed project. Please refer to Appendix D for the PPP Report.

2.2.1 Pre-consultation meeting

A pre-consultation meeting was held with DEA on 18 November 2011 at the DEA offices in Pretoria. The purpose of this meeting was to discuss the requirements for the Scoping and EIA process for the proposed projects. The main points raised at the pre-consultation meeting are listed in Table 2-1. A copy of the minutes is included in Appendix D.

Table 2-1: Main points raised at the pre-consultation meeting

ASPECT	NAME AND ORGANISATION	ISSUES/COMMENT	RESPONDER	RESPONSE
Scoping and EIA Reports	Mia Ackermann Digby Wells	Will the DEA require separate Scoping reports and EIA reports for each specific site?	Coenraad Agenbach Deputy director: Special projects (DEA)	All sites can be combined into one comprehensive report, but there must be separate chapters dedicated to each site. Common chapters can be combined, but maps, descriptions of the site and property, applicable listed activities, impacts and mitigation measures must be in separate chapters. The cumulative impacts of the project and other projects in the vicinity must be assessed. There are a significant number of applications for renewable energy projects in the project area.
PPP report	Mia Ackermann Digby Wells	Enquired if the Issues and Response report can be combined for all sites.	Coenraad Agenbach Deputy director: Special projects (DEA)	There might be site specific issues and therefore, it is best to have a separate Issues and Responses reports and tables for each site.
Submission of reports	Mia Ackermann Digby Wells	Enquired on the process to follow when to submitting draft and final reports.	Coenraad Agenbach Deputy director: Special projects (DEA)	Draft reports must be sent to commenting authorities and I&APs on the same day. Final reports should be sent to DEA after the 40 day commenting period. Prior to the lapsing of the DEA's commenting period, the DEA will follow up with the commenting authorities to find out if they have any comments regarding the proposed project. In order to avoid delays in the project, the consultant must ensure that the commenting authorities respond to the draft reports. Suggests that the following organisations should be added as key stakeholders and commenting authorities for the proposed project: • Department of Agriculture, Forestry and Fisheries (DAFF); • Weather South Africa (SA); • Square Kilometre Array (SKA) project;

ASPECT	NAME AND ORGANISATION	ISSUES/COMMENT	RESPONDER	RESPONSE
				• Eskom; • Department of Energy; • South African National Biodiversity Institute (SANBI); • Civil Aviation Authority;
Screening phase	Mia Ackermann Digby Wells	During the screening phase three alternatives sites will be considered for each Orlight SA Solar PV Power Plant. Heritage, Visual and Ecological studies will be undertaken during this phase to assess potential impacts.	Coenraad Agenbach Deputy director: Special projects (DEA)	Indicated that he fully supports the undertaking of a screening phase. The proposed project area is characterised by Succulents, Camel Thorns and Kokerbome, so it important that a Flora and Fauna study is undertaken. Information collected during the screening phase and the determination of preferred site options should be included in the Scoping and EIA reports. Suggested that an environmental sensitivity map indicating no-go areas, alternative sites and buffer areas should be developed. The project infrastructure and project information should be overlaid on the sensitivity map in order to determine the impacts the proposed development will have on the environment.

2.2.2 *Identification of Interested and Affected Parties*

During the initial phase of the project, I&APs were identified by means of land surveyor data gathered by an appointed land surveyor and Windeed searches. Two main stakeholder groups were identified, namely public parties and authorities.

Public

The general public includes the following groups of stakeholders:

- Directly affected land owners;
- Surrounding land owners;
- Environmental groups;
- Non-Governmental Organisations (NGOs); and
- Community Based Organisations (CBOs).

The land owner of the Portion 1 of the farm Aroams 57 RD is Mr Abrie van Niekerk and he was involved during the preliminary identification of sites for the development of the proposed solar PV power plants and on a continuous basis throughout the EIA process.

Authorities

Authorities responsible for governing all aspects of the proposed project and forming part of the decision-making process were identified. The authorities were identified through liaison with different government officials and through considering existing I&AP databases for similar projects and published government databases.

Authorities have been divided into the categories listed in Table 2-2.

2.2.3 *Notification of the EIA process*

This phase of the EIA process commenced in December 2011 with the distribution of information sharing documents to identified stakeholders. A copy of all documentation that was developed for the PPP is included in Appendix D.

The objectives of this phase of the process were to:

- Inform I&APs of the proposed project and the PPP to be followed;
- Ensure that stakeholders receive accurate and sufficient project information;
- Invite I&APs to raise issues of concern and suggest project alternatives; and
- Identify and register additional I&APs for the project in response to newspaper advertisements and site notices.

Table 2-2: Authorities included in the EIA process

GROUP	AUTHORITY
National	• Department of Environmental Affairs (DEA); • Department of Water Affairs (DWA); • South African National Roads Agency Limited (SANRAL); • Department of Agriculture, Forestry and Fisheries (DAFF); • Civil Aviation Authority (CAA); • Department of Science and Technology; and • South African Heritage Resources Agency (SAHRA).
Provincial	• Department of Agriculture; • Northern Cape Department of Economic Development and Tourism; • Department of Transport and Public Works; • Department of Water Affairs; • Department of Environmental Affairs and Nature Conservation (DEANC); • Economic Development Agency; • Cape Nature; and • Northern Cape Economic Development Agency.
Municipalities	• Namakwa District Municipality; • Khai Ma Local Municipality; • Ward councillors.
Parastatals	• Eskom; and • Transnet

Background Information Document

A BID and I&AP registration form were developed as part of the PPP. BIDs were distributed to various stakeholders and I&APs from 07 December 2011. Additional BIDs were made available at the local municipal offices and libraries. The BIDs included information regarding the following:

- Description of the project;
- Legal framework to be adhered to;
- Locality and extent of the proposed project;
- Specialist studies to be undertaken;
- Approach to the EIA;
- PPP that will be followed;
- Invitation to an information sharing meeting; and
- I&AP registration form.

Newspaper adverts

In compliance with the local environmental regulations, newspaper advertisements were published in English and Afrikaans.

Site notices

Site notices were compiled in English and Afrikaans and placed in the vicinity of the study areas and within local towns. The site notices provided I&APs with similar information as contained in the BIDs. Please refer to Appendix D for photographs of site notice placements.*Site notices*

Site notices were compiled in English and Afrikaans and placed in the vicinity of the study areas and within local towns. The site notices provided I&APs with similar information as contained in the BIDs. Please refer to Appendix D for photographs of site notice placements.

Table 2-3

Table 2-3 indicates the publication dates and the newspapers used to advertise the proposed project. Proof of placement of the newspaper advertisements are provided in (Appendix D).

Site notices

Site notices were compiled in English and Afrikaans and placed in the vicinity of the study areas and within local towns. The site notices provided I&APs with similar information as contained in the BIDs. Please refer to Appendix D for photographs of site notice placements.

Table 2-3: Newspaper adverts

NEWSPAPER	DATE OF PUBLICATION
Cape Argus	09 December 2011
Diamond Field Advertiser	09 December 2011
Ons Kontrei	15 December 2011
Gemsbok	15 December 2011

2.2.4 Information sharing meeting

An information sharing meeting was held on 10 January 2012 in the town of Aggeneys. The meeting was conducted in Afrikaans and attendees were encouraged to ask questions in the language of their choice. Details of the information sharing meeting are listed in Table 2-4 below.

Table 2-4: Details of the Information Sharing Meeting

LOCATION	VENUE	DATE	TIME
Aggeneys	Aggeneys Community Hall	10 January 2012	14h00

The purpose of the meeting was to present I&APs with information regarding the proposed project, the process to undertaken and to provide I&APs with a platform to raise their issues and comments regarding the proposed project. Minutes from the information sharing meeting are included in Appendix D.

2.3 Public review of reports

2.3.1 Review of draft Scoping Report

The draft Scoping report was made available to all I&APs for review over a period of 40 days from 26 January 2012 to 08 March 2012 at the Black Mountain Recreation Club Black (Boliden Road, Aggeneys).

The report was also made available for download at www.digbywells.com. Information letters were sent to I&APs to inform them about the availability of the draft report. This letter was sent by e-mail, fax and registered post from 26 January 2012.

In accordance with Section 56(7) of GN Regulation 543 of NEMA, the draft Scoping Report was also sent to all identified regulating authorities for comment. Proof of notification of the availability of the draft Scoping Report for review by authorities is included in Appendix D.

2.3.2 Review of final Scoping Report

All I&APs were notified of the submission of the final Scoping Report to the DEA on 04 April 2012 and the availability of this report for review for a further period of 21 days. I&APs were invited to submit their comments to the responsible officer at the DEA.

2.3.3 Review of draft EIA Report

In accordance with Section 56(7) of GN Regulation 543 of NEMA, this draft EIA Report will be sent to all identified regulating authorities for comment. Proof of notification of the availability of the draft EIA Report for review by authorities will be forwarded to the DEA upon submission of the final reports.

The report will also be available for download at www.digbywells.com. Hard copies of the report will be made available on request.

2.4 Specialist environmental assessments

Upon completion of the scoping phase, it was determined that further specialist investigations would be required during the EIA Phase to assess the environmental impacts associated with the construction, operational and decommissioning phases of the proposed project.

The specialist investigations, as well as the name and expertise of the various specialists involved in undertaking these assessments are provided in Table 2-5. Copies of their CVs have been attached to this report as Appendix C.

Table 2-5: Specialist studies and project team

ASPECT	SPECIALIST	QUALIFICATIONS AND COMPETENCY
Aquatic and wetland ecology	Andrew Husted	2006 – 2007: MSc Aquatic Health – UJ 2005 – 2006: BSc (Honours) Zoology and Aquatic Health –RAU 2005 – 2003: BSc Zoology and Botany – RAU Competent Wetland Delineator, Department of Water Affairs
Visual Impact Assessment	Bradly Thornton	2008: Advanced Analysis with ArcGIS (GIMS) 2008: Flood Hydrology (University of Stellenbosch)

ASPECT	SPECIALIST	QUALIFICATIONS AND COMPETENCY
		2007: Introduction to ArcGIS (GIMS) 2003: BSc (Honours) Geography and Environmental Management – RAU 2000 – 2002: BSc Geology, Geography & Environmental Management - RAU
	Alice McClure	2009 – 2010: MSc Environmental Sciences 2008: BSc (Honours) Environmental Sciences – Rhodes University 2005 – 2007: BSc Environmental Sciences and Ethnology – Rhodes University
Ecological assessment	Rudi Greffrath	2005: B-tech Nature Conservation – UPE Saasveld Campus 2001 – 2004: Diploma in Nature Conservation – UPE Saasveld Campus
Soils and agricultural potential assessment	Louw Potgieter	2004 – current: SA Council for Natural Scientific Professions – Certificated Natural Scientist (Soil Science) 1989 – 1991: National Diploma in Resource Utilisation – Pretoria Technikon
Tourism and land use assessment	Marike de Klerk	2005 – 2006: MA Sustainable Development – UJ 2003 – 2004: BhcS (Honours) (*Cum Laude*) – UP 2000 – 2002: BhcS (*Cum Laude*) – UP
Socio-economic impact assessment	Karien Lotter	2007: MA Research Psychology – UP 2006: BSocSci (Honours) – UP 2005: BSocSci Psychology (*Cum Laude)* – UP
Rehabilitation plan	Thomas Wilson	2008 – 2009: BSc (Honours) Geography and Environmental Management – UJ 2005 – 2007: BSc Geography and Environmental Management – UJ
Traffic impact statement	Gerhard de Wet	2011 – 2012: BKS (PTY) LTD, Associate Engineer 2006 – 2011: BKS (PTY) LTD, Chief Engineer 2002 – 2006: BKS (PTY) LTD, Senior Engineer 2001 – 2002: BKS (PTY) LTD, Engineer
Cultural resources pre-assessment	Johan Nel	2012 – Current: MA Archaeology 2002: BA (Honours) Archaeology – UP 2001: BA Anthropology and Archaeology – UP
Archaeological Impact Assessment	Jayson Orton	1998: MA Archaeology – UCT 1997: BA (Honours) Archaeology – UCT
Paleontological Impact Statement	John Pether	1994. M.Sc. degree awarded with distinction (UCT). 1983. B.Sc. Honours, University of Cape Town SACNASP: Pr.Nat.Sci (Earth Science)

2.5 Assumptions and limitations

This section defines the main assumptions and limitations applicable to the EIA process and this report. Knowledge gaps that were identified during the specialist investigations undertaken for the proposed project are also described.

2.5.1 Assumptions

This report is based on the following assumptions:

- The main factors that were taken into consideration during the selection of a suitable site for development of the proposed Aggeneys Solar PV Power Plant were the identification of available land where long-term lease agreements for development of renewable energy projects by Orlight SA's could be put in place with the land owners and the willingness of the land owner of the identified site to agree to a long-term lease of the property; and
- The objective of the EIA process was to determine the optimal generation capacity that could be accommodated in the identified study area, by configuring the placement of infrastructure in such a way as to avoid environmentally sensitive and other problematic areas. The optimal generation capacity specified in this report is thus based on the maximum amount of solar PV panels and associated infrastructure that could technically be accommodated within the areas that have been delineated as suitable for development. A surface area requirement of 4 ha per MW generation capacity was assumed.

2.5.2 Limitations

2.5.2.1 *Fauna and flora assessment*

The flora and fauna field survey was conducted during the dry season (December) due to constraints imposed by the project timeline. The implication of this was that many of the plant species were dormant during this period and the species that were present were not easily identifiable. Theoretically, sampling of plants should be completed over a full annual cycle. Consequently, the confidence in the data collected for both the flora and the fauna components of the study is medium to low.

In spite of this, regional data from the Succulent Karoo Ecosystem Programme (SKEP) and Critical Biodiversity Area (CBA) plan data that were collected for the study area have a high confidence level and these data sets were used in addition to the findings of the field surveys to delineate sensitive areas. The species composition of the study area, according to the study, could change if the seasonality of plant species is taken into account.

2.5.2.2 *Archaeological surveys*

As with all archaeological surveys, it is not possible to be completely confident that all archaeological sites were identified during the fieldwork. Surface distributions give only a general indication of sub-surface remains. It is always possible that sub-surface archaeological sites may be present which were not identified during the survey.

Morris (2010) has also commented elsewhere in the area on the considerable "background noise" of massively preponderant small nodules of white quartz strewn over most the land surfaces. This may hamper the identification of artefacts, as local assemblages of are dominated by stone artefacts made from such nodules.

2.5.2.3 *Alternatives*

No alternative sites in proximity to Aggeneys was assessed as part of this EIA process for development of the proposed Orlight SA solar PV power plant as the objective of the EIA process was to determine the optimal generation capacity that could be accommodated in the areas identified by Orlight SA as proposed development sites.

3 LEGISLATIVE REQUIREMENTS AND PLANNING CONTEXT

3.1 Background and context

The main energy challenges faced by the world today include addressing climate change considerations, limited water resources and increased demand for electricity. A number of people are demanding sustainable methods of electricity generation. With regards to energy supply in South Africa, Eskom reported that there may be a shortfall in electricity supply in the near future, despite a significantly lower-than-expected recovery in electricity demand. South Africa's energy demand will continue to increase and the shortfall in supply is a major concern.

Simultaneously, South Africa is attempting to move away from the utilisation of carbon intensive, non-renewable fossil fuels for energy production. On international level, the legally binding Kyoto Protocol agreement was established in 1997 soon after the inception of the United Nations Framework Convention on Climate Change (UNFCCC). According to the Kyoto Protocol, developed countries are committed to reducing their greenhouse gas (GHG) emissions by 5.2% from 1990 levels by the year 2012. Classified as a developing country under the Kyoto Protocol, South Africa is not legally bound to reduce its GHG emissions and, therefore, the country's contribution to climate change mitigation has not been framed as an absolute emission reduction target (DEAT, 2004).

The likelihood of GHG emission constraints playing a role in the medium and long-term future of South Africa's economy, whether invoked through the UNFCCC, trade barriers, or other measures not yet contemplated cannot, however, be dismissed. International pressure on industrialised developing countries to formalise their GHG emission reduction target and climate change mitigation strategy is increasing and it is within this context that the Government of South Africa pledged to reduce domestic GHG emissions by 34% by 2020 and 42% by 2025, when compared to business as usual. This pledge was made in agreement with the Copenhagen Accord, a non-binding agreement reached by parties at the 15th Conference of Parties (COP 15) of the UNFCCC held in December 2009 in Copenhagen. The South African economy is, however, still highly dependent on fossil fuels and is considered one of the top 15 countries in terms of absolute GHG emissions. Achievement of the GHG emission reduction target pledge by the South African Government will require a well-planned and co-ordinated response over the long-term.

As outlined by the National Climate Change Response Green Paper (2010), South Africa is subsequently aiming to increase the use of renewable energy and energy efficiency to ensure a sustainable energy future that is in line with the principles of sustainability. This includes the development of future opportunities for the use of renewable energy such as solar power in South Africa that is affordable, environmentally sound and socially acceptable. The Department of Energy (DoE) confirmed the procurement (Request for Proposals) of allocated capacity across various renewables technologies, with 1 850 MW set aside for onshore wind, 200 MW for concentrated solar thermal and a further 1 450 MW for Solar PV solutions.

In response to the macro-economic needs described in this legislative overview, Orlight SA is proposing to construct and operate five new Solar PV Power Plants in the Northern Cape and Western Cape Provinces. The

aim is for these projects to participate in the third bidding window of the DoE bidding process, which ends on 20 August 2012.

3.2 Legislative framework

The following legislation and guidelines were considered during the EIA process for the proposed Aggeneys Solar PV Power Plant.

3.2.1 Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)

Section 24 of the Constitutional Act states that everyone has 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 -

i. Prevents pollution and ecological degradation;
ii. Promotes conservation; and
iii. Secures ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

In support of the above rights, the environmental management objectives of proposed project are to protect ecologically sensitive areas and support sustainable development and the use of natural resources, whilst promoting justifiable socio-economic development in the towns nearest to the project sites.

3.2.2 National Environmental Management Act, 1998 (Act No. 107 of 1998)

NEMA provides for cooperative environmental governance by establishing principles for decision making on matters affecting the environment, institutions that will promote cooperative governance and procedures for coordinating environmental functions exercised by organs of state.

NEMA also provides for matters related to sustainable development, which means the integration of social, economic and environmental factors into planning, implementation and decision-making so as to ensure that development serves present and future generations. To achieve the above objectives, the Act makes provision for the use of the EIA process as a tool for environmentally sound decision-making. The EIA process is regulated in terms of the GN Regulations 543 to 546 (18 June 2010) ("EIA Regulations"). This EIA report is an integrated part of the EIA process.

3.2.3 The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)

The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) controls Indigenous Biological Resources. NEMBA provides for the consolidation of biodiversity legislation through establishing national norms and standards for the management of biodiversity across all sectors and by different management authorities.

Within the regional conservation context there are two conservation programmes which are underlain by NEMBA, namely the SKEP and the CBA. The aim of these programmes are to identify and conserve areas of high biodiversity and areas that are in support of these areas through defining conservation outcomes and working towards these. For this report, these programmes were referred to as the basis for conservation planning for the project.

3.2.3.1 *Succulent Karoo Ecosystem Programme*

The SKEP is a long-term, multi-stakeholder bioregional conservation and development programme, with four strategic areas:

- Increasing local and international awareness of the unique biodiversity of the Succulent Karoo;
- Expanding protected areas and improving conservation management;
- Supporting a matrix of harmonious land uses; and
- Improving institutional co-ordination.

The SKEP is a partnership programme with government and non-government partners. The first five years of implementation was funded by the Critical Ecosystem Partnership Fund (CEPF) and focused on catalysing and programme start-up. The next five years will focus on programme consolidation. This will entail integrating the SKEP objectives into national and regional government programmes, and thereby ensuring programme sustainability. The Succulent Karoo biodiversity hotspot extends from the southwest through the north-west areas of South Africa and into southern Namibia.

The Aggeneys site is a geographic priority area, specifically the Bushmanland Inselberg area. This priority area is located on the northeast margin of the Succulent Karoo Hotspot, just south of the Orange River and the border between Namibia and South Africa. SKEP recommends giving priority to conserving those habitats within geographic priority areas that have conservation value and are most vulnerable to increasing land use pressures. Ideally, all untransformed land in these habitats, irrespective of size should enjoy some form of conservation action in order to achieve conservation targets and link reserves by means of natural corridors.

The site is also considered important in terms of amphibian, bird and insect biodiversity, with scattered quartz patches. More information on the importance of the site in terms of biodiversity is provided in Chapter 5 of this report.

3.2.3.2 *Critical Biodiversity Areas*

CBAs are terrestrial and aquatic features in the landscape that are critical for retaining biodiversity and supporting continued ecosystem functioning and services. These form the key output of a systematic conservation assessment and are the biodiversity sectors inputs into multi-sectorial planning and decision making tools (Figure 3-1).

CBAs are areas of the landscape that need to be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. In other words, if these areas are not maintained in a natural or near-natural state then biodiversity conservation targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity-compatible land uses and resource uses.

Ecological support areas (ESAs) are areas that are not essential for meeting biodiversity representation targets/thresholds but which nevertheless play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration. The degree of restriction on land use and resource use in these areas may be lower than that recommended for critical biodiversity areas.

The purpose of CBAs is simply to spatially indicate the location of critical or important areas for biodiversity in the landscape. The CBA, through the underlying land management objectives that define the CBA, prescribes the desired ecological state in which we would like to keep this biodiversity. Therefore, the desired ecological state or

land management objective determines which land-use activities are compatible with each CBA category based on the perceived impact of each activity on biodiversity pattern and process.

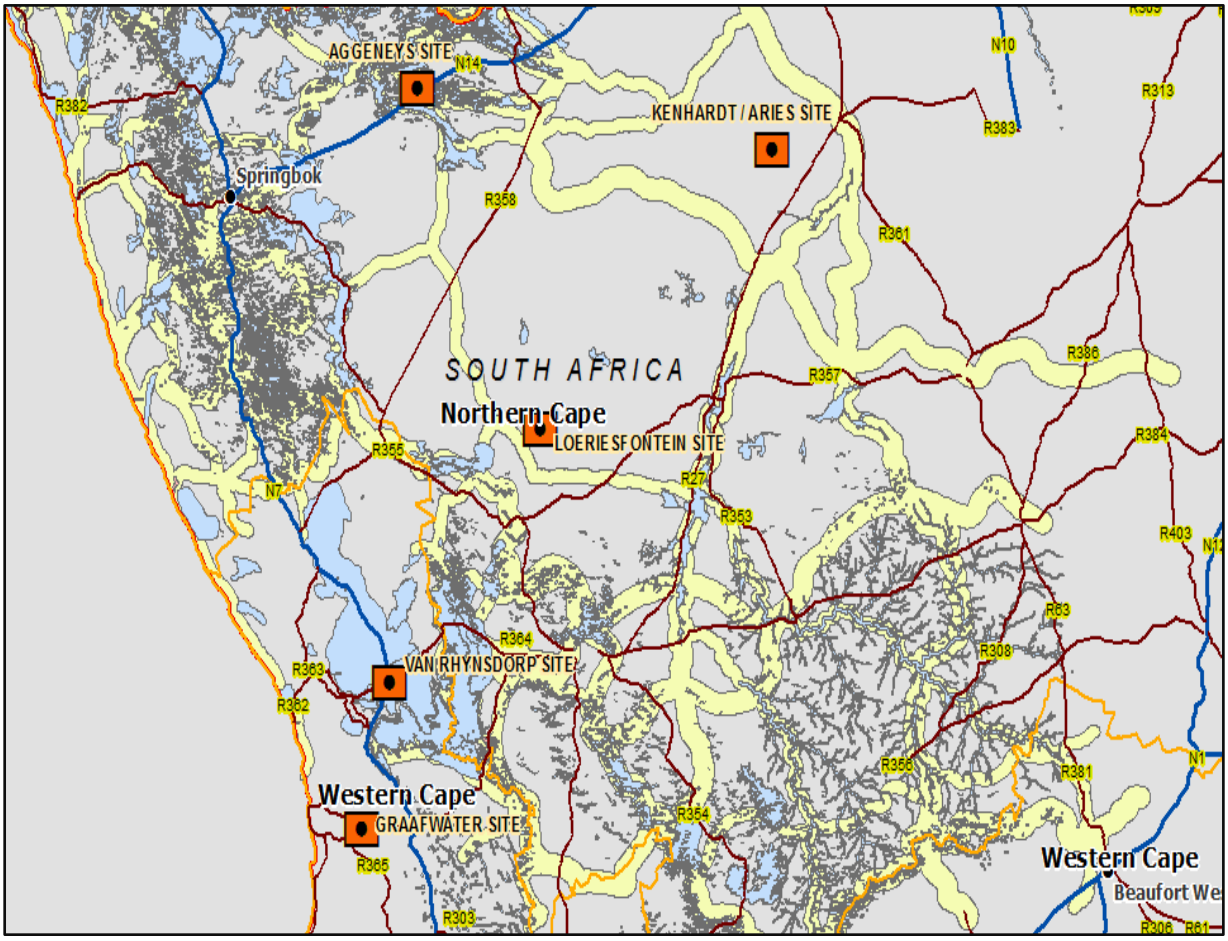

Figure 3-1: Critical Biodiversity Areas (blue) and Ecological Support Areas (yellow) in relation to the Aggeneys project site (Source: CBA database)

3.2.3.3 *Freshwater Ecological Priority Area Programme*

For the aquatic and hydrological assessment of the proposed project, the Freshwater Ecological Priority Area (FEPA) Programme will be considered. This programme provides FEPA maps and supporting information which forms part of a comprehensive approach to sustainable and equitable development of South Africa's scarce water resources (WRC, 2011).

FEPA is a single, nationally consistent information source for incorporating freshwater ecosystem and biodiversity goals into planning and decision-making processes to support the water resource protection goals of the NWA (WRC, 2011). This programme is directly applicable to the NWA, informing Catchment Management Strategies, classification of water resources, reserve determination, and the setting and monitoring of resource quality objectives. FEPA maps are also directly relevant to the NEMBA, informing both the listing of threatened freshwater ecosystems and the process of bioregional planning provided for by this Act. FEPA maps support the implementation of the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) by informing the expansion of the protected area network.

3.2.4 National Water Act, 1998 (Act No. 36 of 1998)

According to the National Water Act, 1998 (Act No. 36 of 1998) (NWA), a water resource is not only considered to be the water that can be extracted from a system and utilised but the entire water cycle. This includes evaporation, precipitation and entire aquatic ecosystem including the physical or structural aquatic habitats, the water, the aquatic biota and the physical, chemical and ecological processes that link water, habitats and biota. The entire ecosystem is acknowledged as a life support system by the NWA.

According to van Wyk *et al*. (2006) the "*…resource is defined to include a water course, surface water, estuary and aquifer, on the understanding that a water course includes rivers and springs, the channels in which the water flows regularly or intermittently, wetlands, lakes and dams into or from which water flows, and where relevant, the banks and bed or the system*."

In terms of the NWA, water courses that were identified in the project area necessitated that establishment of suitable buffer zones around these drainage lines within which no construction activities would be allowed. The Department of Water Affairs (DWA) was consulted in an attempt to determine the suitable widths for these buffer zones, depending on the nature of drainage lines identified. It is not currently anticipated that any activity would be undertaken within these buffer zones and consequently, a Water Use License Application (WULA) for the proposed project is not required in terms of Section 21(d) and 21(i) of the Act.

3.2.5 Environment Conservation Act, 1989 (Act No. 73 of 1989)

The aim of the Environment Conservation Act, 1989 (Act No. 73 of 1989) is to provide for cooperative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote cooperative governance and procedures for coordinating environmental functions exercised by organs of state; and to provide for matters connected therewith. The Act also includes aspects related to the protection of freshwater systems stating that appropriate environmental investigations are mandatory before approval for the "*…construction or upgrading of dams, levees or weirs affecting the flow of a river…*" will be given by the relevant authority.

3.2.6 Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)

The Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA) provides for control and conservation of the utilisation of the natural agricultural resources of South Africa in order to promote the conservation of the soil, water sources and vegetation and the combating of weeds and invader plants; and for matters connected therewith. Land owners are obliged, by law, to eradicate alien vegetation on their properties.

For the purpose of the proposed Solar PV Power Plant, the relevant soil and agricultural assessments were undertaken in order to minimise potential impacts on the agricultural potential or productivity of the proposed project site. This report also provides a motivation for the use of agricultural land for energy generation in Section 5.6, based on the findings of the assessment undertaken. The motivation will be communicated to DAFF and will be managed as part of the rezoning application for the proposed project.

3.2.7 National Heritage Resources Act, 1999 (Act No. 25 of 1999)

The National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) devolves responsibility for the identification of local heritage resources and the inclusion of heritage areas to all municipalities in South Africa.

Developers need to incorporate the NHRA and gain approval from the relevant heritage authorities or municipalities before construction may commence.

For the purpose of this project, a cultural resource pre-assessment was undertaken for the study area, which incorporated the submission of a Notice of Intent to Develop (NID) to SAHRA in terms of Section 38 of the NHRA and the undertaking of a Phase 1 AIA and preparation of a Palaeontological Impact Statement, as stipulated in the feedback received from SAHRA.

3.2.8 Land Use Planning Ordinance, Ordinance 15 of 1985

The purpose of the Land Use Planning Ordinance (LUPO), Ordinance 15 of 1985, is "*to regulate land use and to provide for matters incidental thereto*". The consultation and rezoning process for the proposed project sites is being undertaken concurrently with the EIA process for the proposed project.

3.3 Local socio-economic planning context

The municipality in which the study area is located is the Khai Ma Local Municipality of the Namakwa District Municipality in the Northern Cape Province.

The local socio-economic planning factors of the province and municipalities that were taken into consideration during the EIA process for the proposed project are discussed below.

3.3.1 Namakwa District Municipality Integrated Development Plan, 2006 – 2011

The Integrated Development Plan (IDP), 2006 – 2011 for the Namakwa District Municipality was assessed as part of the EIA process for the proposed Aggeneys Solar PV Power Plant. The objective of the IDP is to promote the establishment of a sustainable development-orientated and economically viable district.

In terms of local economic development (LED), the municipality has identified a number of LED projects which will have important implications for the proposed Aggeneys Solar PV Power Plant. A description of these LED projects and their relevance to the proposed project is provided in Table 3-1.

3.3.1 Local Economic Development Strategy

During the EIA process, the Local Economic Development (LED) Strategy for the Namakwa District Municipality was taken into consideration in an attempt to identify socio-economic opportunities and constraints for the proposed project. These opportunities and constraints would have to be integrated into the project planning and design process to ensure that the socio-economic benefits of the project are enhanced.

The LED Strategy contains a scan and analysis of potential opportunities for private sector development in the municipality and identifies public sector projects required to create the economic environment in which private sector projects could be implemented. These projects have already been scanned according to their potential for job creation; strategic importance and alignment with national government priorities; feasibility; economic impacts; and development support of small- and medium enterprises. The private sector projects and public sector interventions identified in the LED Strategy that are considered relevant to the proposed Solar PV Power Plant is described in Table 3-2.

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Table 3-1: LED projects for the Namakwa District Municipality and project implications

PROJECT	OBJECTIVE	RELEVANCE
Project LE02 – Renewable Energy Cluster	To ensure the participation of the municipality in creating synergy between different renewable energy sectors to allow the municipality to enhance their competitive and comparative advantage for renewable energy projects.	The proposed project will directly contribute to the realisation of the municipality's goal to enhance their competitive advantage for renewable energy project, by illustrating that renewable energy projects can be successfully implemented in the district. Orlight SA must endeavour to consult with the municipality to understand how the project can further contribute to the realisation of this goal.
Project LE05 – Small, Medium and Micro Enterprise (SMME) development cluster	To develop a management support system for SMMEs.	The proposed project will necessitate the procurement of goods and services, many of which could be sources from new SMMEs in the district.
Project LE11 – Working for Water (Tourism and Environmental Cluster)	To eradicate Prosopis sp. to protect the underground water resources and eradicate poverty in communities.	Prosopis species were identified in the study area and will have to be eradicated in terms of CARA. The project will implement an alien invasive eradication programme to ensure that impacts on biodiversity and water resources are minimised.
Project LE12 – Tourism and Environment Cluster (Development of Biodiversity in Namakwa)	To promote initiatives such as the Greening Namakwa, Skeppies Fund and Tourism Hub projects, including development of heritage sites.	The project site itself is not located next to a main tourist route and is therefore not considered an integral part of these tourism initiatives. However, the opportunity exists for Orlight SA to promote a new form of tourism in the area, namely "renewable energy tourism".

Table 3-2: Private and public sector projects and interventions relevant to the proposed project

OPPORTUNITY AREA	PRIVATE SECTOR OPPORTUNITY	PUBLIC SECTOR INTERVENTIONS	RELEVANCE
Manufacturing	Supply of machinery and parts for energy sector.	An equipment needs analysis is required with the private sector to identify their supply chain requirements.	If and when available, Orlight SA should promote procurement of locally produced machinery and equipment.
	Recycling depots	A feasibility study is required to identify potential sites for recycling depots.	The solar PV panels are recyclable and therefore the establishment of recycling depots that could accommodate materials from the project would be favourable for both Orlight SA and the municipality. Orlight SA should use local recycling depots if available.
Energy	Solar energy projects	Develop a legal framework for public-private partnerships guiding the establishment of such partnerships.	A legal framework for the establishment of these partnerships has not yet been formulated, but Orlight SA will engage with the public sector to ensure that its operations are aligned with the legal framework once implemented.
		Infrastructure required for the development of projects should be communicated to the relevant provincial departments so that they can take it into consideration during their budget and planning process.	SANRAL was identified as an important stakeholder during the EIA process, as access to the project site will be via the main national highways. Orlight SA will continue to consult SANRAL throughout the development process.
		Skills development programmes will be required for installation, operation and maintenance of renewable energy projects.	Orlight SA will implement their own training and skills development programme to ensure that necessary skills transfer is achieved for local workers that are employed during the construction and operational phases of the project.
Tourism	Techno tours (local space and energy projects) Eco-tourism and flower mapping tours	The Namakwa Tourism information office should package these opportunities and present them at relevant expos and Indabas.	The proposed project will have a negative impact on eco-tourism due to the removal of natural vegetation. Orlight SA should therefore consider the establishment of a visitors centre at the proposed project, or alternatively, contribute to the establishment of a visitors centre in the town with educational opportunities on solar energy for tourists that visit the area.

3.4 Policies, guidelines and conventions

In addition to the regulations and guidelines discussed in this chapter, the guidelines and policies of the following organisations were also considered during the EIA process:

- Guidelines implemented by the South African National Biodiversity Institute (SANBI), responsible for exploring, revealing, celebrating and championing biodiversity;
- Guidelines of the World Wildlife Foundation (WWF) South Africa, which aims to conserve the biodiversity assets (endangered wildlife, species, habitats and ecosystems) of South Africa and ensure natural ecosystems and their services are appropriately valued and integrated into sustainable development;
- The International Union for Conservation of Nature and Natural Resources (IUCN) Red List, which is based on information from a network of conservation organisations to rate which species are most endangered;
- Convention Concerning the Protection of the World Cultural and Natural Heritage initiated by the United Nations Educational, Scientific and Cultural Organization (UNESCO). The Convention aims to protect and conserve the world's natural and cultural heritage. As custodian of unique cultural and natural heritage, South Africa has the responsibility to ensure the identification, protection, conservation, presentation and transmission of cultural and natural heritage sites for future generations;
- The Convention on Biological Diversity that is dedicated to promoting sustainable development. Conceived as a practical tool for translating the principles of Agenda 21 into reality, the Convention recognises that biological diversity is no only centred around plants, animals and ecosystems, but includes people and their need for food security, medical care, fresh air and water, shelter and a clean and healthy environment in which to live;
- The Convention on International Trade in Endangered Species (CITES) which governs international trade in wild animals and plants; and
- The European Landscape Convention of the Council of Europe which focuses exclusively on landscapes with the purpose of promoting effective management and planning of landscapes.

3.5 Equator Principles

The Equator Principles are a voluntary set of standards for determining, assessing and managing social and environmental risk in project financing. Once a bank or financial institution adopt the Equator Principles, they commit to refrain from financing projects that fail to follow the processes defined by the principles. The Equator Principles are modelled on the environmental guidelines of the World Bank Group and social policies of the International Finance Corporation (IFC).

Financing of the proposed Solar PV Power Plant will most likely require that the project applicant demonstrates that all potential environmental and social impacts associated with the project have been considered and that these will be managed and monitored in accordance with the Equator Principles. As listed in Table 3-3 and Table 3-4, the Equator Principles and the IFC performance standards were considered throughout the EIA process for the project.

Table 3-3: The Equator Principles applicable to the proposed Solar PV Power Plants

EQUATOR PRINCIPLES
EP 1: Review and Categorisation A project should be categorised according to the magnitude of its potential impacts and risks in accordance with the environmental and social screening criteria of the IFC. **The proposed Orlight SA Solar Power Plants project does not have the potential to bring about significant adverse social and environmental impacts and has thus been classified as a* ***Category C project.***
EP 2: Social and Environmental Assessment An environmental and social assessment process should be conducted to assess the relevant impacts and risks of the proposed project. Mitigation and management measures relevant and appropriate to the nature and scale of the proposed project should be proposed.
EP 3: Applicable Social and Environmental Standards The assessment should refer to the applicable IFC Performance Standards and the Industry Specific Environmental, Health and Safety (EHS) Guidelines and establish the project's overall compliance with, or justified deviation from, these standards and guidelines. **The IFC Performance Standards applicable to the proposed project are listed* in **Error! Reference source not found.**.
EP 4: Action Plan and Management System Action plans should be prepared that details the actions needed to implement mitigation measures, corrective actions and monitoring measures necessary to manage the impacts and risks of the project. **The EMP for the proposed project should hereby be converted into action plans and implemented as part of an Environmental Management System (EMS) for the project.*
EP 5: Consultation and Disclosure Consultation with project affected communities should be undertaken in a structured and culturally appropriate manner. **The PPP for the proposed project will be undertaken in accordance with Government Notice R. No. 543 of NEMA and the IFC Performance Standard 1.*
EP 6: Grievance Mechanism A grievance mechanism should be implemented to ensure that consultation, disclosure and community engagement continues throughout construction and operation of the proposed project.
EP 7: Independent Review An independent social or environmental expert not directly associated with the borrower should review the assessment, action plan and consultation process documentation.

EQUATOR PRINCIPLES
EP 8: Covenants Covenants to comply with all relevant host country social and environmental laws, regulations and permits and project action plans should be made.
EP 9: Independent Monitoring and Reporting An independent environmental and/or social expert should be requested to verify all monitoring information.
EP 10: Equator Principles financial Institution Reporting An annual report on the implementation processes and experience of the project should be supplied to the lender.

Table 3-4: IFC performance standards applicable to the proposed Solar PV Power Projects

APPLICABLE IFC PERFORMANCE STANDARDS
PS 1: Social and Environmental Sustainability Underscores the importance of managing social and environmental performance throughout the life of a project. The objectives of this standard are to: • Identify and assess social and environment impacts, both adverse and beneficial, in the project's area of influence; • To avoid, or where avoidance is not possible, minimise, mitigate, or compensate for adverse impacts on workers, affected communities and the environment; • To ensure that affected communities are appropriately engaged on issues that could potentially affect them; and • To promote improved social and environment performance of companies through the effective use of management systems.
PS 2: Labour and Working Conditions Recognises that the pursuit of economic growth through employment creation and income generation should be balanced with protection for basic rights of workers. The objectives of this standard are to: • Establish, maintain and improve the worker-management relationship; • Promote the fair treatment, non-discrimination and equal opportunity of workers and compliance with national labour and employment laws; • Protect the workforce by addressing child labour and forced labour; and • Promote safe and healthy working conditions, and to protect and promote the health of workers.

APPLICABLE IFC PERFORMANCE STANDARDS
PS 3: Pollution Prevention and Abatement Outlines a project approach to pollution prevention and abatement in line with these internationally disseminated technologies and practices. The objectives of this standard are to: • Avoid or minimise adverse impacts on human health and the environment by avoiding or minimising pollution from project activities; and • Promote the reduction of emissions that contribute to climate change.
PS 4: Community Health, Safety and Security Addresses the client's responsibility to avoid or minimise the risks and impacts to community health, safety and security that may arise from project activities. The objectives of this standard are to: • Avoid or minimise risks to and impacts on the health and safety of the local community during the project life cycle from both routine and non-routine circumstances; and • Ensure that the safeguarding of personnel and property is carried out in a legitimate manner that avoids or minimises risks to the community's safety and security.
PS 5: Land Acquisition & Involuntary Resettlement Seeks to protect sellers from a variety of risks of negotiated transactions that occur as a result of expropriation. The objective of this standard for the proposed Orlight SA Solar PV Power Plants is ensure land owners are satisfied with the lease agreements that are negotiated for use of the land to establish the proposed Orlight SA Solar PV Power Plants.
PS 6: Biodiversity Conservation & Sustainable Natural Resource Management Recognises that protecting and conserving biodiversity and its ability to change and evolve is fundamental to sustainable development. The objectives of this standard are to: • Protect and conserve biodiversity; and • Promote the sustainable management and use of natural resources through the adoption of practices that integrate conservation needs and development priorities.
PS 8: Cultural Heritage Aims to protect irreplaceable cultural heritage and to guide clients on protecting cultural heritage in the course of their business operations. The objectives of this standard are to: • Protect cultural heritage from the adverse impacts of project activities and support its preservation; and • Promote the equitable sharing of benefits from the use of cultural heritage in business activities.

4 PROJECT DESCRIPTION

This chapter provides an overview of the proposed Aggeneys Solar PV Power Plant, as well as the findings of assessments undertaken in support of the project design process. A description of the need and desirability of the proposed project in comparison to the no-go project alternative is also provided.

4.1 Description of the proposed project

The proposed project entails the development of a solar PV power plant on Portion 1 of the farm Aroams 57 RD, located approximately 3 km east of the town of Aggeneys in the Northern Cape Province. The land tenure of the project site and directly adjacent properties is illustrated in Plan 2a (Appendix A).

The available surface area that was delineated for the development of the proposed project, based on the avoidance of environmentally sensitive and no-go areas, is approximately 322 ha in extent and therefore, the optimal generation capacity of the power plant based on an estimated requirement of 4 ha surface area per MW generation capacity was determined to be 80 MW. This area includes the surface area requirements for the development of access roads, the construction lay-down yard, site offices and all other project components. The details of the project design process are provided in Section 4.3 and Section 6.2 of this report.

The proposed solar PV power plant will consist of the following components:

- *Solar PV panels* – An array of solar PV panels with a generating capacity of up to 80 MW will be installed over an area of 312.7 ha;
- *Support structures* – The solar PV panels will be mounted on steel support structures. The solar PV panels will be mounted to a maximum height of 7 m and tilted approximately 25° from the horizontal plane, facing to the north and may be on tracking systems to adjust the angle of the panels to the summer or winter solar radiation characteristics;
- *Foundations* – The panel foundations will be either hammered into the ground or have concrete foundations excavated to a depth of approximately 1.5 m, depending on the terrain characteristics determined through geotechnical studies;
- *Electric cabling* – The solar PV arrays will be connected via electric cabling which will be laid underground in trenches of approximately 1 m deep and 0.6 m wide;
- *On-site substation* – The substation will occupy a surface area of approximately 0.78 ha and will include invertors to convert the electricity generated by the solar PV arrays from direct current (DC) to alternating current (AC);
- *Transmission line* – The proposed power plant will be connected to the Eskom Aggeneys substation with overhead transmission lines;
- *Access roads* – Access to the proposed project site will be from an existing farm road that joins up with the N14 national road. An internal network of roads will be required to access the different components of the proposed project;
- *Temporary construction lay-down yard* – The construction lay-down yard will occupy a surface area of 9.1 ha and will include a site office, mobile toilets and bathroom facilities, a car yard where all vehicles will be parked to reduce oil spillage and the hydrocarbon management facility; and
- *Access control and fencing of the site* – The site must be secured against theft from outside and for this purpose, different types of fencing will be considered, depending on the generation capacities of the proposed project.

The layout of these components within the development footprint is illustrated in Plan 2a (Appendix A).

4.2 Need and desirability

The proposed Aggeneys Solar PV Power Plant is one of five proposed solar PV developments that are being proposed by Orlight SA. The other projects are situated near the towns of Kenhardt and Loeriesfontein in the Northern Cape Province and Vanrhynsdorp and Graafwater in the Western Cape Province (Plan 14).

The proposed solar PV developments are being planned in response to the urgent need for increase electricity supply and cleaner energy production in South Africa. As discussed in Section 3.1 of this report, the development of the proposed solar PV power plants will ensure adherence to the Final Integrated Resources Plan (IRP) (2010 – 2030) which allows for the development of solar PV and other renewable energy technologies in the country. The proposed project is also in alignment with the LED Strategy of the Namakwa District Municipality, as discussed in Section 3.3.

4.2.1 Project benefits

The project benefits, including a description of the need and desirability of the proposed project, are described in Table 4-1 below.

Table 4-1: Project benefits

MOTIVATION	DETAILS
Energy demand	The proposed solar PV power plant will assist in addressing the growing need for increased electricity supply and renewable energy production in South Africa.
Adherence to the IRP 2010 – 2030	The development of the proposed solar PV power plant will ensure adherence to Final IRP 2010 – 2030. The IRP is a living document promulgated by the Department of Energy (DoE) on 6 May 2011 (in consultation with Eskom) to guide decisions on the future energy mix in SA. This document allows for a certain MW capacity for Solar PV in SA and guides the programme development.
Solar radiation	The proposed project site is located in an area of high solar irradiation and is considered ideal for solar PV power generation.
Grid accessibility	The proposed project site is located in geographical proximity to the existing Eskom Aggeneys substation which allows for easy integration into the national electricity grid.
Accessibility	The site is located adjacent to the N14 highway and can therefore be easily accessed during the construction and operational phases.
Optimisation of use of available land	The proposed project site is located in a region characterised by vast tracts of available land. The current grazing capacity of the site is very low and there are no other significant competitive land uses. Use of the land for renewable energy projects is considered a suitable use.
Affordability	PV installations require little maintenance or intervention after their initial set-up (after the initial capital cost of building any solar power plant, operating costs are extremely low compared to existing power technologies).
Future growth	Demand for energy will increase. Although renewable energy is currently still a capital intensive development, technologies will become more cost effective over time, while fossil fuels may become more expensive.
Socio-economic development	The proposed solar PV power plant will stimulate job creation, local content and local manufacturing, rural development and community involvement, education and development of skills, enterprise development and socio-economic development of the Namakwa District Municipality and the Northern Cape Province.

MOTIVATION	DETAILS
Emission reduction targets	The development of renewable energy projects and solar plants leads to a reduction in additional carbon intensive electricity production, which may in turn reduce the overall GHG emission rates of South Africa.

4.2.2 Assessment of the no-go alternative

The no-go alternative is the option of not proceeding with the development of the proposed Aggeneys Solar PV Power Plant. The status quo will be maintained and none of the expected negative environmental impacts will occur. In addition, none of the anticipated benefits of the project, as described in Table 4-1 will be realised.

Based on the above motivations, it would be beneficial to pursue projects such as the Aggeneys Solar PV Power Plant that may assist in electricity supply and contribute towards more sustainable and renewable energy. This project also has the potential to provide much needed training and employment opportunities for local communities in the Northern Cape Province. The aspiration and desires to proceed with this sustainable project became apparent during public consultations and site visits to the study area.

4.3 Project alternatives and the project design process

The following alternatives were considered during the EIA process for the proposed development of the solar PV power plant:

- Site alternatives;
- Design and layout alternatives;
- Technology alternatives;
- Operating alternatives; and
- No-go alternative.

It should be noted that the project was not compared to other renewable projects neither is the project compared to the increased production of power from fossil fuels.

4.3.1 Assessment of alternative project sites

The identification of suitable sites for development of proposed solar PV power plants was undertaken prior to the commencement of the EIA process. Sites suitable for the development of solar PV power plants were considered according to the following parameters:

- Areas of high solar irradiation;
- Availability of large tracts of open land for development;
- Easy access to existing roads;
- Diversity in terms of geographical location of the projects proposed by the applicant to ensure that socio-economic benefits of renewable energy projects are not restricted to certain localities;
- Proximity to existing Eskom substations to allow for easy integration of the solar plants with the nearest grid connection points;
- Proximity of sites to load centres where electricity is required;
- Willingness of land owners to agree to long-term leases of their properties; and

- Local need for employment creation and economic development.

Based on an assessment of different areas according to these parameters, the applicant identified the following properties as potential sites for the proposed development of solar PV power plants:

- Portion 1 of the farm Aroams 57 RD near Aggeneys in the Namakwa District Municipality, Northern Cape Province;
- The Remaining Extent (RE) of the farm Klein Zwart Bast 188 RD near Kenhardt in the Siyanda District Municipality. Northern Cape Province;
- Portion 5 of the farm Klein Rooiberg 227 RD near Loeriesfontein in the Namakwa District Municipality, Northern Cape Province;
- The RE of the farm Paddock 257 RD near Vanrhynsdorp in the West Coast District Municipality, Western Cape Province; and
- Portion 1 of the farm Graafwater 97 RD and the RE of the farm Bueroskraal 220 RD near Graafwater in the West Coast District Municipality, Western Cape Province.

All of the above properties were considered suitable for the development of solar PV power plants and therefore, it was decided to submit EIA applications for the development of solar PV power plants on each of the above mentioned properties.

Although the EIA processes for the five proposed Solar PV Power Plants are being undertaken concurrently, this draft EIA Report specifically addresses the impacts associated with the development of the Aggeneys Solar PV Power Plant.

4.3.2 Assessment and delineation of study areas

An environmental screening assessment was undertaken in December 2011 with the aim of determining the suitability of the proposed project site for development, taking into consideration the site's environmental sensitivities and the anticipated impacts of project activities on natural or cultural resources.

The study area that would be considered during the EIA process was subsequently delineated. From the onset of the project, the objective was to design the infrastructure layout in such a way to avoid problematic areas. The study area would thus have to be larger than the required footprint areas for the proposed Solar PV Power Plant, to provide adequate space for optimising site layout to avoid ecological and cultural sensitive areas; transmission line, road servitudes; and difficult topographical areas

The delineation of the study area was based on the following factors:

- Preliminary exclusion of areas that would be present challenges to development in terms of topography;
- Preliminary exclusion of areas that are not easily accessible from main roads;
- Optimisation of the extent of study areas to provide sufficient space for site layout alternatives, while minimising the costs and time involved in surveying large areas of land; and
- Willingness of land owners to agree to long-term leases of land included in the delineated study areas.

4.3.3 Assessment of alternative site layouts

Upon completion of the environmental and cultural assessments undertaken in the study area, including important feedback received from stakeholders during the PPP, a number of sensitivity maps were created using

a Geographic Information System (GIS). Details of the approach and process used to delineate environmentally sensitive and no-go areas are provided in Chapter 6 of this report.

The proposed site layout for the proposed Aggeneys Solar PV Power Plant, based on the environmental sensitivity analysis is illustrated in Plan 2a (Appendix A).

4.3.4 Assessment of alternative project generation capacities

The optimal generation capacity that can be accommodated in the study area, based on the preliminary assessment of ecological, cultural and socio-economic characteristics and other technical factors are summarised in Table 4-2.

Table 4-2: Optimal generation capacity of the proposed Aggeneys Solar PV Power Plant

SITE	AVAILABLE AREA (LOW SENSITIVITY)	AVAILABLE AREA (TECHNICAL)	OPTIMAL GENERATION CAPACITY[2]
Aggeneys	345.3 ha	322.3 ha	80.00 MW

4.3.5 Assessment of alternative solar technologies

Two main solar PV technologies were considered for the project, namely solar PV and concentrated solar PV (CPV). At this stage, the use of specific technology alternatives is still under investigation by the Orlight SA, but it is foreseen that the two technologies will have similar environmental impacts. It is anticipated that the final decision on preferred technology will depend on both generation efficiency and economic conditions.

4.4 Proposed project activities

4.4.1 Construction phase

The duration of the construction phase of the proposed 80 MW solar PV power plant is approximately 16 months.

Employment opportunities and accommodation

In the event that an 80 MW power plant is developed, approximately 320 direct job opportunities will be created during the construction phase.

Construction workers will be sourced from local areas and therefore, minimal additional housing will be required. Accommodation of workers from outside the local area will be provided in the town of Aggeneys.

Establishment of access and internal roads

The site will be accessed from the existing farm road that connects to the N14 national road. This will not require widening of the N14, but the road edges will have to be strengthened with concrete edge beams at the accesses to prevent breaks in the road surface. Two-track gravel roads of approximately 6 m in width will be established to access the construction lay-down yard and development footprint.

[2] This was based on an approximated requirement of 4 ha per MW peak generation capacity. Includes all power plant infrastructure, construction lay-down areas and internal and access roads.

Site preparation

Site preparation will consist of the clearance of vegetation at the footprint of the construction lay-down yard, substation and each solar PV mounting structure. Topsoil will be removed from the footprint of the substation and car parking yard and stockpiled for use during site remediation. Where the terrain is undulating, the terrain may be levelled. Large boulders and rocks will be removed. No protected tree species will be removed.

Construction lay-down yard

The construction lay-down yard will provide a storage area for construction material and will be used for assembly purposes.

Vehicle hard park and hydrocarbon storage

A vehicle hard park will be established where all construction vehicles and equipment will be parked overnight, serviced and refuelled. The hydrocarbon management area will be bunded for the safe storage of fuel, lubricants and waste oils.

Access control and fencing of site

Adequate systems and procedures will be in place to minimise the risk of unauthorised access to the site. Carefully consideration will also be given to the plant layout to ensure access for day-to-day operations, emergency escape routes and maintenance of the plant and equipment.

Anchoring and installation of solar PV panels

The foundation types used for the solar PV mounting structures will depend on the terrain characteristics defined by the geotechnical studies. The mounting structure will either be hammered into the earth surface, or a shallow concrete foundation will be cast.

Installation of underground cables

Trenches will be excavated wherein underground electrical transmission cables will be laid.

Construction of facility substation

An on-site facility substation will be constructed which will include the casting of foundations, installation of the transformer and inverters and connecting of the conductors.

Construction of transmission lines

In the event that a 40 MW power plant is constructed, a short 66 kV transmission line will be constructed from the facility substation to loop into the existing 66 kV Eskom transmission line that crosses the site. For an 80 MW power plant, a new 66 kV transmission line will be required from the facility substation to the Eskom Aggeneys substation.

Upon completion of the preliminary electrical engineering designs and associated consultation with Eskom, it was determined that the project would require the construction of transmission lines to it to the Eskom Aggeneys substation. The properties on which these transmission lines are to be located were not included in the original EIA application. The EAP recommended that a separate Basic Assessment (BA) process be undertaken for the proposed transmission lines. Although considered an “associated activity” to the Solar PV Power Plants, this approach would allow the current EIA process to continue without affecting its planned timeframes.

The proposed approach to the environmental authorisation process for the proposed Solar PV Power Plant and the required transmission lines were discussed with the DEA and it was decided that the potential impacts and

required management measures for transmission lines would be addressed during the BA process. Please refer to Appendix D for the correspondence with the DEA.

Water use

Water will be used for domestic use and possibly for dust suppression during the construction phase. The total water requirements for the construction phase are estimated at 165 m^3 per month. Orlight SA has applied for water service provision from the local municipality.

Construction waste management

All construction phase waste will be collected and stored in a temporary waste storage area, where it will be collected by a waste removal contractor for disposal at a licensed waste disposal facility. No on-site burying or burning of wastes will be allowed.

The only chemical toxins on site will be the gas used in welding, the concrete, sulphur hexafluoride housed inside the switchgears and the diesel for the power generators used during the construction. These will be handled with care according to regulatory requirements. Wherever possible, waste materials shall be recycled.

Sewage management

Temporary ablution facilities will be provided and a contractor employed to safely remove sewage from the site to a licensed disposal facility.

Site remediation

Upon completion of the construction phase, the site will be remediated by removing all temporary construction infrastructure, construction waste and construction materials. Topsoil that was removed from the footprint of the substation and car parking yard and stockpiled will be spread over disturbed areas and vegetation re-established.

4.4.2 Operational phase

The typical lifecycle of a PV power plant is generally 20 years, where after it can be considered for upgrade and renewal or decommissioning, depending on the prevalent socio-economic conditions.

Employment opportunities and accommodation

In the event that an 80 MW power plant is developed, approximately 80 direct job opportunities will be created during the operational phase.

Generation and transmission of electricity

The electricity generated by the solar PV panels will be stepped up through the inverters and transformers in the facility substation. The electricity will be evacuated from the facility substation via the overhead transmission lines described above.

Access control and fencing of the facility

The perimeter fence established during the construction phase will be maintained and access to the facility will be through a controlled access point.

Facility maintenance

Facility maintenance will include the replacement of damaged solar PV panels and cleaning of the panels using small amounts of water. Approximately 353 m^3 water will be required per month for cleaning purposes of an 80 MW power plant. . Orlight SA has applied for water service provision from the local municipality.

4.4.3 Decommissioning and closure phase

Removal of infrastructure

The facility infrastructure will need to be removed unless a suitable alternative user can be found for the infrastructure.

Site rehabilitation

Where disturbed during operation and decommissioning, sites will be rehabilitated by returning excess soils removed from the substation footprint and car parking yard to disturbed areas and the re-establishment of vegetation compatible with the surrounding land. Rehabilitation is the process of returning the land in a given area to some degree of its former state, after some construction or operation activities may have resulted in its damage. The implementation of the EMP will be essential through the construction operational and closure phase.

5 STATUS OF BASELINE ENVIRONMENT

This chapter provides a description of the current status of the biophysical, socio-economic and cultural characteristics of the study area for the development of the proposed Aggeneys Solar PV Power Plant.

The specialist environmental investigations that were undertaken to in support of the baseline characterisation are attached as Appendix E to Appendix I to this report.

5.1 Climate

Aggeneys receives approximately 75 mm of rain per year, with most rainfall occurring during autumn. It receives the lowest rainfall (0 mm) in January and the highest (15 mm) in March and April. The monthly distribution of average daily maximum temperatures shows that the average midday temperatures for Aggeneys range from 14°C in June and July to 29°C in January. The region is the coldest during July when the temperature drops to 4°C on average during the night. The region is characterised by fluctuating temperatures, low and unpredictable rainfall and high evaporation rates. The low annual rainfall (average of 170 mm to 240 mm in central and western parts of Northern Cape Province) is significantly lower than the evaporation rate which creates the dry and arid environment. The area experiences high temperatures especially in the summer months, where daily maximums of >42°C are experienced. The annual evaporation in the area is high at average 2 200 mm. In winter, temperatures can drop below 4°C. Frost is rare, but occurs occasionally, although not severe. Winds generally predominate from the west and east-southeast direction, with strongest winds coming from the northeast and north-north easterly sectors.

5.2 Land use of the site and surrounding area

The main land use of the proposed project area near Aggeneys is illustrated in Plan 3a. The primary land use is grazing (Figure 5-1). There are two existing transmission lines constructed on Aggeneys that divide the site in two (Figure 5-2).

Figure 5-1: Main land use of the Aggeneys site is grazing

Figure 5-2: Existing transmission lines in the study area

The site can be accessed directly from the N14 via the existing farm access road. There is a two track service road that follows the transmission lines, which can be used to access the site. Farm fences are present on the property. No other significant infrastructure was identified in this study area.

5.3 Topography

The topography of the Aggeneys study area is fairly uniform. The area has a change in elevation elevation from 880 metres above mean sea level (mamsl) to 900 mamsl and the landscape is south facing (Plan 4a). The study area is flat with a slope rise of no more than 3%, except for very small, isolated pieces of land near the northern and eastern borders of the study area where a 10% slope rise might be experienced (Plan 5a).

The Inselbergs that are characteristic of the region can also be seen to the north of the study area. The footslopes of these rocky outcrops are located in the northern sections of the study area. There are also a number of outcrops comprising large boulders in the approximate centre of the study area.

The Aggeneys study area contains one major drainage line running in a south-westerly direction from the north-eastern corner to the south-western corner. Smaller streambeds enter the site in the northeast and further to the northwest respectively and converge towards the centre to join this drainage line. This drainage line is up to about 50 m wide in places.

Surfaces littered with rock remnants seemed to be more prominent north of the riverbed towards the foot of the Aggeneys Mountains. South of the river rocky surfaces diminished whilst coverage was of a much smaller order. However very fine (<2 mm) quartzitic fragments were often seen to cover the surface. As illustrated in Figure 5-3, the study area is covered by sandy and rocky sections and low-lying vegetation.

Figure 5-3: Aggeneys study area and landscape

5.4 Catchment characteristics

The project area is situated in the Lower Orange Water Management Area (WMA 14). The major rivers associated with this WMA are the Ongers, Hartbees and Orange rivers. The project site is situated in the quaternary catchments D81G, D82A, D82A and D82C. An ephemeral river system and associated drainage lines were identified and delineated for the project area. The project area is not recognised as a FEPA and this sub-catchment is not considered to be an upper management area.

This ephemeral system and associated drainage lines is recognised as a watercourse in terms of the NWA and is protected from the associated project activities.

5.5 Soils

A soil and agricultural potential assessment was undertaken and a comprehensive report was compiled at this site. This report was attached to the EIA as Appendix E.

Three transects constituted a cross-cut for the Aggeneys study area and enabled the observation the soil at 24 locations. Findings are as follows:

- The soil observations clearly depicted the dominance of shallow (<30 cm) red loamy sands of the Hutton (Hu) soil form;
- A yellow-red alluvial sand to loamy sand was found to cover the riverbed and banks;
- The surface north of the riverbed was littered with rock fragments of various sizes and shapes and often showed up in the soil profile;
- Most of the surface south of the river was found to be only covered with very fine rock remnants;
- A few occurrences of calcrete cover were observed; and
- Minor occurrences of other soils containing lime or which showed significant differences in colour were accommodated in the Augrabies (Ag) and Clovelly (Cv) soil forms.

Table 5-1 describes the main characteristics of the dominant soil types. Due to the scale of the survey, it was not possible to prepare a map delineating the different soil types. A map illustrating the dominant land type of the site is provided in Plan 6a.

Table 5-1: Characteristics of the soils at the Aggeneys site

SOIL TYPE	DEPTH RANGE (CM)	CLAY CONTENT * %	TEXTURE*	EROSION SUSCEPTIBILITY	UNDERLYING MATERIAL
Hu	< 5 – 30	8-15	Sand to loamy sand	High	Consolidated rock
Hu	< 70 – 200**	<10	Sand	High	Consolidated bedrock
*Take note that clay content was based on an in-field estimation and texture was derived from the clay content estimation. **It must be noted the depth of 200 cm was the exception to the rule and was located on the river embankment in a part where a deeper cutting prevailed.					

The sandy red soils covering the majority of the site at Aggeneys and partly infested with coarse fragments, implies susceptibility to water and wind erosion respectively, both of a moderate to high rating if no mitigation measures are in place. The fine particles in particular will be easily picked up by prevailing winds if exposed and not protected.

5.6 Land Capability

The land capability of the Aggeneys site is described in Table 5-2. The classification of land capability was conducted in terms of the Guidelines for Rehabilitation of Mined Land (Chamber of Mines & Coaltech, 2007). The site is mainly suitable for grazing, with exception of the alluvial deposits found in the main drainage line that runs through the project site. The grazing capacity of the land is considered too low for large-scale, intensive stock farming and therefore, the use of the land for generation of renewable energy is considered a suitable alternative land use.

Table 5-2: Land Capability of the Aggeneys site

TERRAIN	SOILS	LAND CAPABILITY
Crests	Rock outcrop and scattered occurrences of very shallow topsoil (5-10 cm)	Wilderness/ grazing
Midslopes	Red-yellow shallow topsoil in combination with rock remnants in abundance	Grazing
Footslopes	Red-yellow apedal, topsoil, with rock fragments on surface in places	Grazing
Drainage lines	Alluvial deposits (Red-yellow apedal, Ag, other)	Riparian area

5.7 Flora

In relation to the CBA and SKEP data, the Aggeneys study area is of importance for amphibian, bird and insect habitat components. The baseline characterisation of the flora present in the study area was undertaken as part of a comprehensive Flora and Fauna Assessment that was undertaken for the project. Please refer to Appendix F for a copy of the Flora and Fauna Report.

The Aggeneys study area is situated approximately three kilometres east of the town of Aggeneys within the Nama Karoo. As a result the plant species encountered here have evolved to cope with the low amounts of moisture, even during the rainy season. This study site is located within the Bushmanland and West Griqualand and stretches across two vegetation types described by Mucina and Rutherford (2006), namely the Bushmanland Sandy Grassland (NKb 4) and Bushmanland Arid Grassland (NKb 3). A total of 38 plant species were recorded from the Aggeneys study area (Appendix F) and the main vegetation types are illustrated in Plan 7a.

5.7.1 Red Data and protected plant species

During the field surveys only one Red Data species was encountered, namely *Aloe dichotoma* which is designated as Vulnerable (Raimondo et al., 2009) and is also classified as a medicinal plant species (Van Wyk and Van Wyk 1997, Shearing 1997, Esler et. al. 2010). *Boscia albitrunca* is designated as a protected tree species in terms of the National Forest Act of 1998 and would require a permit before removal.

Red Data plant lists were obtained from SANBI (Raimondo et al., 2009), which indicated that although not recorded during the dry-season survey, the Aggeneys study areas could also contain the following Red Data and protected plant species (Raimondo et al., 2009):

- *Conophytum burgeri* (L.Bolus) – Endangered, African endemic, Northern Cape, Aggeneys;
- *Conophytum ratum* (S.A.Hammer) – Vulnerable, Northern Cape, Ghaamsberg near Aggeneys;
- *Eriospermum pusillum* (P.L.Perry) – Rare, Northern Cape, Springbok to Aggeneys; and
- *Lithops olivacea* (L.Bolus) – Vulnerable, African endemic, Northern Cape, Aggeneys to Pofadder.

5.7.2 Medicinal plant species

The results from the field survey further indicate that the Aggeneys study area contains a wide diversity of medicinal species (Table 5-3), further enforcing the argument that this area is sensitive as far as medicinal plant species populations. Medicinal plants are important to many people and are an important part of the South African cultural heritage (Van Wyk et al, 1997). Plants have been used traditionally for centuries to cure many ailments, as well as for cultural uses such as building material and for spiritual uses such as charms.

Table 5-3: Medicinal plant species (Van Wyk and Van Wyk 1997, Shearing 1997, Esler et. al. 2010)

SCIENTIFIC NAME	COMMON NAME	FORM
Aloe dichotoma	Kokerboom	Aloe
Boscia albitrunca	Shepherds tree	Tree
Hoodia gordonii	Ghaap	Succulent
Monsonia spinosa	Spiny Bushman's Candle	Succulent
Peliostomum leucorrhizum	Veld violet	Dwarf shrub
Rhus undulata	-	Tree
Salsola tuberculata	-	Shrub
Sarcostemma viminale	Melktou	Succulent creeper

5.7.3 Landscape sensitivity

The findings of the landscape sensitivity determination have been taken into consideration during the site layout design process which is described in more detail in Section 6.2 of this report. An illustration of the location of sensitive areas is provided in Plan 8a.

A distinct division is evident between the dominating landscape features of the study area and this also corresponds with the different plant communities that were delineated. The drainage line that flows from the north eastern corner of the project site to the central western boundary displayed the physical characteristics of these landscape types. A drainage line was the concave part of the habitat also called the valley bottom, where the sediment (sand) collects during rain events, creating favourable habitat for certain plants while excluding others (Figure 5-4).

The grass species *Stipagrostis namaquensis* or River Bushman's grass dominated the grass sward of the drainage line, with the tree species *Boscia foetida* subsp. foetida, and *Prosopis glandulosa* occurring exclusively within the drainage line. This vegetation community is designated as a no-go area due to the sensitivity of the vegetation types within the regional biodiversity context.

Figure 5-4: Drainage line at Aggeneys

The higher lying landscapes encountered on Aggeneys consisted of ridges and relatively flat plains (Figure 5-5). The ridge areas are located to the central and northern sections of the study area. The northern ridges are highly sensitive and forming part of the foot slopes of a mountain range.

The grass sward here was dominated by *Stipagrostis obtusa* and *Stipagrostis uniplumis*, the shrub component was dominated by *Rhigozum trichotomum* and *Searsia (Rhus) undulata*. The tree *Boscia albitrunca* was also encountered here.

The plains (Figure 5-6) present on the Aggeneys study area were sparsely covered by grass and shrub species, no tree species were encountered here. The dominant grass species were *Stipagrostis obtusa* and *Stipagrostis uniplumis*, and the shrub component was dominated by *Rhigozum trichotomum*.

Figure 5-5: Ridge area in Aggeneys

Figure 5-6: Aggeneys plains

Within the study area, areas that were not considered to be ecologically sensitive included areas that are adjacent to human disturbances (the N14) and is affected by this disturbance and areas where prior disturbance (overgrazing) has impacted the plant species richness in a negative way, if compared to other areas within this study area. One alien invasive species, namely *Prosopis glandulosa* (Mesquite tree) was encountered here.

5.8 Fauna

The Karoo region, because of its aridity and low shrubby vegetation, never supported the diversity of herbivorous large mammals found in the African savannas (Azef, 2010). Plant eating animals of the Karoo are either small or confined to protected habitats, or are very mobile. The evidence of dung and spoor suggests that animals were present in the area although very few were recorded during the surveys.

5.8.1 Mammals

During the field survey, the presence of mammal species such as *Rhaphicerus campestris* (Steenbok), *Vulpes chacma* (Blackbacked Jackal), *Suricatta suricatta* (Meerkat), *Lepus capensis* (Cape Hare) and *Xeris inauris* (Cape Ground Squirrel) were confirmed.

5.8.2 Avifauna

The Aggeneys study area displayed low numbers of bird species, however the time of day when the field study was conducted was not conducive to bird spotting as it was exceptionally hot. Birds that were observed include the Namaqua Dove (*Oena capensis*), Pied Crow (*Corvus albus*) and Sociable Weaver (*Philetairus socius*).

Important birding areas near the project site are illustrated in Plan 9a. Birds that occur in the ecoregion include some of the smallest and largest species in South Africa. Among the birds that can be expected to occur in the study area, are the ferruginous lark (*Certhilauda burra*, VU) and Sclater's lark (*Spizocorys sclateri*) which are strictly endemic to this ecoregion. Five near-endemic species are known to occur, including the Karoo chat (*Cercomela schlegelii*), tractrac chat (*Cercomela tractrac*), red lark (*Certhilauda burra*), Karoo scrub robin (*Cercotrichas coryphaeus*), red-headed cisticola (*Cisticola subruficapillus*) and the Namaqua prinia (*Phragmacia substriata*).

Other characteristic species of the Nama Karoo that could be expected and which is regarded as "Vulnerable" in South Africa are tawny (*Aquila rapax*) and martial (*Polemaetus bellicosus*) eagles, African marsh harrier (*Circus ranivorus*), lesser kestrel (*Falco naumanni*), blue crane (*Anthropoides paradiseus*), kori (*Ardeotis kori*) and Ludwig's (*Neotis ludwigii*) bustardsi and the red lark (McCann 2000; Barnes 2000).

5.8.3 Herpetofauna

The herpetofauna of xeric landscapes in general tends to be poor due to a paucity of suitable habitat. This is evident in the fact that reptile species richness within the Nama Karoo, is generally low and there are few endemic species. Furthermore, few of the reptile species that occur in this ecoregion are of conservation concern or classified as threatened (Alexander and Marais 2008). Only two reptile species were observed during the field survey, namely the Namaqua Speckled Padloper (*Homopus signatus*) which has an IUCN "vulnerable" status and the Karoo Girdled Lizard (*Cordylus polyzonus*).

5.9 Biodiversity importance

In relation to the CBA and SKEP data, the Aggeneys study areas is of importance in terms of its amphibian, bird and insect habitat components. As far as vegetation is concerned the plains that occur on study area is of importance because of the presence of quartz gravel patches which are the preferred habitat for *Lithops* spp., or stone plants, demarcated as highly sensitive areas in Plan 8a.

The study area falls within an area that is imperative for maintenance of ecological processes that support amphibian biodiversity, is described as threatened (in terms of amphibian habitat) and one endemic amphibian species occurs in the area (SKEP, 2010). Because of all the reasons mentioned above the no-go areas of the drainage lines was delineated. As far as avifauna is concerned, the area is approximately 3 km away from an area that is described as a unique habitat for birds (SKEP, 2010).

As far as invertebrate sensitivity is concerned the area falls within an area that is a centre of endemism, a local centre of biodiversity and a unique habitat for insects (SKEP, 2010). Furthermore, the study area falls within an area where eastern Bushmanland Quartz and Gravel patches are found.

The site falls within CBA 2 (Near Natural landscapes) which means the ecosystems and species in it are largely intact and undisturbed. These are areas with intermediate irreplaceability or some flexibility in terms of area required to meet biodiversity targets. There are options for loss of some components of biodiversity in these landscapes without compromising our ability to achieve targets. These are landscapes that are approaching but have not passed their limits of acceptable change (BGIS, 2010).

Entire area falls within the Geographic Priority area, specifically the Bushmanland Inselberg area. This priority area is located on the northeast margin of the Succulent Karoo Hotspot, just south of the Orange River and the border between Namibia and South Africa. The area is dominated by a plain of desert grasslands and peppered by Inselbergs, ancient rocky outcrops in irregular patterns. These Inselbergs are important refugia for plants and animals and act as stepping-stones for rock-loving species migrating east west across the sand-covered plains of Bushmanland. Isolation of populations has led to diversification within the dwarf succulent shrublands. In total, the 31 400 ha area includes 429 plant species, of which 67 are found only in this hotspot and 87 are Red List species.

Mining has impacted many of the Inselbergs, and a proposed opencast zinc mine may devastate most of the spectacularly diverse Gamsberg Inselberg, home to two endemics: *Conophytum ratum* and *Lithops dorotheae*. The Red Lark (*Certhilauda albescens*) is also an important endemic species, although severe overgrazing on communal lands in this part of the Bushmanland plateau is impacting its habitat. The study area has a Very High irreplaceability status (BGIS, 2010). Namaqua Speckled Padloper was encountered. According to the IUCN this tortoise is vulnerable.

All of these findings have been integrated into the site layout design process, as discussed in Section 6.2 and illustrated in Plan 11a.

5.10 Visual environment

The baseline characterisation of the visual quality of the study area was undertaken as part of the VIA that was undertaken for the project. Please refer to Appendix G for a copy of the VIA report.

With regard to their visual considerations, the outcrops on the northern border of the study area are typical of the regional area in which the study area falls. The dry landscape is somewhat dramatic with its contrasting features and has a rugged and stark beauty. The surrounding landscape is impressive with large, flat open spaces and contrasting large rocky outcrops.

The study area does, however, have a sense of being transformed by people, not only because of the visibility of the town from the border of the study area, but also because a transmission lines runs through the study area and fences on the border of the property (Figure 5-7). The N14 also dissects the study area towards the south-eastern corner which also adds to the aspect of the area being transformed.

The town of Aggeneys itself is very small and only visible from the north-western boundary of the study area. The N14 national road, Aggeneys town and a number of dirt roads were identified as potential receptors within the 5 km radius around the Aggeneys study area. As illustrated in the viewshed that was prepared for the study area (Plan 10a), the large outcrops and inselbergs to the north and east of the study area will shield the visibility of the potential infrastructure anywhere beyond these outcrops.

There are also smaller outcrops that are scattered around the study area which will also decrease visibility of the proposed infrastructure. The proposed infrastructure will therefore likely only be visible from within a 5 km radius of the site itself.

Figure 5-7: Fence lines on the north westerly boundary of the site - Aggeneys town just visible

5.11 Tourism

Aggeneys falls into the Namakwa tourist district. The surrounding mountains, rivers, valleys and coastline are criss-crossed by hiking, biking, canoe and 4×4 trails. The Aggeneys town itself is not a major tourist attraction, as it mainly accommodates the employees of the mining industry in the area. The main tourist attraction in the regional area is the unique natural and cultural resources found in this area (Figure 5-8). Beyond the edges of town the arid conditions and the unique ecologies on the various inselbergs, peaks, hills and plains, with their varied rocky and shallow soil substrate, support a wide range of plants, animals, birds and insects, including rare and endemic species, as evident from the findings of the fauna and flora assessment. The Quiver tree (*Aloe dichotoma*) is a well-known attraction in this region and was encountered on site during the flora survey.

In the LED Strategy for the Namakwa District Municipality, the following opportunities have been identified to further develop the tourism industry in the area:

- Eco-tourism: Vast open land, unique natural flora and a number of national parks and conservancies;
- Adventure tourism: Numerous 4x4 trails and hiking;
- Historical and cultural tourism: A rich heritage of the Khoi San/Nama people in the area, as well as mining museums; and
- Technological tourism: Potentially the SKA radio telescope project (if awarded to the Northern Cape) and renewable energy tourism.

Figure 5-8: View of project site from main tourist route

5.12 Traffic

A Traffic Impact Statement (TIA) for the proposed Aggeneys Solar PV Power Plant was prepared by BKS Consulting Engineers. Please refer to Appendix H for a copy of the report.

The N14 is a two-lane road with paved shoulders of approximately 1 m wide. Farm accesses on the N14 currently serve the two sides of the study area and are located approximately 1.5 km north-west of the Namies/Lus gravel road intersection (T-junction). The N14 is straight and flat at the access position and the sight distance along the N14 is more than a kilometre in both directions. The average daily traffic on this section of the N14 is in the order of 1 200 vehicles per day (SANRAL Yearbook 2011). Conflicting traffic flows on the N14 at the access are therefore low and there will be an abundance of safe gaps for turning vehicles.

5.13 Socio-economic context

The study area is located in the Khai-Ma Local Municipality of the Namakwa District Municipality in the Northern Cape Province. The major settlements in Khai-Ma Local Municipality are the towns of Aggeneys, Pella, Pofadder, Onseepkans and Witbank.

5.13.1 Population

The Khai Ma local municipality is one of the least populated in the Namakwa District Municipality. According to the classification system used by Statistics South Africa in census and community surveys, the most numerous population group in the Khai Ma Local Municipality is Coloured. In this regard it is similar to most local municipalities within the Northern Cape. The population composition of the municipality consists of 86% Coloured, 11% White followed by 3 % Black African. The smallest population group is Asian (Stats SA Community Survey, 2007). The dominant language spoken in this region is Afrikaans, followed by English and IsiXhosa, which are spoken to a lesser extent.

5.13.2 Employment and unemployment

In 2007, half the population within Khai-Ma Local Municipality was employed and 35% was regarded as not economically active. Only 13.6% was unemployed and a majority of the unemployed group are young people below the age of 30. The total percentage of the unemployed group and those classified as economically inactive, indicates a high dependency ratio.

In addition, the high proportion of semi-and unskilled workers has implications for the nature and quality of jobs created. To improve on the quality of jobs, household incomes and overall economic status of the area, skills development programmes are needed.

5.13.3 Education levels

A greater portion of the population has a primary school education which indicates that most people are literate. However, most of the population does not have a matric certificate and even less a tertiary qualification. The low education levels in the Khai-Ma Local Municipality could indicate that the area is challenged by shortage of skills which creates a high unemployment rate. Due to shortage of skills, most people in the Khai-Ma Local Municipality have elementary jobs as these jobs require a low skill levels.

From the above, it is evident that there is a need for educational facilities, particularly post-matric training as well as accredited tertiary institutions that offer affordable and appropriate qualifications. A further need is to attract and retain qualified professionals in the municipality.

5.13.4 Economic overview

Agriculture and mining are the main sectors that contribute to employment in the Khai-Ma Local Municipality. The Khai Ma IDP (2004) views the mining sector as a significant potential injection for the local economy. Employment at Black Mountain is contributing towards upliftment in the area and the municipality is looking towards the Gamsberg mining project to do the same.

Other sectors such as transport, manufacturing and construction do play a role in the economy of this region, although their contribution is minimal. This could be attributed to the low productivity in the area which is created by the shortage of skills. The main contributors towards the economy of the Khai-Ma Local Municipality are shown in Figure 5-9. It is evident that the municipality requires a strategy that will further diversify the economy, reducing dependence on the mining sector.

The municipal area is characterised by low-income households, which has serious implications for the financial status of the municipality itself and its ability to implement development programmes. The low household income also has implications for the types of initiatives that would be feasible for the municipality to implement in terms of local market demand.

The majority of the population currently live in small, dispersed settlements and have limited transport capacity to travel the significant distances between urban centres. As many of these households are also living in poverty, the lack of transport adds to the so-called “poverty trap”.

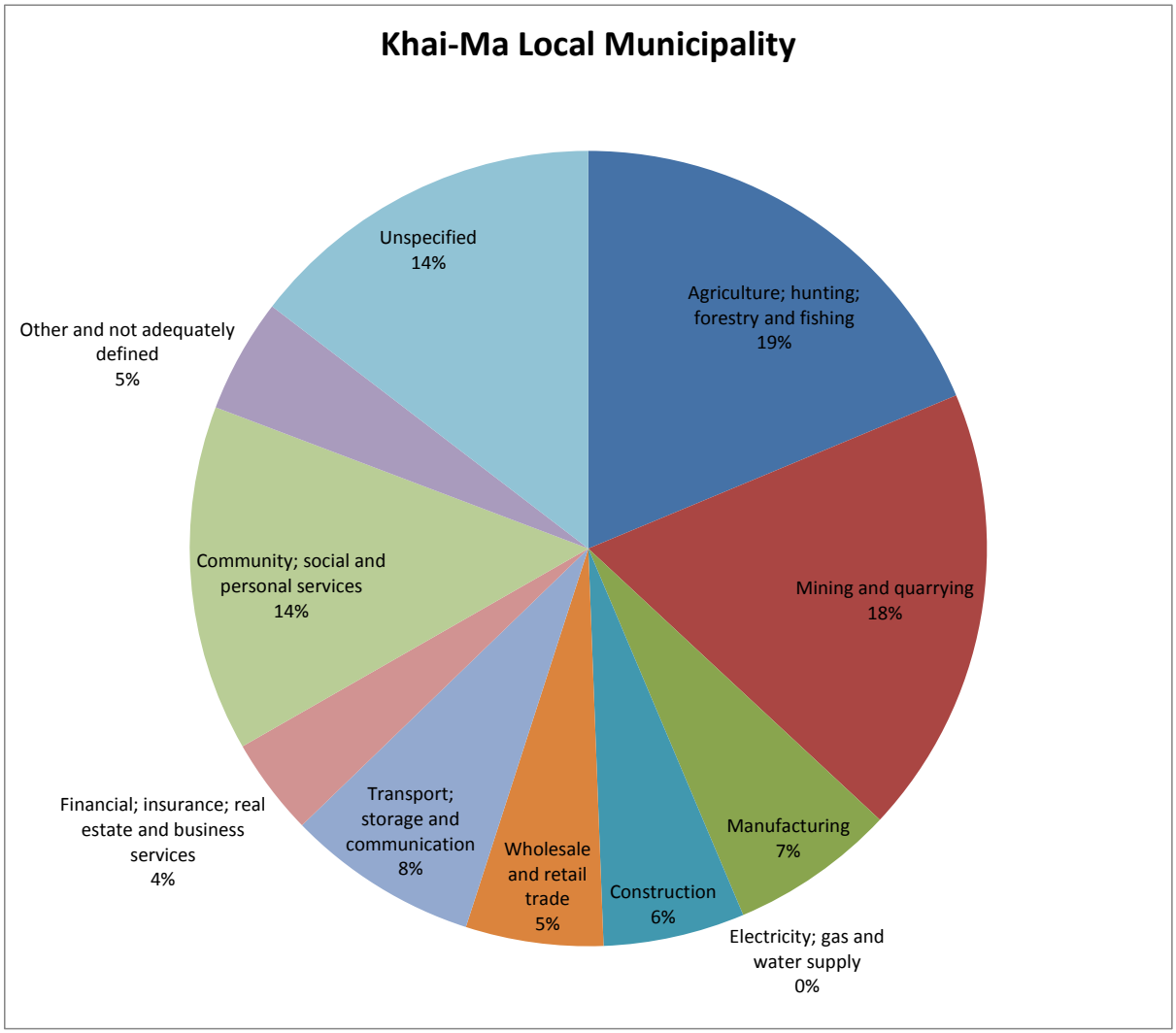

Figure 5-9: Contributions of sectors to local employment in the Khai-Ma Local Municipality *(Source: Adapted Stats SA Community Survey, 2007)*

5.14 Heritage

A Phase 1 AIA was undertaken for the proposed project and a Paleontological Impact Statement prepared. Please refer to Appendix I for a copy of the heritage reports. The location of relevant heritage aspects of the study area is illustrated in Plan 12a.

5.14.1 Palaeontology

The palaeontological landscape is described as bedrock comprising ancient basement rocks of the Bushmanland Terrance of the Namaqua Province. This geology is of negligible palaeontological interest. The Bushmanland Terrance is overlain by Quaternary sand cover – a combination of alluvium in the drainage lines and colluvium closer to the bedrock outcrops.

5.14.2 Archaeology

Background and context

In general, it is stated that archaeological visibility is low around Aggeneys and Pofadder (Morris, 2011). The predominant archaeology consists of widespread, low density lithic artefact scatters of Early Stone Age (ESA) and Middle Stone Age (MSA) material across areas of Bushmanland to the south of the study area. Systematic collections that have been made included a 'fresh component of Middle Stone Age with prepared cores, blades and points and a large aggregate of moderately to heavily weathered Earlier Stone Age' (Beaumont *et al*., 1995).

Cultural Resource Management (CRM) assessments conducted over the past two years in the area around Kenhardt have identified considerable MSA material distributions. Expressions of the Stone Age around Aggeneys and Pofadder is less well known or described. Five 'significant locales' were identified by Morris's (2010) surveys of the northern slopes of the Gamsberg (2.5 km east of the proposed project). These included both ESA and MSA sites.

MSA and Later Stone Age (LSA) material was identified at Paulputs near Pofadder, as well as the presence of ostrich eggshell. It seems that the LSA lithic industries are the predominant 'archaeological trace' seen in CRM surveys in the Aggeneys-Pofadder region. A ceramic LSA site that included lithics manufactured from quartz, glass and porcelain as well as two stone cairns that represent graves was found to the north-west of the Gamberg (Morris, 2010). This may indicate LSA settlements and occur on the plains, near little rocky outcrops, rather than on the slopes of the Gamsberg itself. Additionally, another ceramic LSA site (containing pottery, stone tools, ostrich eggshell and glass) was identified north of the N14 linking Aggeneys to Pofadder where 'boat-shaped grinding grooves in the outcropping bedrock' was found (Morris, 2010). These may represent 'transient settlement by transhumant hunter-gatherers or herders'. Furthermore, it seems that LSA sites are concentrated at the base of small koppies. Rock art (paintings) are also known to occur.

Findings of the field survey

A dense background scatter of quartz flakes was found across the south-western section of the study area. The material is particularly prevalent in those areas where the soil surface is covered in quartz pebbles and cobbles. These quartz "floors" occur in patches between the knee high grasses and are easy to see (Figure 5-10).

The artefacts comprise predominantly quartz flakes, cores and chunks, although quartzite stone artefacts are also present. The size of the artefacts suggests that they are of Middle Stone Age date. The concentrations of stone tools appear to be highest near the drainage channel that runs through the site.

A small koppie to the north of the proposed facility contained a higher concentration of stone artefacts, particularly in quartzite. The koppie is located near a small farm building, and there are fragments of glass in the area, suggesting that livestock may have been kraaled in the shelter of the koppie in the recent past.

Rocky outcrops to the north of the area were also examined for signs of engravings, but the rock was not of a suitable dolerite material for engravings. A slight overhang in one of the rocky outcrops outside the study area was examined for signs of rock paintings, but none were found.

The stone artefact scatters which were recorded during the survey are considered to be of minor significance. They are probably not in original context and not associated with other archaeological material, such as bone, which could provide valuable information on prehistoric life ways. There do not appear to be "archaeological sites" with stone tools left in their original context.

Figure 5-10: Stone artefact scatters are found in these open patches of soil between the vegetation cover

5.14.3 Historical period

The Aggeneys and Gamsberg areas represented a frontier zone during the colonial period where place names were becoming fixed in terms of cadastral terms and farm names. Many current place names have their origins in colonial interpretations or perversions of original San/Khoe names. Aggeneys (alternatively Aggeneis) and Gams are names derived from the Nama language (Morris, 2010).

Of importance is recorded oral history that infers that a 'massacre of Bushmen took place in a kloof at Aggeneys' (Nienaber & Raper, 1977:173). However, there is also a premise that links the San massacre with the Gamsberg rather than Aggeneys. Other interpretations embraces possible meanings of 'place of red clay' or association with reeds. A critical consideration based on the above inference is the possible inclusion of the Gamsberg into a potential /Xam and Khomani Heartland World Heritage Site.

The farm Aroams 57 was surveyed and granted in 1895, suggesting a relatively recent European settlement date of the area. The name Aroams is possibly derived from the Nama terms for *Ziziphus mucronatus* and mouth (ǂaro- and am or am-s), translating into 'Wag-'n-bietjiebosfontein' (Nienaber & Raper, 1977).

6 ENVIRONMENTAL IMPACT ASSESSMENT

This section presents the findings of the assessment of potential environmental impacts associated with the proposed development of the Aggeneys Solar PV Power Plant.

The results of the impact assessment are presented as follows:

- *Issues and concerns* – The findings of the PPP undertaken for the proposed project are described;
- *Environmentally sensitive and no-go areas* – The process to delineate these areas and resulting sensitivity maps are presented;
- *Significance assessment* – An assessment of the significance of anticipated positive and negative environmental impacts associated with project activities is provided; and
- *Cumulative impacts* – The results of a qualitative assessment of the potential cumulative impacts of the proposed project, similar projects and other developments in the project area is presented.

Recommended measures to enhance the positive environmental impacts and mitigated negative environmental impacts have been detailed in the EMP for the project attached as Appendix J to this report.

6.1 Findings of the Public Participation Process

Issues and comments raised by I&APs during the EIA process have been recorded and addressed in Table 6-1. The table will be updated throughout the environmental authorisation process to capture all issues identified through on-going consultation and review of public documents and reports.

The main issues and concerns that were raised by I&APs related to:

- Water utilisation and storm water management;
- Requirements for rezoning and consent use applications for affected land;
- Impacts on existing Eskom transmission line servitudes; and
- Visual impacts of infrastructure on motorists using national and district roads.

The significance of the impacts associated with the above mentioned issues and concerns are assessed in Section 6.2 and Section 6.3 that follow.

To summarise, I&APs generally had no objections regarding the proposed Aggeneys Solar PV Power Plant and feel that the proposed project will benefit them in terms of the supply of renewable energy to an area where it is much needed and through local socio-economic development.

Table 6-1: Issues and response table

ASPECT	REFERENCE	NAME AND FARM/ ORGANISATION	ISSUE	RESPONDER	RESPONSE
Water provision and management	Information sharing meeting (10 January 2012)	Mr Pieter Venter: Black Mountain Mining (Environmental Manager)	Water is a scarce resource in the area. Aggeneys relies on only one source of water from Pella, which has already been exhausted. Requested that a study be undertaken to investigate alternative water sources in the area. Indicated that there are proposed mine developments to be undertaken in the area. This will increase the water demand in the area.	Orlight SA	For the proposed Solar PV Power Project, water will be required for general use by employees during construction and operation, as well as for washing the panels twice a year. **Alternative water sources were considered and it was decided that Orlight SA will utilise a water service provider to bring water to the site during the operational phase for washing the panels.*
	Information sharing meeting (10 January 2012)	Mr France: Farm Aroams 57 RD	Storm water management must be undertaken.	EAP	**A storm water management plan will be implemented as part of the EMP for the proposed project. No activities will be undertaken in the drainage lines and buffer zones that were delineated during the sensitivity mapping process.*
	Fax correspondence (03 April 2012)	Ms N Feni: Northern Cape DWA	The applicant must assess all the potential water uses associated with the proposed development as defined under section 21 of the National Water Act, 1998 (Act 36 of 1998).	EAP	**It is not currently anticipated that the Aggeneys project will require an Integrated Water Use License Application (IWULA), as no Section 21 water uses have been identified.*
	Fax correspondence (03 April 2012)	Ms N Feni: Northern Cape DWA	Indicated that energy developments are not part of small industries users and as such cannot be entitled to the water use allowance set aside for small industries users as determined by the General authorisation.	EAP	Comment noted. **Orlight SA will apply to the municipality as water service provider for the provision of water for the construction and operational phases of the project.*

ASPECT	REFERENCE	NAME AND FARM/ ORGANISATION	ISSUE	RESPONDER	RESPONSE
	Fax correspondence (03 April 2012)	Ms N Feni: Northern Cape DWA	The EMP should include the following management and mitigation measures: Storm water management, waste management, sanitation, sedimentation and erosion and storage of hazardous substances.	EAP	Comment noted. **The EMP (Appendix J) includes management measures for all of these aspects.*
Servitudes	Information sharing meeting (10 January 2012)	Mr Pieter Venter: Black Mountain Mining (Environmental Manager)	Concerned that the servitudes running through the project area.	EAP	**The proposed Solar PV Power Plants and associated components were designed in such a way to ensure that Eskom retains access to all existing Eskom servitudes.* *Infrastructure has been kept out of servitudes.*
	Email Correspondence (29 February 2012)	Mr John Geeringh: Eskom	Indicated that Eskom will require access to its existing servitudes for maintenance purposes		
Buffer Zones	Email Correspondence (23 January 2012)	Ms Mia Ackermann: Digby Wells	Enquired on what are the prescribed buffers zones for the N7 at Vanrhynsdorp and the N14 at Aggeneys.	Ms Colene Runkel: SANRAL	SANRAL recommends that there should be a 500 m buffer from the road reserve fence. Requested Digby Wells to send a motivation letter for the relaxation of the buffer zones. The motivation letter should provide mitigation measures that have been put in place. **A motivation letter was sent to SANRAL.*
	Email Correspondence (14 February 2012)	Ms Rene De Kock: SANRAL	Indicated that SANRAL is prepared to approve a 30 m building line, pending the approval of the rezoning of land.	EAP	Comment noted. **The rezoning application is currently being undertaken.*
Grazing land	Information sharing meeting (10 January 2012)	Mr France: Aroams 57 RD	Enquired if the land will still be available for grazing.	Orlight SA	The project site will be fenced-off and therefore, no land will be available for grazing.
Visual Impact	Information sharing	Mr Pieter Venter: Black	The mine does not foresee any visual impact	EAP	Comment noted.

ASPECT	REFERENCE	NAME AND FARM/ ORGANISATION	ISSUE	RESPONDER	RESPONSE
Assessment	meeting (10 January 2012)	Mountain Mining (Environmental Manager)			**A VIA was undertaken and the Solar PV Power Plant layouts designed in such a way to avoid areas that have a high visual sensitivity rating and to locate infrastructure in areas that have low visual sensitivities. The infrastructure will still be visible from the national road and this impact cannot be avoided.*
	Email Correspondence (23 February 2012)	Ms Rene De Kock: SANRAL	Concerned about the visual impact that will caused by the proposed project. Indicated that proposed project might be a distraction for motorists on the national road		
Socio-economic issues	Information sharing meeting (10 January 2012)	Mr Pieter Venter: Black Mountain Mining (Environmental Manager)	There is a need for a solar power projects in the area as result of increased electricity demands. The mine is also planning to expand in the near future, adding to the electricity demand. Housing is a problem, as Black Mountain Mine will be expanding. Indicated that Pieter Clark, the social development consultant from Black Mountain Mine, will be able assist in the identification of community needs.	Orlight SA	Suitable accommodation in the town of Aggeneys will have to be identified in consultation with the municipality. Suitable community development and/or LED initiatives in which Orlight SA can participate should be identified in consultation with the Black Mountain Mine.
Legislative requirements	Letter Correspondence (06 February 2012)	Ms Toerien: Department of Agriculture, Land Reform and Rural Development	The Department of Agriculture, Land Reform and Rural development is guided by Act 43 of 1983. Indicated that the Department does not foresee any problems regarding the proposed development as long as the developer adheres to the articles of Act 43 of 1983.	EAP	Comment noted. **The requirements of this Act will be taken into consideration in the rezoning process that is being undertaken for the project.*
	Email Correspondence (28 February 2012)	Dr Tiplady: South African SKA Project Office (SASPO)	Indicated that the nearest SKA station to the proposed Aggeneys study area is 150 km away and that there is no risk to SKA associated with this installation.	EAP	Comment noted.

ASPECT	REFERENCE	NAME AND FARM/ ORGANISATION	ISSUE	RESPONDER	RESPONSE
			SASPO would like to be kept informed of progress with the projects and states that any transmitters that are to be established at the sites for the purpose of voice and data communication should comply with the relevant AGA regulations.		
Rezoning	Letter Correspondence (06 February 2012)	Mr/ Ms Toerien: Department of Agriculture, Land Reform and Rural Development	Indicated that rezoning will be applicable as the land use will change from the current agricultural status.	EAP	**An application for rezoning is in the process of being undertaken.*
Land Owner information	Letter Correspondence (06 February 2012)	Mr/ Ms Toerien: Department of Agriculture, Land Reform and Rural Development	The developer must have information on who is the current landowner for the affected farm.	EAP	The current landowner has been identified and has been consulted. The affected farm (Aroams 57 RD) is owned by Mr Abrie van Niekerk.
Lease agreements	Letter Correspondence (06 February 2012)	Mr/ Ms Toerien: Department of Agriculture, Land Reform and Rural Development	Enquired if there will be a subdivision of land or a lease contract between the developer and the land owner.	Orlight SA	**Long term lease agreements have been reached with the land owner. Land will not be subdivided.*
Environmental Impact Assessment	Email Correspondence (29 February 2012)	Mr John Geeringh: Eskom	Eskom is currently conducting network expansion in some areas which are in close proximity to the proposed sites and possible alternative sites. Indicated that Eskom is planning to construct a 400 kV transmission line from Aggeneys to the Helios substation.	EAP	Comment noted. **The proposed project does not impact on the construction of the transmission line. The proposed project will, however, contribute to the supply of electricity to the area.*
Heritage resources	Email Correspondence (20 March 2012)	Dr M. Galimberti: SAHRA	An AIA should be undertaken for the proposed project. The AIA should assess whether the cumulative impact of the solar energy facilities proposed on the same property may	EAP	Comment noted. **An AIA was undertaken for the proposed project and a Palaeontological Impact*

ASPECT	REFERENCE	NAME AND FARM/ ORGANISATION	ISSUE	RESPONDER	RESPONSE
			compromise the cultural landscape and its archaeological significance. Recommended that the EAP must engage with a Palaeontologist in order to define whether the area is paleontological sensitive and whether paleontological resources will be affected by the proposed project.		*Statement prepared by a palaeontologist. The palaeontological potential of the site was considered to be low.*
General	Information sharing meeting (10 January 2012)	Mr Pieter Venter: Black Mountain Mining Mr France and Mr Arnold: Aroams 57 RD farm	Indicated that they have no objections regarding the proposed project	EAP	Comment noted.
	Email Correspondence 13 October 2011	Mr Christopher Isherwood: CAA	Indicated that the CAA has no objection to the proposed Solar PV facility development, as long as the height of the proposed facility does not exceed a height of 7 m.	Digby Wells	Comment noted. **A restriction of 7 m to solar PV infrastructure will be imposed. Should infrastructure be higher than this, CAA will be engaged to discuss the possibility of exceeding the height restrictions.* *The EAP is currently consulting with the CAA regarding height restrictions for proposed transmission lines.*

6.2 Environmentally sensitive and no-go areas

The project design for the proposed project was finalised after suitable alternatives and necessary assessments were conducted. This was part of an integrated and dynamic process to ensure the most financially viable and environmentally sensitive designs were considered for the project.

Upon completion of the environmental and cultural assessments undertaken for the study area, including important feedback received from stakeholders during the PPP, sensitivity maps were created using a GIS. The approach and methodology used to determine sensitivity of the study areas is described in Table 6-2.

The ecological sensitivity of the study area was assigned a higher weighting than its visual impacts, due to its location in terms of regional biodiversity conservation programmes. Not only does the site fall within a geographic priority area in terms of SKEP, but it is also considered important in terms of its amphibian, bird and insect habitat components. In addition, the study area is classified as a near natural landscape in terms of the CBA, which means that there are options for loss of some components of biodiversity in the landscape without compromising the ability to achieve conservation targets.

Due to the nature of the project and its location in terms of the N14 national road, the visual impact cannot be avoided. Consequently a lower weighting was given to the visual considerations during the site layout design process.

In addition, there do not appear to be "archaeological sites" with stone tools left in their original context and therefore, the stone artefact scatters which were recorded are considered to be of minor significance.

The following sensitive and no-go areas were delineated:

- *Drainage line* – It is recommended that the main drainage line and associated system be avoided during construction and operation, owing to the sensitivity of the benefiting ephemeral river systems and the largely natural state of these systems. A buffer zone of 50 m is prescribed around the main drainage system, with 30 m buffer zones around its tributaries;
- *Ecologically sensitive areas* –The no-go area generally describes the drainage line running through the project area. Other areas of high ecological sensitivity include the sensitive habitat of the ridges and areas which include protected and red data species. Least sensitive areas that can be considered for development exist in southern parts of the study area;
- *N14 road reserve* – A 30 m buffer zone around the N14 national road has been included in the site layout;
- *Visual impacts* – Areas north of the drainage line should be avoided due to their high visual sensitivity and proximity to the Gamsberg; and
- *Eskom transmission line servitudes* – The existing 220 kV line has a servitude width of 47 m, while the existing 66 kV line has a servitude width of 22 m. No construction will take place within these servitudes.

The site layout design process for the proposed Aggeneys Solar PV Power Plant is illustrated in Plan 11a. The infrastructure layout plan of the proposed project in relation to the environmentally sensitive and no-go areas is presented as Plan 2a.

Table 6-2: Approach and methodology to determining site sensitivity

ASSESSMENT	PHASE	DESCRIPTION
Delineation of drainage lines	EIA phase	Watercourses and drainage areas were delineated in accordance with the DWAF (2005) guidelines, "*A practical field procedure for identification and delineation of wetlands and riparian areas".* A field investigation was conducted in order to delineate these systems. Wetland indicators such as topography, soil and vegetation were considered in order to identify areas of saturation. In addition to this, the riparian indicator referred to as "alluvial soils and deposited material" was also considered in order to delineate the associated drainage areas of the catchment. These indicators were jointly considered to identify and classify areas of the landscape/catchment that are important for the maintenance and functioning of the water resources.
Ecological assessments	EIA Phase: Research	Existing plans and maps were used to gain an understanding of the sites and to determine what to expect once on site. Sites of importance, such as drainage lines can often be determined from these and then investigated in detail during the field work.
	EIA Phase: Field work methodology	The primary objective was to characterise the vegetation in the study areas by conducting an in-depth vegetation survey. The findings were used to identify ecologically sensitive areas, which guided the placement of infrastructure. The presence of the plants with Red Data status; medicinal uses; cultural uses; and declared weeds and invader species were established. An animal survey was conducted in conjunction with the vegetation survey and mammals; avifauna; and herpetofauna known to occur in the area, or observed during surveys were recorded.
	EIA Phase: Sensitivity ratings	The findings from the vegetation and animal studies were used to delineate areas that are sensitive to disturbance from an ecological perspective. The sensitivity categories concentrate on landscapes that perform integral biophysical support and maintenance functions within the study area and surrounding landscapes. In addition to the sensitive landscapes, the protected plant and animal species are also regarded as sensitive and were used in sensitivity mapping. Sensitive areas included areas where Red Data Species (*Boscia albitrunca*) and protected species (*Aloe dichotoma*) occur, Terrestrial CBAs, as well as areas defined in SKEP as Sensitive (Plant priority Areas, Ridge Areas, Buffers, Drainage Lines, Sand Corridors and Quartz Patches). From this information various ratings were developed which defined "No go" areas, which are most sensitive, Highly Sensitive, Sensitive, Minimally Sensitive and Least Sensitive Areas. "No Go' Areas within the study sites are to be avoided at all costs; these areas have a very high potential to support sensitive plant and animal species, but more importantly they are integral for ecosystem functioning within the general area and once removed will have a far reaching effect on the site and surrounding areas. "Highly sensitive" areas are areas that could very possibly provide habitat for sensitive flora and fauna species, and have a role to play in ecosystem functioning but are not integral to this function. Removal or damage to these areas will only affect the habitat present on site and possibly surrounding

ASSESSMENT	PHASE	DESCRIPTION
		habitats. "Sensitive" areas could once again provide habitat for sensitive flora and fauna species and they may contribute to ecosystem functioning within the study area, they are not integral and removal of them will not affect the surrounding ecosystems. "Minimal sensitive" areas have a small chance of containing sensitive flora and fauna species; however these areas have very little ecosystem functioning value on or off the study area. "Least sensitive" areas are considered areas that are most favourable for development due to existing disturbances.
Visual sensitivity analysis	EIA Phase: Identification of visual receptors	Potential receptors were identified using aerial imagery within a 5 km radius of the proposed study area. These receptors included national road users (i.e. those people travelling on the national road); and towns (i.e. those people who reside in or are visiting the town).
	EIA Phase: Viewshed analysis	A model was created in ArcGIS for the viewshed analyses to be run for each of the receptor groups. The results of this model were 12 polygon viewshed layers for each receptor group for each site, denoting which points they would be seen from and, concurrently, which points in the landscape the persons within these receptor groups would be able to see. Values were then assigned for the viewshed polygons based on the receptor group such that the areas visible by more sensitive visual receptors were given a higher value (i.e. the visibility areas for the towns and national roads are likely to be experienced more frequently/by a larger number of people).
	Integration of EIA Phase: viewshed polygons	All of the viewshed polygons for all of the different receptor groups were then merged in order to obtain one comprehensive visual sensitivity layer. This merging process allowed both the number of receptors and the type of receptors to be factored into an all-inclusive visual sensitivity index that ranged from 0 (areas within the study site that are not visible from any of the identified receptors) to 7.25 (areas that are visible from a range of receptors, including the most sensitive receptors – towns and a national road).
	EIA Phase: Visual sensitivity rating	These scores were then grouped into visual sensitivity ratings. Based on the definition of the visual sensitivity scale, areas for potential construction that would lead to lower visual impacts were recommended. *Due to the nature of the project and its location in terms of the N14 national road, the visual impact cannot be avoided. Consequently a lower weighting was given to the visual considerations during the site layout design process.*
Cultural and landscape	Sites of archaeological significance	Findings of the Phase 1 AIA and Palaeontological Impact Statement were integrated into sensitivity maps. For the Aggeneys study area, no areas were delineated as significant in terms of archaeological or palaeontological finds.

ASSESSMENT	PHASE	DESCRIPTION
Technical factors	Eskom servitudes	Consultation with Eskom regarding the prescribed servitude widths of existing transmission lines was undertaken by Aurecon Engineers. The proposed Solar PV Power Plant components were designed in such a way as not to impact on the existing Eskom transmission line servitudes.
	Road servitudes	During the initial consultation with SANRAL, it was recommended that a 500 m buffer from the road reserve fence of the N14 should be maintained. The prescribed buffer would significantly reduce the available surface area that could be used for development of the Solar PV Power Plant and thus, Digby Wells sent a motivation letter for the relaxation of the buffer zones. Upon completion of the review of the motivation letter, SANRAL indicated that they are prepared to approve a 30 m building line, pending the approval of the rezoning or consent use of land.
	Integrated design workshop	An integrated design workshop was held between the EAP, the applicant and Aurecon Engineers and NETGroup who were responsible for the preliminary design layouts of the proposed Solar PV Power Plant. The objective of this workshop were to plan the layout of all Solar PV Power Plant components, including the construction lay-down yards and access points, taking into account the environmental sensitivity of the study area, as well as engineering practicality and technical design considerations. The outcomes of this workshop was a site layout plan for each of the Solar PV Power Plant, which could be considered the best-suited option in terms of the project footprint's' environmental and cultural impacts.

6.3 Assessment of potential impacts

Activities associated with the construction, operation and decommissioning of the proposed Aggeneys Solar PV Power Plant will result in impacts on the biophysical, socio-economic and cultural environments. The activities that will trigger an impact during each phase of the project were described in more detail in Section 4.4 of this report.

The physical area that will be disturbed by the proposed project activities and components are summarised in Table 6-3 below.

Table 6-3: Scale of physical disturbances associated with the proposed project

COMPONENT	PHYSICAL DISTURBANCE
Solar panels, roads and cables (ha)	312.7
Area of laydown yard (ha)	9.0
Area of substation (ha)	0.7
Total (ha)	**322.4**
Area suitable for development (ha)	345.3
Portion of area suitable for development (%)	*93%*
Study area (ha)	872.2
Portion of study area (%)	*37%*

In order to assess the significance of these impacts, use was made of a semi-quantitative impact assessment methodology which is based on an assessment of the following parameters:

- *Severity* – The magnitude of change from the current baseline status of the affected environmental, socio-economic or heritage aspect;
- *Spatial scale* – The physical area which is impacted on by the potential impact;
- *Duration* – The expected time period during which a potential impacted will be experienced; and
- *Probability* – The likelihood of occurrence of the impact, based on knowledge of the operating conditions and the type of activities that will be undertaken.

More detail on the quantitative ratings attached to each of the above parameters and the EIA methodology is attached in Appendix K.

6.3.1 Potential impacts on surface water systems

The main impacts on surface water systems will occur during the construction phase of the proposed project. These impacts were assessed to have **low** to **medium-low significance.** Activities that will result in changes to the surface water systems include:

- The clearance of vegetation at the footprint of the construction lay-down yard, substation and each solar PV mounting structure;
- Removal of topsoil from the footprint of the substation and car parking yard and stockpiling of topsoil for use during site rehabilitation;

- Levelling of the terrain where it is too undulating for installation of panels;
- Creation of compacted surfaces, including roads, the vehicle hard park area and construction lay-down yard; and
- Generation and handling of domestic and industrial wastes.

Tables summarising the significance of the potential impacts on surface water systems during the project phases are presented below.

Nature of impact	**Changes to surface water flow dynamics due to the site preparation activities.**				
Description of impact	The removal of natural vegetation from the project development footprint, levelling of undulating areas and creation of hard and compacted surfaces will alter the natural topography and drainage patterns of the project site. The soil is susceptible to erosion. During rainfall events, disturbed surfaces would be susceptible to erosion and altered surface flow dynamics will aggravate the natural erosion process and sediment transport on-site and off-site. The project site is situated in an arid area which received very little rainfall and therefore, this impact will not occur frequently. However, flash floods could occur and erosion will occur after vegetation removal.				
Mitigation required	• It is recommended that the majority of site preparation activities be undertaken during the dry season; • A storm water management plan (Appendix J) should be implemented during the construction phase and operational phase; • No activities may be allowed with the delineated drainage lines and buffer zones; • Clearing of vegetation should be supervised to ensure that no more than the minimum area of land that is needed is cleared; and • Site remediation should be undertaken on a concurrent basis according to the rehabilitation plan (Appendix J) during the construction phase to ensure that vegetation is restored to disturbed areas, which will restore some of the site's flood attenuation capabilities and reduce vulnerability to erosion.				
Parameters	*Severity*	*Spatial scale*	*Duration*	*Probability*	*Significant rating*
Pre-Mitigation	Very serious (5)	Limited (2)	Project life (5)	Probable (4)	Medium-low (48)
Post-Mitigation	Limited damage (1)	Very limited (1)	Short-term (2)	Rare or improbable (2)	Low (8)
I&AP concern	Yes, a concern was voiced regarding storm water management of the site and a request made that a management plan be implemented to mitigate its impacts.				
Residual impacts	The surface water dynamics will be altered permanently during the life of the project; however, the resulting impacts (i.e. soil erosion and sediment transport) can be limited through the implementation of a storm water management plan.				

Nature of impact	**Contamination of downstream water resources during surface flow events.**
Description of impact	The main drainage direction of the site is towards the west via the main drainage channel. During surface flow events, increased sediment transported due to aggravated erosion from disturbed areas, as well as other contaminants (i.e. waste products, effluents, construction

Nature of impact	**Contamination of downstream water resources during surface flow events.**				
	materials) stored on the construction site, may result in contamination of downstream water resources.				
Mitigation required	• It is recommended that the majority of site preparation activities be undertaken during the dry season; • A storm water management plan (Appendix J) should be implemented during the construction phase; • Upslope water should be directed away from cleared areas, • Erosion of cleared areas needs to be prevented e.g. by placing rocks in this area, • Soil and vegetation needs to be replaced at decommissioning, • Clearing of vegetation should be supervised to ensure that no more than the minimum area of land that is needed is cleared; • Site remediation should be undertaken on a concurrent basis during the construction phase to ensure that vegetation is restored to disturbed areas, which will restore some of the site's flood attenuation capabilities and reduce vulnerability to erosion; • All waste products must be managed according to a waste management plan (Appendix J); • All construction materials should be stored in bunded areas to ensure that material loss during surface flow events are prevented; • Vehicles should be services and checked for leaks on a daily basis to minimise spillage of hydrocarbon contaminants during the construction phase; • The vehicle hard park area should be separated from clean water areas with berms or channels; and • Spillage should be managed through an emergency spill response plan (Appendix J).				
Parameters	*Severity*	*Spatial scale*	*Duration*	*Probability*	*Significant rating*
Pre-Mitigation	Moderate (3)	Limited (2)	Short-term (2)	Probable (4)	Low (28)
Post-Mitigation	Limited damage (1)	Very limited (1)	Short-term (2)	Rare or improbable (2)	Low (8)
I&AP concern	No concerns regarding surface water contamination were voiced during the PPP.				
Residual impacts	Some erosion and surface water contamination could still occur during the construction phase and therefore, it is important to monitor water quality during surface water flow events to identify potential sources of contamination.				

6.3.2 Potential impacts on soil and agricultural potential

The main impacts on soils and the agricultural potential of the project site will occur during the construction phase of the proposed project. These impacts were assessed to have **low** to **medium-low significance.** Activities that will result in impacts include:

- The clearance of vegetation at the footprint of the construction lay-down yard, substation and each solar PV mounting structure;
- Removal of topsoil from the footprint of the substation and car parking yard and stockpiling of topsoil for use during site rehabilitation;
- Creation of compacted surfaces, including roads, the vehicle hard park area and construction lay-down yard;

- The installation of solar PV panels and all associated infrastructure; and
- Generation and handling of domestic and industrial wastes.

Tables summarising the significance of the potential impacts on soils and agricultural potential during the project phases are presented below.

Nature of impact	**Loss of the soil resource to support existing land use and land capability.**				
Description of impact	Due to the sizes of the areas impacted upon, the loss of the soil resource as a medium of supporting the grazing capability of the land as well as forming part of a grazing rotational system with a farm management unit will be total for the life of the project. Due to the fact that the land cannot be replaced for the full life of the project, no mitigation is possible.				
Mitigation required	Soil needs to be stockpiled in such a manner that it can be used for rehabilitation after decommissioning.				
Parameters	*Severity*	*Spatial scale*	*Duration*	*Probability*	*Significant rating*
Pre- Mitigation	Serious (4)	Very limited (1)	Project life (5)	Certain (7)	Medium-low (70)
Post- Mitigation	Serious (4)	Very limited (1)	Project life (5)	Certain (7)	Medium-low (70)
I&AP concern	Yes, a query was raised whether the existing use of the land for grazing could continue during the operational phase of the project. This will not be possible as the site will be fenced to protect the project from thefts and vandalism.				
Residual impact	After decommissioning it should be fairly achievable to restore the land to its original natural state, land capability and land use.				

Nature of impact	**Wind and water erosion of soils due to site preparation activities.**
Description of impact	The coarse graded soils that occur on the project site have little cohesion between particles and consequently, these soils are highly susceptible to water erosion, depending on the force applied at the time of impact. The fact that all of the designated sites are situated in low rainfall areas, does not exclude the possibility for potential erosion. One unexpected heavy rainstorm can initiate erosion on a slightly elevated bare patch. The very fine material in-between the fragments will be subjected to wind erosion where exposed and stockpiled. The fine-graded soils of southern part of the site will also be vulnerable to wind erosion when exposed after the removal of vegetation during site preparation and stockpiling for later use. Water erosion can only occur during the rainy season, while wind erosion can occur at any time of the year. Both types of erosion pose a threat to the soil as a support structure for sustaining a grazing land capability.
Mitigation required	• It is recommended that the majority of site preparation activities be undertaken during the dry season; • Minimise soil removal and construction activities on windy days. Temporary cessation of construction activities could be required during very windy periods; • A storm water management plan (Appendix J) should be implemented during the

Nature of impact	**Wind and water erosion of soils due to site preparation activities.**				
	construction phase; • Clearing of vegetation should be supervised to ensure that no more than the minimum area of land that is needed is cleared; • Re-vegetate soil stockpiles to avoid erosion losses; • Ensure stockpiles are placed on a free draining location so as to limit erosion loss; • Minimise the period of exposure of soil surfaces through planning; • Limit stockpile height – a safe height can be regarded as the height at which material can be placed without repeated traffic over already placed material; and • Site remediation should be undertaken on a concurrent basis during the construction phase to ensure that vegetation is restored to disturbed areas, which will restore some of the site's flood attenuation capabilities and reduce vulnerability to erosion.				
Parameters	*Severity*	*Spatial scale*	*Duration*	*Probability*	*Significant rating*
Pre- Mitigation	Significant (6)	Limited (2)	Short term (2)	Probable (4)	Medium-low (40)
Post- Mitigation	Very serious (5)	Limited (2)	Short term (2)	Unlikely (3)	Low (27)
I&AP concern	No concerns regarding soil erosion were voiced during the PPP.				
Residual impact	Some erosion could still occur during the construction phase and therefore, it is important to monitor the site and soil stockpiles for visible signs of erosion (i.e. gullies, rills and bare patches).				

Nature of impact	**Soil compaction due to soil handling, stockpiling and vehicles use.**
Description of impact	Site clearance, topsoil removal from the substation and car parking yard footprints and soil stockpiling all have the potential to induce soil compaction in the case where heavy machinery will be used. Soil compaction is a function of the composition of the soil and relates to the grading. Well sorted fine-graded sand and silty soils will compact easier than soils with a coarse or loamy texture. In addition, the establishment of foundations for various construction works may also contribute to compaction. The coarse graded soils that occur on site have little potential for compacting, whilst the fine graded soil south of the riverbed may tend to compact under pressure.
Mitigation required	• Where feasible, activities that are usually undertaken by machinery (such as vegetation removal), should be replaced with manual labour; • Heavy vehicle movement over soil stockpiles should be prevented; • Traffic over project areas that have not been stripped of topsoil should be minimised; • Stripping operations should only be executed when soil moisture content will minimise the risk of compaction (i.e. during dry season); • During stockpiling, preferably use the 'end-tipping' method to keep stockpiled soils loose; • Limit stockpile height – a safe height can be regarded as the height at which material can be placed without repeated traffic over already placed material.; • Preserve looseness of stockpiled soil by applying fertiliser and seeding by hand; • Where topsoil is partially removed, the soil surface can be loosened via tillage/ripping; and • Soil should be loosened after construction activities, as per the rehabilitation plan (Appendix J).

Nature of impact	**Soil compaction due to soil handling, stockpiling and vehicles use.**				
Parameters	*Severity*	*Spatial scale*	*Duration*	*Probability*	*Significant rating*
Pre- Mitigation	Very significant (7)	Very limited (1)	Project life (5)	Probable (4)	Medium-low (42)
Post- Mitigation	Very serious (5)	Very limited (1)	Long-term (4)	Rare (2)	Low (20)
I&AP concern	No concerns regarding soil compaction were voiced during the PPP.				
Residual impacts	Soil compaction in some areas of the project development footprint will be inevitable. During site remediation and final rehabilitation, all soils will have to be ameliorated as per the rehabilitation plan (Appendix J).				

Nature of impact	**Soils contamination due to spillage of hydrocarbons or wastes.**				
Description of impacts	The potential for contaminating the soil resource is dependent on the presence of vehicles, machinery and processes involving various types of chemicals. For the planned site use very little of these are anticipated during the life span of the project. The potential impact is thus assumed to be minor and localised if it should occur (i.e. oil leakage from vehicles and earth moving machines).				
Mitigation required	• All waste products must be managed according to a waste management plan (Appendix J); • All construction materials should be stored in bunded areas to ensure that material loss during surface flow events are prevented; • Vehicles should be services and checked for leaks on a daily basis to minimise spillage of hydrocarbon contaminants during the construction phase; • The vehicle hard park should have a concrete surface and drip trays installed overnight to minimise spillage of hydrocarbon contaminants. The vehicle hard park area should be separated from clean water areas with berms or channels; and • Spillage should be managed through an emergency spill response plan (Appendix J).				
Parameters	*Severity*	*Spatial scale*	*Duration*	*Probability*	*Significant rating*
Pre- Mitigation	Significant (6)	Very limited (1)	Long-term (4)	Likely (5)	Medium-low (55)
Post- Mitigation	Moderate (3)	Very limited (1)	Immediate (1)	Rare (2)	Low (10)
I&AP Concern	No concerns regarding soil contamination were voiced during the PPP.				
Residual impact	It is advisable to conduct a soil monitoring plan after construction through collecting and analysis of soil samples at and around the site of potential impact				

6.3.3 Potential impacts on the ecology

The main impacts on the ecology will occur during the construction phase of the proposed project. These impacts were assessed to have **medium-high significance.** Activities that will result in impacts include:

- The clearance of vegetation at the footprint of the construction lay-down yard, substation and each solar PV mounting structure;

- Access control and fencing of site during the construction and operational phases of the proposed project; and
- Site remediation activities.

Tables summarising the significance of the potential impacts on the ecology during the project phases are presented below.

Nature of impact	**Loss of habitat within indigenous natural vegetation types**				
Description of impacts	During the site layout design process, no-go areas along the drainage line running through the project area and other areas of high ecological sensitivity, such as the ridges and areas which include protected and red data species occur were delineated. This area will not be impacted by development. The least sensitive and favourable areas that were delineated and defined as suitable for development consist mostly of indigenous natural vegetation and is still considered significant in terms of SKEP and the CBA. During site preparation activities, 93% of this vegetation will be removed. There is also a possibility that Red Data or protected plant species that have not been identified in these areas during dry-season surveys could be destroyed. During site clearance, it is also likely that alien invasive and weed species will propagate on disturbed areas. Alien invasive species often tend to out-compete indigenous vegetation, due to the fact that they are vigorous growers that are adaptable and able to invade a wide range of ecological niches.				
Mitigation required	• The no-go and high ecologically sensitive areas should be demarcated and avoided at all costs; • A flora survey of the project development footprint should be undertaken during the wet-season to try and identify Red Data and protected plant species that might not have been identified during dry-season surveys. If found, the necessary permits should be obtained prior to the removal or destruction of these species; • No vegetation removal should be allowed outside the designated project development footprint; • A representative sample of indigenous plant species should be selected and relocated to an on-site nursery. During site remediation and rehabilitation, these species should be replanted on disturbed areas as per the rehabilitation plan (Appendix J); • Where possible, the removal and destruction of indigenous vegetation should be avoided (i.e. adhering to the designated internal road network); and • An alien invasive and weed control programme should be implemented throughout the project lifetime (Appendix J).				
Parameters	*Severity*	*Spatial scale*	*Duration*	*Probability*	*Significant rating*
Pre- Mitigation	Very significant (7)	Very limited (1)	Permanent (6)	Certain (7)	Medium-high (98)
Post- Mitigation	Significant (6)	Very limited (1)	Project life (5)	Certain (7)	Medium-high (84)
I&AP Concern	No concerns regarding the ecological impacts of the proposed project were voiced during the PPP.				

Residual impact	The destruction of indigenous vegetation in an area which is defined as a near natural landscape in terms of the CBA, in spite of existing disturbances (i.e. due to grazing and transmission line infrastructure) is unavoidable. This impact will continue throughout the project life, although remediation of the site to an ecological state better than the status quo is possible during the decommissioning phase if an alien invasive eradication programme is implemented (Appendix J).

Nature of impact	**Ecological impacts of access control and fencing of the site.**				
Description of impact	The erection of fences during the construction and operational phases of the proposed project will have a dual effect on ecology of the project site. Firstly, animal that graze the project site and contribute to existing pressures on the quality of the vegetation type will be excluded from the property and therefore, natural vegetation outside the project development footprint, but within the fence boundary will be allowed to recover from overgrazing. Secondly, fauna species that currently move freely across the project site will be prevented from doing so.				
Mitigation required	• Veld management measures will have to be employed in areas outside the project development footprint, but within the fence boundary. This can be achieved by allowing gaps in fencing for fauna species to move between grazing areas during prescribed times of the year.				
Parameters	*Severity*	*Spatial scale*	*Duration*	*Probability*	*Significant rating*
Pre- Mitigation	Serious (4)	Limited (2)	Project life (5)	Certain (7)	Medium-high (77)
Post- Mitigation	Minor effect (2)	Very limited (1)	Project life (5)	Certain (7)	Medium-low (56)
I&AP Concern	Yes, a query was raised whether the existing use of the land for grazing could continue during the operational phase of the project. This will not be possible as the site will be fenced to protect the project from thefts and vandalism.				
Residual impact	The impact on loss of grazing for wild animals cannot be prevented. However, it is likely that positive changes to ecological state of no-go areas and highly sensitive ecological areas will be experienced due to fencing of the site and exclusion of these areas from grazing by livestock.				

6.3.4 Potential impacts on the visual environment

The main impacts on the visual environment will occur during the construction phase of the proposed project. These impacts were assessed to have **medium-low significance.** Activities that will result in impacts include:

- Increase in vehicular and other activity levels during the construction phase;
- The clearance of vegetation at the footprint of the construction lay-down yard, substation and each solar PV mounting structure;
- Fencing of the project site;
- Installation of the solar PV panels and construction of all related project infrastructure; and
- Generation of electricity from the PV panels during the operational phase of the project.

Tables summarising the significance of the potential impacts on the visual environment during the project phases are presented below.

Nature of impact	**Change to the existing visual character of the project site.**				
Description of impact	The largest visual impact will be experience due to the removal of natural vegetation and installation of the solar PV panels and associated infrastructure, since a possible change in the intangible heritage and sense of place landscape will occur. The construction activities themselves will lead to noise, dust and visual pollution due to the activities and transport requirements associated with labour, machinery and other materials. The pre-existing mining activities that are being carried out in the area will lead to some level of absorption capacity of the visual and sense of place landscape as a whole. The visual impact from vegetation removal will not be severe since the pre-existing vegetation is low-lying and is not a dominant aspect of the dramatic and stark landscape. However, after installation of the solar PV panels, the impact significance will increase.				
Mitigation required	• No vegetation removal should be allowed outside the designated project development footprint; • A representative sample of indigenous plant species should be selected and relocated to an on-site nursery. During site remediation and rehabilitation, these species should be replanted on disturbed areas as per the rehabilitation plan (Appendix J); • Where possible, the removal and destruction of indigenous vegetation should be avoided (i.e. adhering to the designated internal road network); and • An alien invasive and weed control programme should be implemented throughout the project lifetime (Appendix J); • The possible tourism aspect of the solar PV power plant should be explored and promoted; and • Exotic tree species have been introduced in the town of Aggeneys along avenues. Planting of fast-growing species between receptors and the proposed Solar PV Power Plant is an option for visual screening; however it is not advised considering water scarcity and the threat of spreading of alien invasive species.				
Parameters	*Severity*	*Spatial scale*	*Duration*	*Probability*	*Significant rating*
Pre- Mitigation	Minor (2)	Local (3)	Project life (5)	Certain (7)	Medium-low (70)
Post- Mitigation	Minor (2)	Limited (2)	Project life (5)	Certain (7)	Medium-low (63)
I&AP Concern	SANRAL voiced a concern regarding the visual impact of the infrastructure on motorists using the N14 national road.				
Residual impact	The visual impact that the proposed infrastructure will have is dependent on the subject who is viewing it. Visual impacts are rated based on social norms. For some people, the proposed infrastructure may be an indication of urbanisation, new renewable energy and economic upliftment in the area, in which case a positive visual impact will be experienced. For other receptors, the construction of the infrastructure might be a negative factor which could impede tourism in the area. Ideally the perceptions of people residing in each and every household, shop or restaurant that will potentially be affected would be included in the VIA. For this purpose, the visual specialists attended the public information sharing meeting that was held during the scoping phase. The attendees were shown photos of other solar PV power plants and were made aware of how the potential infrastructure will look once constructed. No comments were made regarding the potential negative visual impact that the proposed infrastructure.				

6.3.5 *Potential impacts on the tourism industry*

The main impacts on the tourism industry will occur during the construction and operational phases of the proposed project. **Positive impacts will be experience and was assessed to have medium-high significance.**

Tables summarising the significance of the potential impacts on the tourism industry during the project phases are presented below.

Nature of impact	**Impacts on the tourism industry.**				
Description of impact	Aggeneys falls into the Namakwa Tourist District. The surrounding mountains, rivers, valleys and coastline are criss-crossed by hiking, biking, canoe and 4×4 trails. The Aggeneys town itself is not a major tourist attraction, as it mainly accommodates the employees of the mining industry in the area. The main tourist attraction in the regional area is the unique natural and cultural resources found in this area and the removal of indigenous vegetation from the project site will have a negative impact on eco-tourism. However, the tourism industry in general will not be negatively affected by the development of the proposed project, as the creation of energy tourism (i.e. renewable energy projects) is possible in the area. The power plant may become a unique tourist attraction for this area. Increased influx of workers may also boost the local tourism industry in terms of local procurement and accommodation or catering.				
Enhancement required	Orlight SA may consider the establishment of a visitor's centre at the proposed project, or alternatively, contribute to the establishment of a visitors centre in the town with educational opportunities on solar energy for tourists that visit the area.				
Parameters	*Severity*	*Spatial scale*	*Duration*	*Probability*	*Significant rating*
Pre- Mitigation	Minor (2)	Municipal (4)	Medium-term (3)	Probable (4)	Positive medium-low (36)
Post- Mitigation	Serious (4)	Provincial (5)	Project life (5)	Almost certain (6)	Positive medium-high (84)
I&AP Concern	No concerns regarding the impact of the proposed project on the tourism industry was voiced during the PPP.				
Residual impact	The type of tourism on which the project area is currently dependent (i.e. eco-tourism) will change to energy tourism.				

6.3.6 *Potential impacts on traffic*

The main impacts on the visual environment will occur during the construction phase of the proposed project. These impacts were assessed to have **low** to **medium-low significance.** Activities that will result in impacts include:

- Increase in vehicular and other activity levels during the construction phase; and
- Off-site accommodation of employees during the construction phase of the project.

Tables summarising the significance of the potential impacts on traffic during the project phases are presented below.

Nature of impact	**Increased traffic and impact on road surfaces.**				
Description of impact	Even if a 150 MW plant is developed, the construction phase truck trip generation will be less than 10 trucks per day (in and out combined). The total trip generation during the construction phase is not expected to exceed 30 trips per day, and during the operational phase it will be negligible. Vehicle trip generation is therefore of no concern from a traffic capacity point of view. Considering the design strength of national roads such as the N14, the impact on pavement life will be minimal and no mitigation is required.				
Mitigation required	• Considering the low traffic volumes and excellent sight distances at the accesses, no road widening is recommended; • Temporary warning signs should however be erected on the N14 on both sides of the accesses to indicate heavy vehicles turning (sign TW344/5 with appropriate wording); and • Care should however be taken to strengthen the N14 road edges with concrete edge beams at the accesses, each 40 m long, to prevent edge-breaks in the asphalt surface.				
Parameters	*Severity*	*Spatial scale*	*Duration*	*Probability*	*Significant rating*
Pre- Mitigation	Limited (1)	Very limited (1)	Short-term (2)	Likely (5)	Low (20)
Post- Mitigation	Limited (1)	Very limited (1)	Short-term (2)	Probable (4)	Low (16)
I&AP Concern	No concerns regarding increases in traffic were voiced during the PPP.				
Residual impact	None, impacts will only be experienced during the construction phase.				

Nature of impact	**Safety impacts of traffic.**				
Description of impact	The construction phase of the proposed project will necessarily increase the volume of traffic in the vicinity of the project site, as well as change the nature of the traffic (there will be an increased number of heavy motor vehicles). This will likely result in the deterioration of roads (including an increase in potholes), which poses a safety risk for other road users. The mere presence of construction traffic may also result in an increased safety risk, or other roads users may feel as though they are at a greater safety risk, whether this is the actual case or not.				
Mitigation required	• Traffic and transportation rules should be implemented; • Directly affected individuals (including surrounding land owners) should be aware and satisfied with the contractor's traffic-related logistics; • Appropriate warning signs should be erected on the access road to the site; • Access roads should be maintained; and • All construction vehicles should be roadworthy and have the required permits and/ or licenses to carry their load.				
Parameters	*Severity*	*Spatial scale*	*Duration*	*Probability*	*Significant rating*
Pre- Mitigation	On-going (3)	Limited (2)	Short-term (2)	Likely (5)	Medium-low (35)
Post- Mitigation	On-going (3)	Limited (2)	Short-term (2)	Probable (4)	Low (28)
I&AP Concern	No concerns regarding increases in traffic were voiced during the PPP.				
Residual impact	None, impacts will only be experienced during the construction phase.				

6.3.7 Potential impacts on the socio-economic environment

The main impacts on the socio-economic environment will occur due to the creation of employment opportunities during the construction phase of the proposed project. **Positive impacts will be experience and were assessed to have medium-high significance.** Negative impacts were assessed to have a **medium-low** to **medium-high significance**.

Tables summarising the significance of the potential impacts on the socio-economic environment during the project phases are presented below.

Nature of impact	**Procurement of goods and creation of employment opportunities.**				
Description of impact	The construction phase will require a workforce of an estimated 280 individuals. Some of these job opportunities will be for unskilled labourers, which will be sourced from the town of Aggeneys. The majority of youth in this town have low educational and skills levels, thus many are unemployed and well suited to unskilled labour. Additionally, the construction phase will necessitate procurement of goods and services, many of which could be sourced from local companies, SMMEs or entrepreneurs, thereby enhancing the socio-economic benefits associated with the project's construction phase. The operational phase will require a workforce of an estimated 70 individuals. Some of these job opportunities will be for un- and semi-skilled labourers, which will be sourced from the town of Aggeneys. Given the low educational and skills levels in the local municipal area, as well as the high unemployment rate of particularly the youth, the small number of permanent long-term job opportunities constitutes a long-term (albeit small scale) socio-economic benefit for the directly-affected communities. Additionally, the use of local entrepreneurs, SMMEs and businesses further enhance the socio-economic benefit associated with the proposed project. Possible opportunities for local service providers include security, catering and cleaning services, maintenance of the accommodation facilities and operational equipment, as well as the provision of chemical toilets for use on site. Both local employees and entrepreneurs, SMMEs and businesses will likely gain significantly from appropriate skills training and capacity building.				
Enhancement required	• The employment of locals (particularly women and previously disadvantaged individuals) should be encouraged and contractors should be contractually bound to giving preference to local persons; • Positions should only be filled by outsiders if the required skills are not available in the local study area; • Goods and services should only be sourced from outside the local municipal area if it is not available in this area; and • Orlight SA should create conditions conducive to the involvement of local businesses, entrepreneurs and SMMEs.				
Parameters	*Severity*	*Spatial scale*	*Duration*	*Probability*	*Significant rating*
Pre- Mitigation	Minor (2)	Municipal (4)	Medium-term (3)	Likely (5)	Positive medium-low (45)
Post- Mitigation	On-going (3)	Municipal (4)	Medium-term (3)	Almost certain (6)	Positive medium-low (60)
I&AP Concern	Positive opinions were voiced regarding the potential of the proposed project to create opportunities for employment creation and local socio-economic development.				

Nature of impact	**Capacity building and skills training undertaken in local communities during the operational phase.**				
Description of impact	In addition to the skills training and capacity building for the employees and service providers utilised by the proponent, the proponent has a social responsibility towards the communities in which it operates.				
Enhancement required	• Orlight SA should actively seek to contribute positively to the local municipal area, and to build capacity and strengthen skills in this area; and • Orlight SA should either contribute to existing LED programmes implemented or planned by the local municipality, or initiate programmes of their own that are aligned with the local municipal LED objectives.				
Parameters	*Severity*	*Spatial scale*	*Duration*	*Probability*	*Significant rating*
Pre- Mitigation	Low-level (1)	Local (3)	Medium-term (3)	Probable (4)	Positive low (28)
Post- Mitigation	On-going (3)	Municipal (4)	Permanent (6)	Almost certain (6)	Positive medium-high (78)
I&AP Concern	Positive opinions were voiced regarding the potential of the proposed project to create opportunities for employment creation and local socio-economic development.				

Nature of impact	**Inflow of migrant job-seekers.**
Description of impact	News of the proposed project and employment opportunities may result in an influx of job-seekers into Aggeneys and surrounding towns. This may result in one or more of the following: • The development of informal settlements due to the limited housing available in the area; • Social conflict between the incumbent and migrant populations, due to the incumbent population feeling that the migrants are taking opportunities away from them; • An increase in social pathologies (prostitution, conflict and violence, alcohol abuse, drug use and crime). • Petty crimes and stock theft; • Risks to the security of the project site and equipment or goods. The negative socio-economic impacts could be severe and include health impacts emanating from poor hygiene associated with the lack of basic services such as sanitation and refuse removal and an increase in the prevalence of HIV due to the presence of migrants. Although some of these workers will be from the local and surrounding towns, some migrant job-seekers will be employed. The presence of these individuals may have adverse impacts on the local communities, especially if the well-being of the workforce is not maintained. Disgruntled workers may strike, abuse alcohol, use drugs, engages in sexual relations with local women or come into conflict with others. Should the adverse impacts materialise, the incumbent population may retaliate by mobilising against the project. All of these impacts could have a significant impact on the successful completion of the construction of the proposed project.
Mitigation required	• An influx of job-seekers should be proactively discouraged by being transparent about the local employment policy to be adopted by the project and by requiring verification of local residence status from job applicants; • The establishments of informal housing/ or settlements should be actively prevented by implementing an effective system through which the erection of such structures can be

Nature of impact	**Inflow of migrant job-seekers.**				
	reported and dismantled as soon as possible; • Adequate accommodation and ablution facilities should be made available to the construction workforce; and • A code of conduct for the construction workforce should be developed and they should be contractually bound to it and their working conditions should be fair.				
Parameters	*Severity*	*Spatial scale*	*Duration*	*Probability*	*Significant rating*
Pre- Mitigation	On-going (4)	Municipal (4)	Project life (5)	Almost certain (6)	Medium-high (78)
Post- Mitigation	Minor (2)	Local (3)	Medium-term (3)	Probable (4)	Low (32)
I&AP Concern	A concern was voiced that the Black Mountain Mine is proposing to expand in the near future and that there is already a shortage of housing in the town of Aggeneys.				
Residual impact	The influx of migrant job-seekers cannot be entirely prevented and this will result in residual impacts, mainly on existing public infrastructure and privately owned land (i.e. in the form of informal settlements).				

Nature of impact	**Project dependence and decommissioning of project infrastructure.**				
Description of impact	It is likely that the proposed project will be decommissioned after an operational lifespan of 20 years, implying that an estimated 70 jobs will be lost at this time. Although this is an inevitable element of such projects, it holds negative socio-economic implications for the town of Aggeneys, the workforce (especially the local unskilled and semi-skilled individuals) and local entrepreneurs, SMMEs and businesses. Additionally, vacated project infrastructure (such as the on-site office, technical service buildings and laydown yard) could potentially be used for inappropriate purposes (shelter), which may give rise to health and safety impacts affecting the local population.				
Mitigation required	• Employment opportunities during the decommissioning phase should go to as many local residents as possible, minimising the adverse effect the inevitable job losses will have on the local population; • Project infrastructure should be decommissioned appropriately and in consultation with the local municipality (Appendix J); • Retrenchments must be aligned with South African labour legislation, and workers should be notified in advance of impending retrenchments; and • Orlight SA should consider providing skills training to employees so as to improve their chances of gainful employment elsewhere.				
Parameters	*Severity*	*Spatial scale*	*Duration*	*Probability*	*Significant rating*
Pre- Mitigation	On-going (4)	Municipal (4)	Long term (4)	Certain (7)	Medium-high (84)
Post- Mitigation	On-going (3)	Municipal (4)	Long term (4)	Likely (5)	Medium-low (55)
I&AP Concern	No concerns regarding dependency on the project were raised during the PPP.				
Residual impact	Loss of jobs after the project has reached its full life time is unavoidable.				

6.3.8 Potential impacts on heritage

The main impacts on heritage of the project site will occur during the construction phase of the proposed project. These impacts were assessed to have **medium-low significance.** Activities that will result in impacts include:

- The clearance of vegetation at the footprint of the construction lay-down yard, substation and each solar PV mounting structure;
- Removal of topsoil from the footprint of the substation and car parking yard and stockpiling of topsoil for use during site rehabilitation; and
- The installation of solar PV panels and all associated infrastructure.

Tables summarising the significance of the potential impacts on heritage during the project phases are presented below.

Nature of impact	**Impacts to archaeological material.**				
Description of impact	Although some archaeological material will be impacted, the impact is considered Low. Lack of site boundaries or associated organic remains reduces scientific value greatly.				
Mitigation required	• In the unlikely event that unmarked graves are present and found during the construction phase, work at that location must be halted, the feature should be cordoned off and the heritage authority (SAHRA) notified. They are likely to suggest mitigation in the form of exhumation. No mitigation has been suggested.				
Parameters	*Severity*	*Spatial scale*	*Duration*	*Probability*	*Significant rating*
Pre- Mitigation	Negligible (1)	Limited (2)	Permanent (7)	Definite (7)	Medium-low (70)
Post- Mitigation	Negligible (1)	Limited (2)	Permanent (7)	Definite (7)	Medium-low (70)
I&AP Concern	No concerns regarding heritage resources were raised during the PPP.				
Residual impact	The cumulative impact of several such facilities will result in the potential destruction of large scatters of archaeological material.				

Nature of impact	**Impacts to cultural landscape.**				
Description of impact	The largest visual impact will be experience due to the removal of natural vegetation and installation of the solar PV panels and associated infrastructure, since a possible change in the intangible heritage and sense of place landscape will occur.				
Mitigation required	• No mitigation is possible.				
Parameters	*Severity*	*Spatial scale*	*Duration*	*Probability*	*Significant rating*
Pre- Mitigation	Moderate (3)	Local (3)	Long term (4)	Definite (7)	Medium-low (70)
Post- Mitigation	Medium (3)	Local (3)	Long term (4)	Definite (7)	Medium-low (70)
I&AP Concern	No concerns regarding heritage resources were raised during the PPP.				
Residual impact	The cumulative impact of several such facilities will result in "industrialization" of the archaeological landscape.				

6.4 Cumulative impacts on the receiving environment surrounding Aggeneys

This section considers and assesses the possible cumulative effects that may occur due to the incremental effects of the proposed Aggeneys Solar PV Power Plant in combination with other projects within the vicinity.

In order to analyse the cumulative impacts associated with a project, the following activities were undertaken:

- The geographic scope of the cumulative impact resource or environmental aspect analysis was defined, based on the potential areas within which impacts from other present or future projects could combine with the project in question; and
- The combined effects of the proposed project in combination with past, present and future projects or activities were analysed in terms of the potential cumulative impacts within the relevant geographical extent.

There has been increased interest by various parties to develop renewable energy facilities throughout South Africa, including the Northern Cape Province with its abundance of solar irradiation and vast open spaces. The cumulative impact assessment therefore mainly focusses on the interaction between proposed renewable energy projects surroundings Aggeneys. Known renewable energy projects that are proposed within the vicinity are illustrated in Plan 13a and include:

- *Solar Capital* – Proposed solar PV development on the farm Blomhoek, located south of the Orlight SA project site; and
- *Aurora Power Solutions* – Two proposed solar PV developments, located 10 km south-west of and 71 km north-east of the Orlight SA project site.

Apart from potential renewable energy developments listed above and the possible expansion of the Black Mountain Mine, no other significant developments have been proposed or are likely to take place in the foreseeable future.

6.4.1 Cumulative impacts on surface water systems

Water is a scarce resource in this area and subsequently the cumulative water use requirements of existing and proposed developments must be taken into consideration. Pressures on surface water systems in the project area include the existing and proposed expansion of mining operations outside the town of Aggeneys, as well as the future solar PV developments described above. The developments fall wholly or partly within the same quaternary catchment as the proposed Orlight SA project (D82C) and cumulative impacts on the catchment could therefore be severe.

All of these developments will result in changes to the natural topography of the area, which will also result in changes to the drainage patterns in the area. Impacts would include increased susceptible to erosion, aggravated erosion processes and sediment transport in the area. However, these impacts will be negligible for all the proposed solar PV developments, especially if major drainage lines are avoided.

Depending on the cumulative water requirements for the projects, there may be an increase in demand for water during the construction and operational phases of the renewable energy projects.

6.4.2 Cumulative impacts on agricultural potential and land use

The area in which the proposed solar PV development will occur occupy a total surface area of approximately 20 465 ha. Even though most of the land within the Khai-Ma Municipality is currently used for grazing of

livestock, the cumulative impact on loss of grazing land is considered negligible, due to the inherently low grazing capacity of the land and the fact that alternative land uses are limited.

6.4.3 Cumulative ecological impacts

The significant ecological features known to occur in the region primarily occur in the inselbergs and unique habitats of rocky outcrops. Due to the unsuitability of such terrains for development of solar PV project, these features are unlikely to be impacted.

A possible cumulative impact that should be considered is the loss of capacity of the area to perform provisioning, regulating, supporting and cultural ecosystem functions. The proposed solar PV development sites all fall within SKEP planning domain and areas that have an irreplaceability status of five or higher, which indicates areas that have a high priority in terms of achieving conservation targets. The incremental effects of developing these areas could introduce a cumulative impact that may negatively affect biodiversity targets on a regional scale.

6.4.4 Cumulative visual impacts

One of the proposed Aurora Power Solutions sites and the Solar Capital site are both bordering on, or are most likely within a 5 km radius of the N14 national road. All of the proposed developments are likely to be within a 15 km radius of the town of Aggeneys itself. These projects will introduce potentially significant cumulative impacts on receptors traveling on the N14 national road. The solar PV development will alter the sense of place and sense of remoteness of the visual landscape, since the solar panels of the proposed parks will be new, industrial and dominant structures within the scenery. They may however be a good symbol for progress as South Africa taps into its natural legacy of solar power and renewable energy production.

There is already an existing mining operation within the vicinity of the proposed solar plants/parks and there is a possibility that mining activities will expand, introducing additional negative visual impacts.

6.4.5 Cumulative impacts on tourism

The tourism industry present in the area will most likely change its focus from eco-tourism to energy tourism, due to the development of solar PV projects in the vicinity of Aggeneys.

In order to maximise the benefits associate with the establishment of an energy-focused tourism industry, the different proponent of solar PV project in the area should consider the establishment of a visitors centre in the town with educational opportunities on solar energy for tourists that visit the area.

6.4.6 Cumulative impacts on traffic

The cumulative impacts on traffic could be potentially significant during construction phase of the proposed projects, if all of these projects are constructed during the same time. A fair amount of traffic will arise on the N14 national road, which is the presumed transport route, if all three of the proposed parks that are within a 15 km radius of one another are constructed simultaneously.

The total trip generation of the sites are likely to be 30 or less trips per day during construction and therefore, the impacts on transport infrastructure is not seen as significant.

6.4.7 Cumulative impacts on the socio-economic environment

The cumulative impacts of the proposed projects on socio-economic development in the Khai-Ma local municipality are likely to have significant positive cumulative impacts. The current unemployment rate (13.6%) is likely to decrease as employment opportunities, prospects for basic skills development and capacity building activities.

6.4.8 Cumulative impacts on archaeology and heritage

The most significant aspect of the archaeological landscape in the area is the Gamsberg, which is located 2.5 km east of the proposed facility. Morris (2010) has discussed the importance of the Gamsberg as a potential "genocide site for the San" and the possibility (albeit unlikely) of its incorporation into a /Xam and Khomani Heartland World Heritage Site. Morris (pers. com.) points to the impact of mining both at Aggeneys Mountain and at Gamsberg and the fact that the area has already been transformed by not only mining, but also by a substation and transmission lines.

7 ENVIRONMENTAL IMPACT STATEMENT

This report presents the findings of the EIA process that was undertaken for the development and operation of the Aggeneys Solar PV Power Plant proposed by Orlight SA.

The following Environmental Impact Statement (EIS) contains a summary of the main findings of the EIA process and recommendations of the EAP.

Public participation process

A comprehensive and fully transparent PPP was undertaken to ensure that I&APs were afforded the opportunity to participate in the EIA process.

I&APs generally had no objections regarding the proposed Aggeneys Solar PV Power Plant and feel that the proposed project will benefit them in terms of the supply of renewable energy to an area where it is much needed and through local socio-economic development.

Integrated sensitivity maps

Integrated sensitivity maps were prepared for the study area, based on the findings of environmental, socio-economic and cultural assessments undertaken for the project as input into the project design process.

It is recommended that the following areas be avoided during project development:

- *Ridges and areas which include protected and red data species;*
- *A buffer zone of 50 m is prescribed around the main drainage system, with 30 m buffer zones around its tributaries;*
- *A 30 m buffer zone around the N14 road reserve;*
- *A buffer zone of 47 m around the existing 220 kV Eskom transmission line and 22 m around the existing 66 kV Eskom transmission line that run across the project site; and*
- *Visually sensitive areas north of the major drainage line.*

Site design process

A study area of 872.21 ha was considered throughout the EIA process, although the actual development footprint of the proposed project, based on the avoidance of environmentally sensitive and other problematic areas, was defined as 322 ha in extent.

The optimal generation capacity of the power plant based on an estimated requirement of 4 ha surface area per MW generation capacity was determined to be 80 MW.

Soil and agricultural potential

The agricultural potential of the soils present in the study area is very low, with land capability restricted to grazing. Soils in the project area also show high susceptibility to erosion by wind and water.

Despite these factors, the overall impacts on soil resources and land capability of study area can be mitigated to an acceptable level, conditional to the exclusion of the drainage lines from the development footprint.

Ecological sensitivity and biodiversity

During the field assessment, the study area was found to be under pressure from current and previous land use, most notably grazing. Despite these threats it was found that the natural habitat present within the study areas provide an ecological service to the plant and animal species encountered during the field survey and very

possibly to the plant and animal species that were identified during the desktop survey. This was evident from the diversity of plant and animal species that were encountered in certain landscapes of the study area.

The vegetation/habitat units identified were all responsible for varied degrees of natural to transformed habitat present; in turn this resulted in the mosaic effect with regards to the vegetation which in turn has an effect on the animal species present.

The opportunity to maintain or increase the ecological functioning of the study area exists, thereby indirectly supporting the population of animal species possibly reliant on this area for services. By increasing the natural habitat types in the no-go areas and removing the threats (i.e. grazing by livestock and alien species invasion), the ecological functioning of the area will be positively affected, thereby increasing the suite of ecological services offered to animals, making the area an attractive option for animals to re-colonise.

Therefore, it is recommended that a management plan be implemented which will firstly monitor ecological status of the project site and secondly, that the destruction of the sensitive species and landscapes areas such as drainage lines, ridges and plains should be avoided. An alien invasive and weed control programme will be an integral part of the success of efforts to increase the ecological functioning of the study area.

Visual sensitivity

The Aggeneys study area is close to the town of Aggeneys town, but the town is a mining town and existing construction related activities contributes to the landscape not being completely pristine. Therefore the landscape type will not be completely transformed by the proposed Solar PV Power Plant.

It is believed that the identified visual impacts associated with the proposed Solar PV Power Plant, should not introduce limitations to the construction of the proposed project based on the current landscape context.

Heritage impacts

The stone artefact scatters which were recorded in the study area are considered to be of minor significance and therefore, although some archaeological material will be impacted, the impact is considered to be low. There are no issues relating to the built environment (e.g. buildings or structures older than 60 years which are protected by the NHRA).

In the unlikely event that unmarked graves are present and found during the construction phase, work at that location must be halted, the feature should be cordoned off and the heritage authority (SAHRA) notified. They are likely to suggest mitigation in the form of exhumation. No other mitigation has been suggested.

Overall recommendation

Based on the nature and extent of the proposed project and the understanding of the significance of anticipated impacts that will be experienced, the EAP is of the opinion that the predicted impacts can be mitigated to an acceptable level. The EAP and specialist team supports the decision for an environmental authorisation.

The following conditions would be required in the environmental authorisation for the proposed project:

- All mitigation measures described in this report and in the EMP (Appendix J) should be implemented to ensure that the negative impacts of the project are mitigated and that positive impacts are enhanced;
- All no-go areas, sensitive areas and prescribed buffer zones that were defined unsuitable for development purposes should be avoided;
- A flora survey of the project development footprint should be undertaken during the wet-season to try and identify Red Data and protected plant species that might not have been identified during dry-season surveys. If found, the necessary permits should be obtained prior to the removal or destruction of these species;
- The implementation of the EMP (Appendix J) is considered a key factor to the achievement of the environmental standards and long-term sustainability of the project. For this purposed, the EMP should form part of the contractual agreement with the contractors that are appointed for development and operation of the proposed project;
- The EMP (Appendix J) should be considered a living document and should be updated during the project phases as more information on the significance of impacts and effectiveness of mitigation measures becomes known.

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