ENVIRONMENTAL IMPACT ASSESSMENT PROCESS
SCOPING REPORT

NOUPOORT CONCENTRATED SOLAR POWER (CSP) PROJECT,
NORTHERN CAPE PROVINCE

JUNE 2016

Prepared for:

CRESCO Energy (Pty) Ltd
267 West Building,
267 West Avenue,
Centurion,
0157

Prepared by:

Savannah Environmental Pty Ltd

UNIT 10, BLOCK 2
5 WOODLANDS DRIVE OFFICE PARK,
CORNER WOODLANDS DRIVE & WESTERN
SERVICE ROAD, WOODMEAD, GAUTENG
PO BOX 148, SUNNINGHILL, 2157
TEL: +27 (0)11656 3237
FAX: +27 (0)86 684 0547
E-MAIL: INFO@SAVANNAHSA.COM
WWW.SAVANNAHSA.COM

PROJECT DETAILS

Title	:	Environmental Impact Assessment Process Scoping Report: Noupoort Concentrated Solar Power (CSP) Project, Northern Cape Province.
Authors	:	Savannah Environmental (Pty) Ltd Thalita Botha Karen Jodas
Sub-consultants	:	Candice Hunter of Savannah Environmental (peer reviewed by Dr Neville Bews) Gabriele Wood of Savannah Environmental Gerhard Botha of Eco-Care Consultancy Elize Butler of the Bloemfontein National Museum Jaco van der Walt of Heritage Contracts and Archaeological Consulting Johan van Niekerk Jon Marshall of Afzelia Environmental Consultants Garry Paterson of Agricultural Research Council
Client	:	CRESCO Energy (Pty) Ltd
Report Status	:	Scoping Report for Public Review
Review period:	:	30 June 2016 – 01 August 2016

When used as a reference this report should be cited as: Savannah Environmental (2016) Scoping Report: Noupoort Concentrated Solar Power (CSP) Project, Northern Cape Province.

PURPOSE OF THE SCOPING REPORT

CRESCO Energy (Pty) Ltd proposes the construction of a Concentrated Solar Power (CSP) Project and associated infrastructure on the Remaining Extent of the Farm 207, Portion 1 and Portion 4 of Farm Carolus Poort 167, situated ~4km north west of Noupoort. The proposed site falls under the jurisdiction of the Umsobomvu Local Municipality and within the greater Pixley ka Seme District Municipality in the Northern Cape Province. The Noupoort Concentrated Solar Power (CSP) Project is proposed to be up to 150MW in capacity and will be constructed over an area of approximately 900 ha in extent within the broader project site.

This Scoping Report documents the evaluation of the potential environmental impacts of the proposed solar energy facility and forms part of the EIA process. The Scoping Phase was conducted in accordance with the requirements of the EIA Regulations in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998).

CRESCO Energy (Pty) Ltd has appointed Savannah Environmental as independent environmental consultants to undertake the Environmental Impact Assessment (EIA) for the proposed CSP Project. The EIA process is being undertaken in accordance with the requirements of the EIA Regulations of December 2014 (of GNR982) promulgated in terms of the National Environmental Management Act (NEMA; Act No. 107 of 1998).

This Scoping Phase aims to:

» Identify and evaluate potential environmental (biophysical and social) impacts and benefits of all phases of the proposed development (including design, construction, operation and decommissioning) within the broader study area through a desk-top review of existing baseline data and specialist studies.
» Identify potentially sensitive environmental features and areas on the site to inform the preliminary design process of the facility.
» Define the scope of studies to be undertaken within the EIA process.
» Provide the authorities with sufficient information in order to make a decision regarding the scope of issues to be addressed in the EIA process, as well as regarding the scope and extent of specialist studies that will be required to be undertaken as part of the EIA Phase of the process.

Within this context, the objectives of this Scoping Phase are to, through a consultative process:

» identify the relevant policies and legislation relevant to the project;

- motivate the need and desirability of the proposed project, including the need and desirability of the activity in the context of the preferred location;
- identify and confirm the preferred project and technology alternative through an impact and risk assessment and ranking process;
- identify and confirm the preferred site, through a detailed site selection process, which includes an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;
- identify the key issues to be addressed in the EIA phase;
- agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the project will impose on the preferred site through the life of the project, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and identify suitable measures to avoid, manage or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

This Scoping Report represents the findings of the Scoping Phase of the EIA process and contains the following sections:

- **Chapter 1** provides background to the proposed CSP project and the environmental impact assessment process.
- **Chapter 2** provides the regulatory and planning context for energy projects within South Africa.
- **Chapter 3** describes the activities associated with the project (project scope) and provides insight of the technology.
- **Chapter 4** outlines the process which was followed during the Scoping Phase of the EIA process, including the consultation programme that was undertaken and input received from interested and affected parties.
- **Chapter 5** describes the existing biophysical and socio-economic environment affected by the proposed project.
- **Chapter 6** provides an identification and evaluation of the potential issues associated with the development of the Noupoort CSP Project.
- **Chapter 7** presents the conclusions of the scoping evaluation for the Noupoort CSP Project.
- **Chapter 8** describes the Plan of Study for the EIA phase.
- **Chapter 9** provides references used to compile the Scoping Report.

LEGAL REQUIREMENTS IN TERMS OF THE EIA REGULATIONS

Table 1 below details how the legal requirements of Appendix 2 and Regulation 21(1) of the 2014 EIA Regulations have been addressed within this report.

Table 1: Legal requirements in terms of the EIA regulations

EIA REGULATIONS 2014 GNR 982: Appendix 2 CONTENT OF THE SCOPING REPORT	**Cross-reference in this Scoping Report**
A Draft Scoping Report must contain all the information that is necessary for a proper understanding of the nature of issues identified during scoping, and includes -	
(a) details of— (i) the EAP who prepared the report; and (ii) the expertise of the EAP to carry out scoping procedures; including a curriculum vitae	Chapter 1 Section 1.4
(b) the location of the activity, including— (i) the 21 digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; (iii) where the required information in items (i) and (iv) is not available, the coordinates of the boundary of the property or properties;	Chapter 1 Section 1.2, Table 1.1
(c) a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is— (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	Chapter 1 Section 1.2 and 1.3
(d) a description of the scope of the proposed activity, including— (i) all listed and specified activities triggered; (ii) a description of the activities to be undertaken, including associated structures and infrastructure;	Chapter 3 Section 3.2 Chapter 4 Section 4.1
(e) a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process;	Chapter 2
(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	Chapter 3 Section 3.3
(g) Missing as per the EIA REGULATIONS 2014 GNR 982: Appendix 2; pg 58	

(h) a full description of the process followed to reach the proposed preferred activity, site and location within the site, including—	
(i) details of all the alternatives considered;	Chapter 3 Section 3.5
(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Chapter 4 Appendix C
(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	Chapter 4 Section 4.4 Appendix C
(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Chapter 5
(v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts—	
(aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	Chapter 6
(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	Chapter 8
(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Chapter 6
(viii) the possible mitigation measures that could be applied and level of residual risk;	Chapter 6
(ix) the outcome of the site selection matrix;	Chapter 3 Section 3.5.1
(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and	Chapter 3 Section 3.5
(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity	Chapter 7
(i) a plan of study for undertaking the environmental impact assessment process to be undertaken	Chapter 8
(j) an undertaking under oath or affirmation by the EAP in relation to— (i) the correctness of the information provided in the report; (ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; and (iii) any information provided by the EAP to interested and affected parties and any responses by	Appendix K

the EAP to comments or inputs made by interested or affected parties;	
(k) an undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and interested and affected parties on the plan of study for undertaking the environmental impact assessment;	Appendix K
(l) where applicable, any specific information required by the competent authority.	To be included in the final Scoping Report

INVITATION TO COMMENT ON THE SCOPING REPORT

This **Scoping Report** has been made available for public review from 30 June 2016 – 01 August 2016 at the following locations:

» Noupoort Public Library, 4 Shaw Street, Noupoort
» Hanover Public Library, 16 Darling Street, Hanover
» The report is also available for download from www.savannahSA.com

Please submit your comments to
Gabriele Wood of **Savannah Environmental** PO Box 148, Sunninghill, 2157 Tel: 011 656 3237 Fax: 086 684 0547 Email: gabriele@savannahsa.com
The due date for comments on the Scoping Report is **01 August 2016**

Comments can be made as written submission via fax, post or e-mail.

EXECUTIVE SUMMARY

Background and Project Overview

CRESCO Energy (Pty) Ltd is proposing the development of a Concentrated Solar Power (CSP) Project on the Remaining Extent of the Farm 207, Portion 1 and Portion 4 of the Farm Carolus Poort 167, located ~4km north west of Noupoort. The proposed site falls under the jurisdiction of the Umsobomvu Local Municipality and within the greater Pixley ka Seme District Municipality in the Northern Cape. The proposed project will be known as the Noupoort CSP Project.

The Noupoort CSP Project under investigation through this Scoping Report is proposed to generate up to 150MW in capacity and will be constructed over an area of approximately 900 ha in extent within the broader properties.

From a regional perspective, the greater area is considered favourable for the development of concentrated solar power projects by virtue of the prevailing climatic conditions (primarily as the economic viability of a concentrated solar power project is directly dependent on the annual solar irradiation values for a particular area), relief and aspect, the extent of the site, the availability of a direct grid connection (i.e. point of connection to the Eskom National grid) and the availability of land and consent from the landowner to develop.

An EIA process and public participation process is being undertaken for the development of the CSP Project. The nature and extent of the project, as well as potential environmental impacts associated with the construction, operation and decommissioning phases are explored in more detail in this Scoping Report.

Project Components

The proposed Noupoort CSP Project will utilise parabolic trough technology. The parabolic trough system is comprised of two components: a heat collection system (a solar field comprising rows of parabolic troughs) and an energy centre. The heat from the solar field creates steam from the heat transfer fluid (HTF) in a closed loop system which heats the storage medium in the energy centre. The HTF (water) in a separate closed loop system is then heated, creating steam and releasing it directly into the turbine inlet, which turns the turbine creating electricity. Infrastructure associated with the CSP Project includes:

» Solar collector field comprising of all systems and infrastructure related to the control and operation of the parabolic troughs;

- Energy Centre, comprising of the storage media and heat exchanger;
- Power Block, consisting of the steam turbine and generator, as well as the air-cooled condenser and associated feedwater system;
- On-site project substation;
- A new 132kV power line to connect the on-site substation to the Eskom's electricity grid;
- Access roads and fencing around the development area;
- Lined evaporation ponds;
- Gas boiler for the start-up process of the facility;
- Water supply pipeline;
- On-site water storage tanks/reservoirs;
- Water treatment facility;
- Plant assembly facility;
- Offices and workshop areas for maintenance and storage; and
- Temporary laydown areas.

The overarching objective for the Noupoort CSP Project is to maximise electricity production through exposure to the solar resource, while minimising infrastructure, operational and maintenance costs, as well as social and environmental impacts. In order to meet these objectives, local level environmental and planning issues will be assessed in the EIA process through site-specific studies in order to delineate areas of sensitivity within the broader project site. This will serve to inform the design of the Noupoort CSP Project.

This Scoping Report is aimed at detailing the nature and extent of this project, identifying potential issues associated with the proposed project, and defining the extent of studies required within the EIA. This was achieved through an evaluation of the proposed project, involving the project proponent, specialist consultants, and a consultation process with key stakeholders that included both relevant government authorities and interested and affected parties (I&APs). In accordance with the requirements of the EIA Regulations, feasible project-specific alternatives (including the "do nothing" option) have been identified for consideration within the EIA process.

Evaluation of the Proposed Project

Through the undertaking of the scoping study, specialist input was provided in order to delineate areas of potential sensitivity that need to be avoided by the development of the Noupoort CSP facility. The main issues identified through this scoping study associated with the proposed CSP Project are summarised in **Table 1** and **Table 2** below.

As is evident from the Tables below, the majority of potential impacts identified to be associated with the construction of the Noupoort CSP Project are anticipated to be localised in extent (i.e. limited to the site boundaries or the area immediately surrounding the site). This excludes social impacts – job creation which could have more of a regional positive impact. Operational phase impacts range from local to regional and national (being the positive

impact of contribution of clean energy as part of the energy mix in South Africa).

The potentially sensitive areas which have been identified through the scoping study are summarised and illustrated in **Figure 1** and **2**. The scoping phase sensitivity maps provide an informed illustration of sensitivity within and around the larger site and are intended to inform the location and layout of the CSP facility within the project site. **Figure 1** illustrates potential areas within the project site that are considered to be no-go areas, very high- and highly sensitive areas as identified in the scoping evaluation. The areas shown as no-go areas are considered to be exclusion areas for development, and must be avoided by the development footprint. **Figure 2** illustrates potential areas of medium sensitivity. These areas are predominantly artificial anthropogenic features (such as furrows associated with historic agricultural activities) and are not considered to present a risk to the intended use of the site. The demarcated sensitive areas must be used as a tool by the developer to avoid those areas flagged to be no-go areas (considered exclusion areas) and areas of very high sensitivity (where impacts would be of high significance). High and medium sensitivity ratings are considered acceptable loss areas.

The mapped detail is based on the desktop review of the available baseline information for the project site as well as field surveys already undertaken.

No environmental fatal flaws associated with the Noupoort CSP Project within the Remaining Extent of the Farm 207, Portion 1 and Portion 4 of the farm Carolus Poort 167 were identified. Further investigation is required in order to fully assess the anticipated impacts as outlined in the specialist reports. It is recommended that the proposed site be considered in an EIA phase assessment according to the Plan of Study contained in this report.

Table 1: Summary of the extent of the potential impacts associated with the construction and decommissioning of the Noupoort CSP Project, as identified at the scoping phase

Construction / Decommissioning Impacts	**Extent**
Disturbance to and loss of indigenous natural vegetation	L
Disturbance or loss of threatened / protected plants	L
Loss of habitat for fauna species of conservation concern	L
Disturbance to migration routes and associated impacts to species populations	S
Impacts on wetlands	L-R
Establishment and spread of declared weeds and alien invader plants	L-R
Disturbance and displacement of birds and destruction of nests	L
Loss of soil resources as a result of erosion (especially water erosion)	S
Loss of agricultural land	S
Visual impact on surrounding areas as a result of construction activities	L
Direct employment opportunities and skills development	L-R (positive)
Economic multiplier effects	L-R (positive)
Safety and security impacts	L
Impacts on daily living and movement patterns	L
Pressure on economic and social infrastructure impacts from an in-migration of people	L-R
Nuisance Impacts (noise & dust)	L
Disturbance and destruction of archaeological sites and graves	L
Loss of unique fossil heritage	S-L

Table 2: Summary of the extent of the potential impacts associated with the operation of the Noupoort CSP Project, as identified at the scoping phase

Operational Impacts	**Extent**
Disturbance or loss of indigenous natural vegetation	L
Altered runoff patterns due to rainfall interception by panels and compacted areas	S-L
Disturbance to faunal migration routes and associated impacts to species populations	S-L
Impacts on wetlands	L-R

Establishment and spread of declared weeds and alien invader plants	L-R
Collision with parabolic troughs and infrastructure	S
Habitat destruction within the CSP trough footprint	S
Potential visual impact on general landscape character	L
Potential visual impact on users of the N9	L
Potential visual impact on users of the R389	L
Potential visual impact on users of the three minor roads	L
Potential impacts on users of the railway line/s	L
Potential visual impact on residents of settlements and homesteads in close proximity to the proposed Noupoort CSP Project	L
Potential impacts on residents of Noupoort	L
Potential visual impact of night lighting	L
Ocular impacts associated with glint and glare	L
Loss of agricultural land	S
Loss of soil resources as a result of erosion (especially water erosion)	S
Direct employment opportunities and skills development	L-R (positive)
Economic multiplier effects	L-R (positive)
Socio-Economic Development (SED), Enterprise Development (ED) and share ownership in the project company with local communities	L (positive)
Development of clean, renewable energy infrastructure	L-R-N (positive)
Visual impact and impacts on sense of place	L
Impacts associated with the loss of agricultural land	S-L

S	**Site**	L	**Local**	R	**Regional**	N	**National**

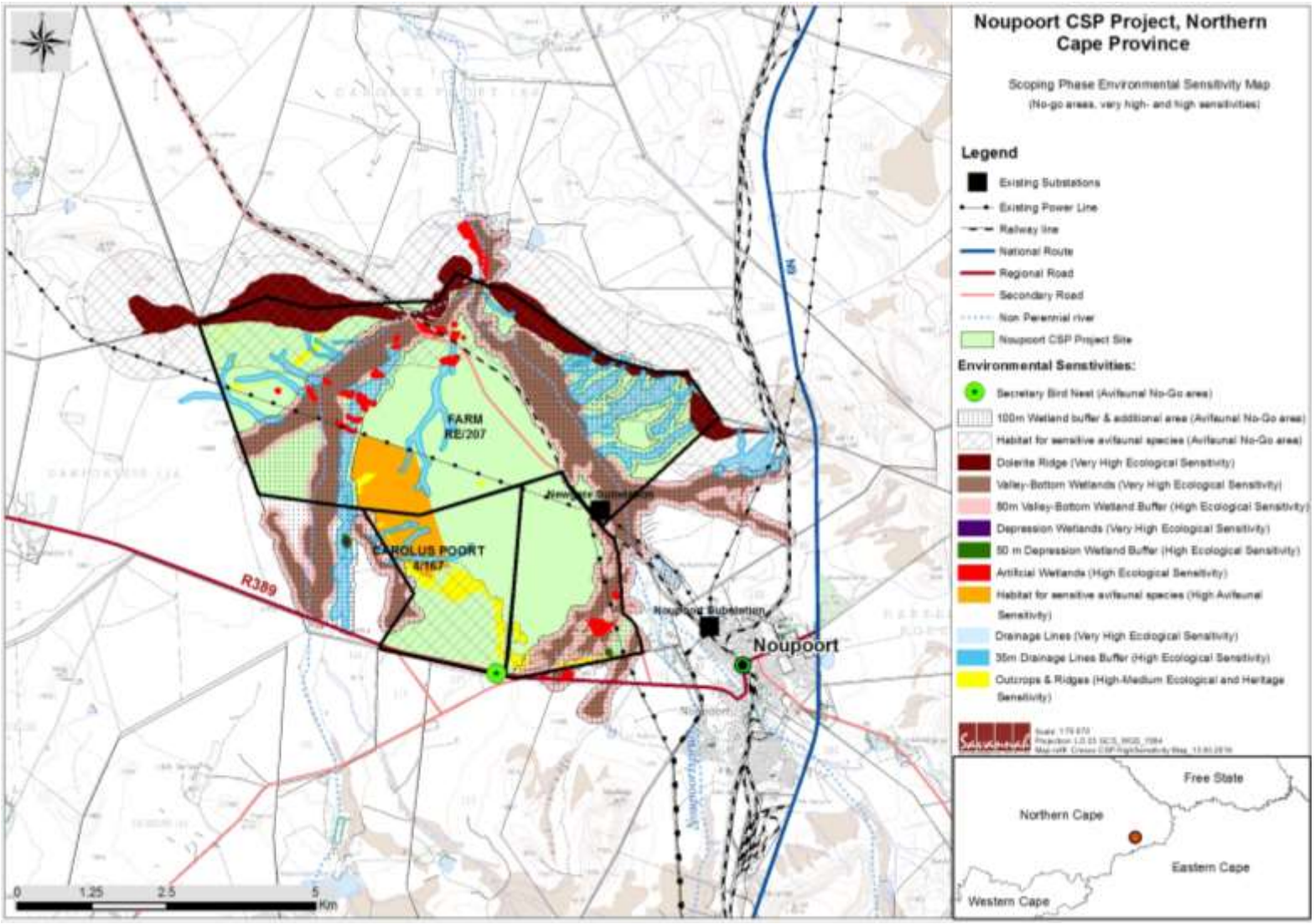

Figure 1: Environmental Sensitivity Map illustrating no-go areas, very high- and high sensitivities identified in the scoping evaluation for the Proposed Noupoort CSP Project (refer to **Appendix M**).

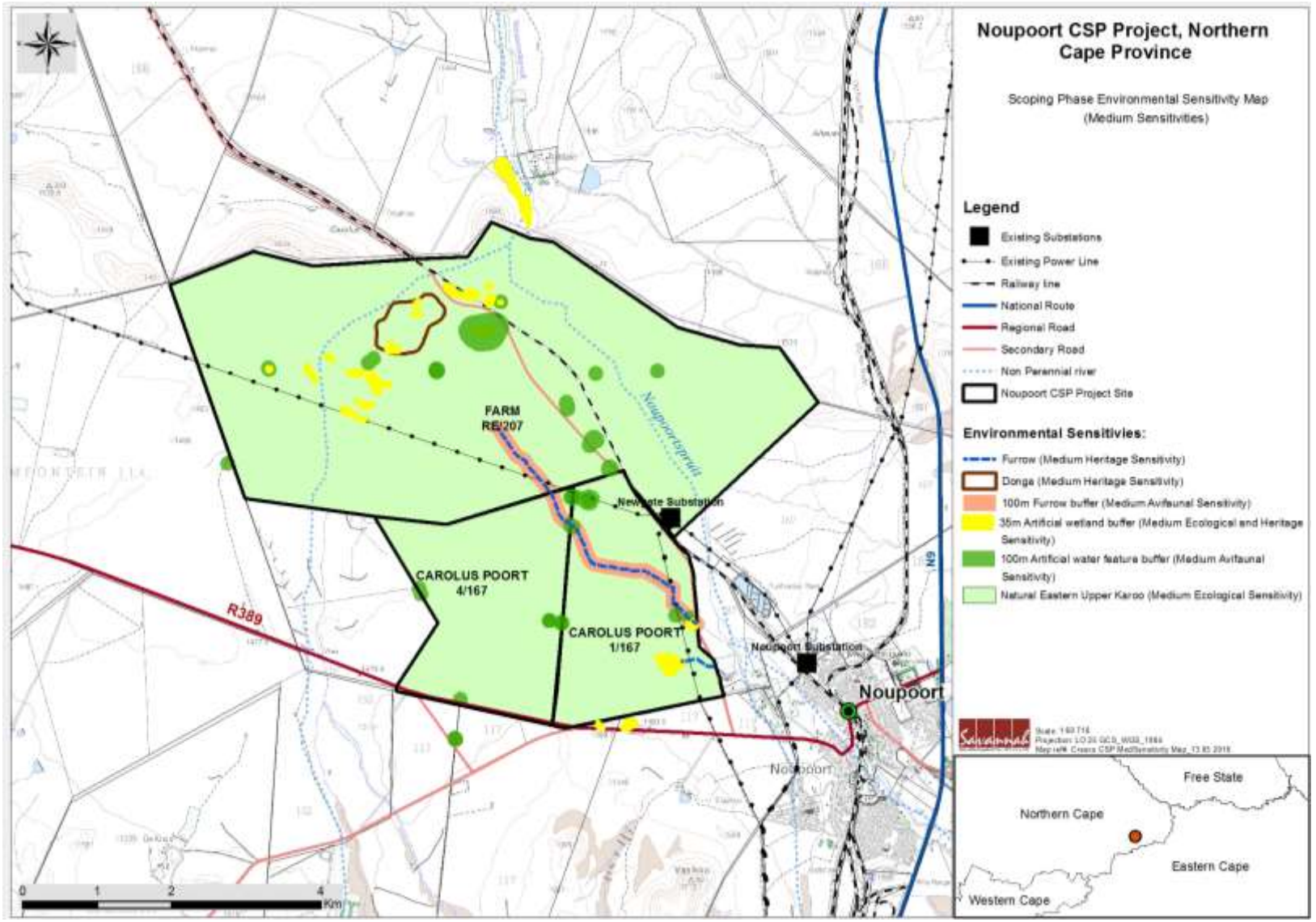

Figure 2: Environmental Sensitivity Map illustrating medium sensitivities identified in the scoping evaluation for the Proposed Noupoort CSP Project (refer to **Appendix M**).

TABLE OF CONTENTS

APPENDICES

Appendix A: EIA Project Consulting Team and Specialist CVs
Appendix B: Correspondence with Authorities
Appendix C: Public Participation Information
Appendix C1: I&AP Database
Appendix C2: Site Notices and Newspaper Advertisements
Appendix C3: Background Information Document
Appendix C4: Organs of State Correspondence
Appendix C5: Stakeholder Correspondence
Appendix C6: Comments Received
Appendix C7: Minutes of Meetings
Appendix C8: Comments and Responses Report
Appendix D: Ecology Scoping Study
Appendix E: Avifaunal Scoping Study
Appendix F: Heritage Scoping Study
Appendix G: Palaeontological Scoping Study
Appendix H: Soil & Agricultural Potential Scoping Study
Appendix I: Social Scoping Study
Appendix I1: Social Scoping Study Review
Appendix J: Visual Scoping Study
Appendix K: EAP Affirmation and Declaration
Appendix L: Specialist Declarations
Appendix M: A3 Maps
Appendix M1: Locality Map
Appendix M2: Environmental Sensitivity Maps
Appendix M3: Cumulative Map

DEFINITIONS AND TERMINOLOGY

Alternatives: Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.

Archaeological material: Remains resulting from human activities which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures.

Article 3.1 (*sensu* Ramsar Convention on Wetlands): "Contracting Parties "shall formulate and implement their planning so as to promote the conservation of the wetlands included in the List, and as far as possible the wise use of wetlands in their territory"".(Ramsar Convention Secretariat. 2004. Ramsar handbooks for the wise use of wetlands. 2nd Edition. Handbook 1. Ramsar Convention Secretariat, Gland, Switzerland.) (see http://www.ramsar.org/)

Calcrete: A soft sandy calcium carbonate rock related to limestone which often forms in arid areas.

Cumulative impacts: Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients and heated water to a river that combine to cause algal bloom and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.

Demand-side Management Programme (DSM): A joint initiative between the DME, the National Electricity Regulator (NER) and Eskom which aims to provide lower cost alternatives to generation system expansion by focusing on the usage of electricity. Consumers are incentivised to use electricity more efficiently and at times of the day outside of Eskom's peak periods.

Direct impacts: Impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity (e.g. noise generated by blasting operations on the site of the activity). These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.

Disturbing noise: A noise level that exceeds the ambient sound level measured continuously at the same measuring point by 7 dB or more.

'Do nothing' alternative: The 'do nothing' alternative is the option of not undertaking the proposed activity or any of its alternatives. The 'do nothing' alternative also provides the baseline against which the impacts of other alternatives should be compared.

Early Stone Age: A very early period of human development dating between 300 000 and 2 million years ago.

Endangered species: Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included here are taxa whose numbers of individuals have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

Endemic: An "endemic" is a species that grows in a particular area (is endemic to that region) and has a restricted distribution. It is only found in a particular place. Whether something is endemic or not depends on the geographical boundaries of the area in question and the area can be defined at different scales.

Environment: the surroundings within which humans exist and that are made up of:

i. the land, water and atmosphere of the earth;
ii. micro-organisms, plant and animal life;
iii. any part or combination of (i) and (ii) and the interrelationships among and between them; and
iv. the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental impact: An action or series of actions that have an effect on the environment.

Environmental impact assessment: Environmental Impact Assessment (EIA), as defined in the NEMA EIA Regulations and in relation to an application to which scoping must be applied, means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of that application.

Environmental management: Ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.

Environmental management programme: An operational plan that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a proposal and its on-going maintenance after implementation.

Fossil: Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

Heritage: That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act of 2000).

Indigenous: All biological organisms that occurred naturally within the study area prior to 1800.

Indirect impacts: Indirect or induced changes that may occur as a result of the activity (e.g. the reduction of water in a stream that supply water to a reservoir that supply water to the activity). These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.

Interested and Affected Party: Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups and the general public.

Late Stone Age (LSA): In South Africa this time period represents fully modern people who were the ancestors of southern African KhoeKhoen and San groups (30 000 – 300 years ago).

Middle Stone Age (MSA): An early period in human history characterised by the development of early human forms into modern humans capable of abstract though process and cognition 300 000 – 30 000 years ago.

Midden: A pile of debris or dump (shellfish, stone artefacts and bone fragments) left by people after they have occupied a place.

Miocene: A geological time period (of 23 million - 5 million years ago).

National Integrated Resource Plan (NIRP): Commissioned by NERSA in response to the National Energy Policy's objective relating to affordable energy services, in order to provide a long-term, cost-effective resource plan for meeting electricity

demand, which is consistent with reliable electricity supply and environmental, social and economic policies.

Natural properties of an ecosystem (*sensu* Convention on Wetlands): Defined in Handbook 1 as the "…physical, biological or chemical components, such as soil, water, plants, animals and nutrients, and the interactions between them". (Ramsar Convention Secretariat. 2004. Ramsar handbooks for the wise use of wetlands. 2nd Edition. Handbook 1. Ramsar Convention Secretariat, Gland, Switzerland.) (see http://www.ramsar.org/).

Palaeontological: Any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.

Pleistocene: A geological time period (of 3 million – 20 000 years ago).

Pliocene: A geological time period (of 5 million – 3 million years ago).

Project development property: The project development area considered through the EIA process in defining the area for the Noupoort CSP Project include, and are defined as follows:

» Project site: The site of the proposed project refers to the Remaining Extent of the Farm 207, Portion 1 and Portion 4 of the Farm Carolus Poort 167.
» Development Area: (900 ha in extent) is a smaller focus area within the project site which has been selected as the best practicable option for the facility, considering technical preference and environmental constraints identified in Scoping. The development area has been subject to detailed assessment in the EIA Phase, and provides the boundary within which the development footprint (900 ha) of the CSP facility will be located, so as to be able to avoid the sensitive areas identified
» Project development footprint: The total development footprint in the development area for the CSP facility, including associated infrastructure will be determined during the EIA phase of the project.

Rare species: Taxa with small world populations that are not at present Endangered or Vulnerable, but are at risk as some unexpected threat could easily cause a critical decline. These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range. This category was termed Critically Rare by Hall and Veldhuis (1985) to distinguish it from the more generally used word "rare".

Red data species: Species listed in terms of the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened

Species, and/or in terms of the South African Red Data list. In terms of the South African Red Data list, species are classified as being extinct, endangered, vulnerable, rare, indeterminate, insufficiently known or not threatened (see other definitions within this glossary).

Significant impact: An impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment.

Sustainable Utilisation (*sensu* Convention on Wetlands): Defined in Handbook 1 as the "human use of a wetland so that it may yield the greatest continuous benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations". (Ramsar Convention Secretariat. 2004. Ramsar handbooks for the wise use of wetlands. 2nd Edition. Handbook 1. Ramsar Convention Secretariat, Gland, Switzerland.) (refer http://www.ramsar.org/).

Structure (historic): Any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith. Protected structures are those which are over 60 years old.

ABBREVIATIONS AND ACRONYMS

BID	Background Information Document
CBOs	Community Based Organisations
CDM	Clean Development Mechanism
CO_2	Carbon dioxide
DEA	National Department of Environmental Affairs
DMR	Department of Mineral Resources
DOT	Department of Transport
DWS	Department of Water and Sanitation
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
GIS	Geographical Information Systems
GG	Government Gazette
GN	Government Notice
GWh	Giga Watt Hour
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IEP	Integrated Energy Planning
km^2	Square kilometres
kV	Kilovolt
m^2	Square meters
m/s	Meters per second
MW	Mega Watt
NEMA	National Environmental Management Act (Act No 107 of 1998)
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act (Act No 25 of 1999)
NGOs	Non-Governmental Organisations
NIRP	National Integrated Resource Planning
NWA	National Water Act (Act No 36 of 1998)
SAHRA	South African Heritage Resources Agency
SANRAL	South African National Roads Agency Limited
SDF	Spatial Development Framework
SIA	Social Impact Assessment
ZVI	Zone of visual influence

INTRODUCTION CHAPTER 1

CRESCO Energy (Pty) Ltd is proposing the construction and operation of a Concentrated Solar Power (CSP) Project and associated infrastructure on the Remaining Extent of the Farm 207, Portion 1 and Portion 4 of the Farm Carolus Poort 167, situated approximately 4 km north west of Noupoort. The proposed project site falls under the jurisdiction of the Umsobomvu Local Municipality and within the greater Pixley ka Seme District Municipality in the Northern Cape Province (refer to **Figure 1.1**). The contracted capacity of the Noupoort CSP Project will be up to 150MW and will be constructed utlising parabolic trough technology over an area of approximately 900ha in extent.

The project is being proposed in response to the requirement for additional electricity generation capacity at a national level and in response to identified objectives of the national and provincial government, and local and district municipalities to develop renewable energy facilities. From a regional perspective, the greater Noupoort area is considered favourable for the development of concentrated solar power generating facilities by virtue of the prevailing climatic conditions (primarily as the economic viability of a concentrated solar power facility is directly dependent on the annual solar irradiation values for a particular area), relief and aspect, the extent of the site, and the availability of a direct grid connection (i.e. point of connection to the Eskom National grid).

It is the developer's intention to bid the Noupoort CSP Project under the Department of Energy's (DoE) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme. The power generated from the Noupoort CSP Project will be sold to Eskom and will feed into the national electricity grid. Ultimately, the project is intended to be a part of the renewable energy projects portfolio for South Africa, as contemplated in the Integrated Resource Plan 2030.

The nature and extent of the Noupoort CSP Project, as well as potential environmental impacts associated with the construction, operation and decommissioning phases are explored in more detail in this Scoping Report.

This Scoping Report consists of the following sections:

» **Chapter 1** provides background to the proposed project and the environmental impact assessment process.
» **Chapter 2** provides the regulatory and planning context for energy projects within South Africa.
» **Chapter 3** describes the activities associated with the project (project scope) and provides insight of the technology.

» **Chapter 4** outlines the process which was followed during the Scoping Phase of the EIA process, including the consultation programme that was undertaken and input received from interested and affected parties.
» **Chapter 5** describes the existing biophysical and socio-economic environment affected by the proposed project.
» **Chapter 6** provides an identification and evaluation of the potential issues associated with the development of the proposed Noupoort CSP Project.
» **Chapter 7** presents the conclusions of the scoping evaluation for the proposed Noupoort CSP Project.
» **Chapter 8** describes the Plan of Study for the EIA phase.
» **Chapter 9** provides references used to compile the Scoping Report.

1.1. Legal Requirements as per the EIA Regulations, 2014

This Scoping report has been prepared in accordance with the requirements of the EIA Regulations published on 08 December 2014 promulgated in terms of Chapter 5 of the National Environmental Management Act (Act No 107 of 1998). This chapter of the scoping report includes the following information required in terms of Appendix 2: Content of the Scoping Report:

Requirement	Relevant Section
(a)(i) the details of the EAP who prepared the report and (ii) the expertise of the EAP to carry out scoping procedures; including a curriculum vitae	The details and expertise of the EAP who has undertaken this scoping report is included in Section 1.4 of the chapter and Appendix A of this scoping report.
(b) the location of the activity, including (i) the 21 digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name and (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties	The location of the proposed Noupoort CSP Project is included in Section 1.2, and within Table 1.1
(c) a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken	A locality map illustrating the proposed site for the development of the project is included under Section 1.2 as Figure 1.1, and in Appendix M of this scoping report.

1.2. Project Overview

The Remaining Extent of the Farm 207, and Portion 1 and Portion 4 of the Farm Carolus Poort 167 has been identified by CRESCO Energy (Pty) Ltd as a suitable site which has the potential for the development of a solar energy facility. The 3 farm portions comprising the identified site are located approximately 4 km north west of the town of Noupoort in the Northern Cape. The project site is accessible via an existing secondary road (referred to as the Wildfontein road) which traverses along the eastern boundary of the site. The development area will occupy an area of up to 900ha within the project site which is approximately 3460ha in extent, therefore allowing sufficient space to avoid any major environmental sensitivities which may be identified within the site. It can therefore be anticipated that the CSP facility and the associated infrastructure can be placed in appropriate positions within the boundaries of the site to avoid identified environmental sensitivities or constraints identified through the EIA process.

The exact location of the project within the farm portions is not explicitly defined at this stage, but will be defined and assessed during the EIA Phase. Therefore, the full extent of the broader farm portions identified as the Remaining Extent of the Farm 207, Portion 1 and Portion 4 of the Farm Carolus Poort 167, and referred to as the project site, has been considered within this Scoping Report. On the basis of the findings of the Scoping Study, the CSP facility and associated infrastructure can be appropriately designed and sited taking environmental and any other identified constraints into consideration.

Table 1.1: A detailed description of the project

Province	Northern Cape Province
District Municipality	Pixley ka Seme District Municipality
Local Municipality	Umsobomvu Local Municipality
Ward number(s)	1
Nearest town(s)	Noupoort, Middleburg, Hanover, and Colesberg
Farm name(s) and number(s)	Farm 207 and Carolus Poort 167
Portion number(s)	Remaining Extent of Farm 207; Portion 1 of Carolus Poort 167; and Portion 4 of Carolus Poort 167.
SG 21 Digit Code (s)	C02100000000020700000
	C02100000000016700001
	C02100000000016700004
Current zoning	Zoned Special: Solar (Remaining Extent of Farm 207, Portion 1 and Portion 4 of Farm Carolus Poort 167)
Site Coordinates (centre of	31° 9'8.99"S 24°54'20.81"E

project site)

The proposed project will utilise sun to steam technology (i.e. concentrated solar power or CSP technology) with a heat collection system (solar field comprising rows of parabolic troughs) and an Energy Centre (where the heat from the solar field is initially stored before it is released as steam directly into the turbine inlet). Concentrated Solar Power (CSP) parabolic trough technology uses thousands of mirrors to reflect and concentrate sunlight onto an absorber tube (containing heat transfer fluid) to generate heat, which in turn is used to turn a turbine and generate electricity. The heat transfer (HTF) fluid to be used at the Noupoort CSP project is water. The project will have a contracted capacity of up to 150MW and will include the following infrastructure:

» Solar collector field comprising of all systems and infrastructure related to the control and operation of the parabolic troughs;
» Energy Centre, comprising of the storage media and heat exchanger;
» Power Block, consisting of the steam turbine and generator, as well as the air-cooled condenser and associated feedwater system;
» On-site project substation;
» A new 132kV power line to connect the on-site substation to the Eskom's electricity grid;
» Access roads and fencing around the development area;
» Lined evaporation ponds;
» Gas boiler for the start-up process of the facility;
» Water supply pipeline;
» On-site water storage tanks/reservoirs;
» Water treatment facility;
» Plant assembly facility;
» Offices and workshop areas for maintenance and storage; and
» Temporary laydown areas.

The overarching objective for the Noupoort CSP Project is to maximise electricity production through exposure to the solar resource, while minimising infrastructure, operational and maintenance costs, as well as social and environmental impacts. In order to meet these objectives, local level environmental and planning issues will be assessed through the EIA process, through site-specific studies in order to delineate areas of sensitivity within the broader site. This will serve to inform and optimise the design of the project. It is anticipated that the CSP facility and associated infrastructure can be appropriately placed within the boundaries of the broader site to avoid identified environmental sensitivities or constraints which will be identified through the EIA process.

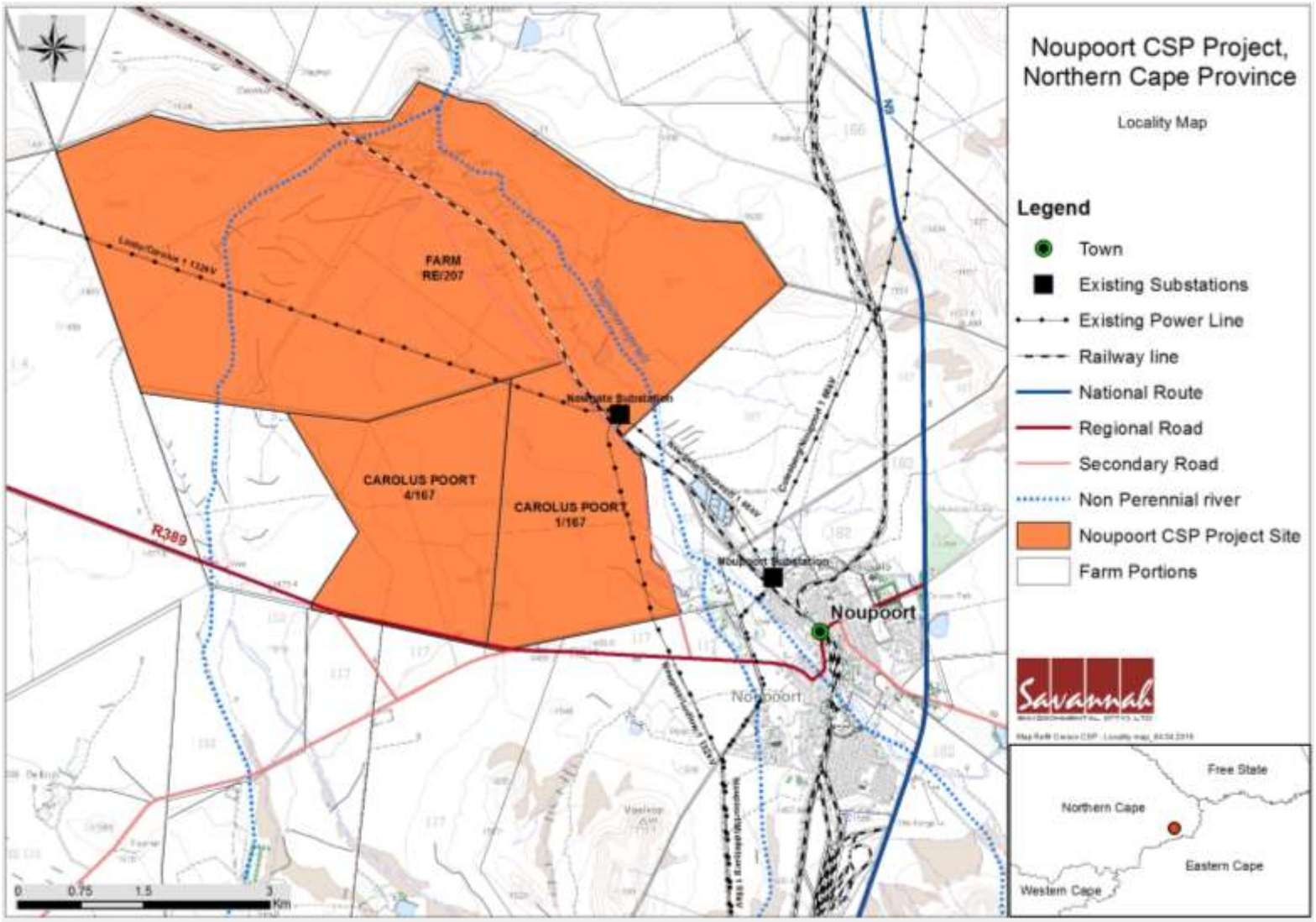

Figure 1.1: Locality map illustrating the location of the Noupoort CSP facility site on the Remaining Extent of the Farm 207, Portion 1 and Portion 4 of the Farm Carolus Poort 167 (refer to **Appendix M** for A3 map).

1.3. Requirement for an Environmental Impact Assessment Process

The construction and operation of the proposed Noupoort CSP Project is subject to the requirements of the EIA Regulations published in terms of Section 24(5) of the National Environmental Management Act (NEMA) 107 of 1998. This section provides a brief overview of the EIA Regulations and their application to this project.

NEMA is the national legislation that provides for the authorisation of 'listed activities'. In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these activities must be considered, investigated, assessed and reported on to the competent authority that has been charged by NEMA with the responsibility of granting environmental authorisations. As this is a proposed electricity generation project and thereby considered to be of national importance, the National Department of Environmental Affairs (DEA) is the competent authority[1] and the Northern Cape Department of Environment and Nature Conservation (DENC) will act as a commenting authority.

The need to comply with the requirements of the EIA Regulations ensures that the competent authority is provided with the opportunity to consider the potential environmental impacts of a project early in the project development process and to assess if potential environmental impacts can be avoided, minimised or mitigated to acceptable levels. Comprehensive, independent environmental specialist studies are required in accordance with the EIA Regulations to provide the competent authority with sufficient information in order to make an informed decision. CRESCO Energy (Pty) Ltd has appointed Savannah Environmental as the independent environmental consulting company to conduct an EIA process for the proposed project.

An EIA is an effective planning and decision-making tool for the project developer as it allows for the identification and management of potential environmental impacts. It provides the opportunity for the developer to be forewarned of potential environmental issues, and allows for resolution of the issues reported on in the Scoping and EIA Reports as well as dialogue with interested and affected parties (I&APs).

The EIA process comprises two phases – i.e. Scoping and Impact Assessment - and involves the identification and assessment of environmental impacts though specialist studies, as well as public participation. The process followed in these two phases is as follows:

[1] In terms of the Energy Response Plan, the DEA is the competent authority for all energy related applications.

» The **Scoping Phase** includes the identification of potential issues associated with the proposed project through desktop studies (considering existing information), limited field work, and consultation with affected parties and key stakeholders. This phase considers the broader site in order to identify and delineate any environmental fatal flaws, no-go or sensitive areas. Following a 30-day review period of the report, this phase culminates in the submission of a final Scoping Report and Plan of Study for EIA to the competent authority for acceptance.
» The **EIA Phase** involves a detailed assessment of potentially significant positive and negative impacts (direct, indirect, and cumulative) identified in the Scoping Phase. This phase considers a proposed development footprint and includes detailed specialist investigations and public consultation. Following a 30-day review period of the EIA report, this phase culminates in the submission of a final EIA Report and an Environmental Management Programme (EMPr), including recommendations of practical and achievable mitigation and management measures, to the competent authority for review and decision-making.

1.4 Details of the Environmental Assessment Practitioner

Savannah Environmental was contracted by CRESCO Energy (Pty) Ltd as the independent environmental consulting company to undertake Scoping and the required EIA process for the proposed project. Neither Savannah Environmental nor any of its specialist sub-consultants on this project are subsidiaries of or are affiliated to CRESCO Energy (Pty) Ltd. Furthermore, Savannah Environmental does not have any interests in secondary developments that may arise out of the authorisation of the proposed project.

Savannah Environmental is a specialist environmental consulting company providing holistic environmental management services, including environmental impact assessments and planning to ensure compliance and evaluate the risk of development; and the development and implementation of environmental management tools. Savannah Environmental benefits from the pooled resources, diverse skills and experience in the environmental field held by its team.

The Savannah Environmental team has considerable experience in environmental impact assessments and environmental management, and have been actively involved in undertaking environmental studies, for a wide variety of projects throughout South Africa, including those associated with electricity generation.

» *Thalita Botha*, the principle author of this report holds a BSc degree with Honours in Environmental Management. Her key focus is on environmental impact assessments, public participation, environmental management plans and programmes.

» *Gabriele Wood* holds an Honours Degree in Anthropology. She has 8 years of consulting experience in public participation and social research. Her experience includes the design and implementation of public participation programmes and stakeholder management strategies for numerous integrated development planning and infrastructure projects. Her work focuses on managing the public participation component of Environmental Impact Assessments and Basic Assessments undertaken by Savannah Environmental.
» *Karen Jodas* is a registered Professional Natural Scientist and holds a Master of Science degree and is the registered EAP on the proposed project. She has 20 years of experience consulting in the environmental field. Her key focus is on strategic environmental assessment and advice; management and co-ordination of environmental projects, which includes integration of environmental studies and environmental processes into larger engineering-based projects and ensuring compliance to legislation and guidelines; compliance reporting; the identification of environmental management solutions and mitigation/risk minimising measures; and strategy and guideline development. She is currently responsible for the project management of EIAs for several renewable energy projects across the country.
» *Candice Hunter* is a social specialist with a Master's degree in Environmental Management and an advanced certificate in Social Impact Assessments (SIA). She has over 2 years of experience as a social consultant. Specific experience lies in field social research; the management and analysis of socio-economic baseline data; policy and programme analysis, undertaking stakeholder engagement; and conducting general social research for a variety of projects. Her expertise lie in the field of social impact assessments specifically within the Northern Cape, with significant experience in social consulting and report writing.

In order to adequately identify and assess potential environmental impacts associated with the proposed project, Savannah Environmental has included the following sub-contracted specialist consultants to conduct specialist assessments:

» Ecology (Flora and Fauna) – Gerhard Botha of Eco-care Consultancy
» Avifauna – Dr Johan van Niekerk (Independent Ornithologist)
» Soils and Agricultural Potential – Garry Paterson of the Agricultural Research Council (ARC)
» Heritage - Jaco van der Walt of Heritage Contracts and Archaeological Consulting cc (HCAC)
» Palaeontology – Elize Butler of the Bloemfontein National Museum
» Visual – Jon Marshall of Afzelia Environmental Consultants & Environmental Planning and Design

Appendix A includes the curricula vitae for the environmental assessment practitioners from Savannah Environmental and the specialist consultants.

REGULATORY AND PLANNING CONTEXT CHAPTER 2

This chapter of the scoping report includes the following information required in terms of Appendix 2 of the Environmental Impact Assessment Process of the EIA Regulations, 2014:

Requirement	Relevant Section
(e) a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process	Legislation, policies, plans, guidelines, municipal development planning frameworks and instruments associated and considered with the development of the Project are included within Section 2.2 and Table 2.1.

2.1. Strategic Electricity Planning in South Africa

The need to expand electricity generation capacity in South Africa is based on national policy and is informed by on-going strategic planning undertaken by the Department of Energy (DoE). The hierarchy of policy and planning documentation that support the development of renewable energy projects such as the Noupoort CSP Project is illustrated in **Figure 2.1**. These policies are discussed in more detail in the following sections, along with the provincial and local policies or plans that have relevance to the development of the proposed Noupoort CSP Project.

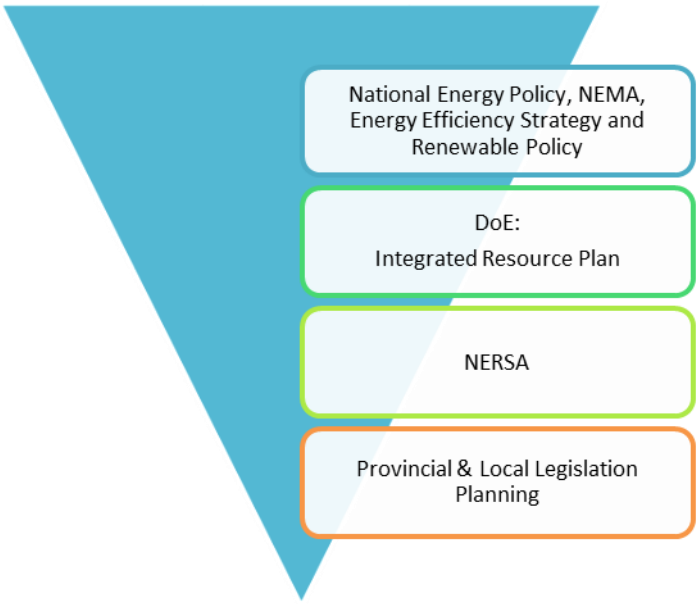

Figure 2.1: Hierarchy of electricity policy and planning documents

The regulatory hierarchy for an energy generation project of this nature consists of three tiers of authority who exercise control through both statutory and non-statutory instruments – that is National, Provincial and Local levels.

At **National Level**, the main regulatory agencies are:

» *Department of Energy (DoE)*: This Department is responsible for policy relating to all energy forms, including renewable energy, and is responsible for forming and approving the IRP (Integrated Resource Plan for Electricity).
» *National Energy Regulator of South Africa (NERSA):* This body is responsible for regulating all aspects of the electricity sector, and will ultimately issue licenses for renewable energy developments to generate electricity.
» *Department of Environmental Affairs (DEA):* This Department is responsible for environmental policy and is the controlling authority in terms of NEMA and the EIA Regulations. The DEA is the competent authority for this project, and charged with granting the relevant environmental authorisation.
» *The South African Heritage Resources Agency (SAHRA):* SAHRA is a statutory organisation established under the National Heritage Resources Act, No 25 of 1999, as the national administrative body responsible for the protection of South Africa's cultural heritage.
» *Department of Transport – South African Civil Aviation Authority (SACAA):* This Department is responsible for aircraft movements and radar, which are aspects that influence renewable energy development location and planning.
» *South African National Roads Agency Limited (SANRAL):* This Agency is responsible for the regulation and maintenance of all national routes.
» *Department of Water and Sanitation (DWS):* This Department is responsible for water resource protection, water use licensing and permits.
» *The Department of Agriculture, Forestry and Fisheries (DAFF):* This Department is the custodian of South Africa's agriculture, fisheries and forestry resources and is primarily responsible for the formulation and implementation of policies governing the Agriculture, Forestry and Fisheries Sector. This Department is also responsible for the issuing of permits for impacts on protected tree species.
» *The Department of Science and Technology:* This Department is the administrating authority for the Astronomy Geographical Advantage Act (Act 21 of 2007).

At **Provincial Level**, the main regulatory agencies are:

» *Provincial Government of the Northern Cape – Department of Environment and Nature Conservation (Northern Cape DENC).* This Department is the commenting authority for this project as well as being responsible for issuing of other biodiversity and conservation-related permits.

» *Department of Transport and Public Works - Northern Cape:* This Department is responsible for roads and the granting of exemption permits for the conveyance of abnormal loads on public roads.
» *Northern Cape Department of Agriculture and Rural Development:* This is the provincial authority responsible for matters affecting agricultural land.
» *Ngwao Boswa ya Kapa Bokone (Northern Cape Heritage Authority):* This body is responsible for commenting on heritage related issues in the Northern Cape Province.

At **Local Level** the local and municipal authorities are the principal regulatory authorities responsible for planning, land use and the environment. In the Northern Cape, the Umsobomvu Local Municipality and the Pixley ka Seme District Municipality play a role.

» In terms of the Municipal Systems Act (Act No 32 of 2000) it is compulsory for all municipalities to go through an Integrated Development Planning (IDP) process to prepare a five-year strategic development plan for the area under their control.

2.2 National Policy and Planning

Further to the South African government's commitment in August 2011 to support the development of 3,725MW of renewable energy capacity, the Department of Energy ("DoE") initiated the Renewable Energy Independent Power Producer Procurement (REIPPPP) Programme to procure renewable energy from the private sector in a series of rounds. To date, the DoE has procured more than 6 000MW of renewable energy capacity from 92 independent producers, with 37 having started commercial operation, adding 1,860MW to the grid.

2.2.1 The Kyoto Protocol, 1997

Currently, South Africa's electricity is mainly generated from coal-based technologies. South Africa accounts for ~38 % of Africa's CO_2 (a greenhouse gas contributing to climate change) from burning of fossil fuels and industrial processes. The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change. South Africa ratified the Kyoto Protocol in 2002. The Kyoto Protocol requires developing countries to reduce its greenhouse gas emissions through actively cutting down on using fossil fuels, or by utilising more renewable resources. Therefore certain guidelines and policies (discussed further in the sections below) were put in place for the Government's plans to reduce greenhouse gas emissions. The development of renewable energy projects (such as the proposed Noupoort CSP Project) is therefore in line with South Africa's international obligations in terms of the Kyoto

Protocol. A second commitment period commenced from 1 January 2013, and extends to 31 December 2020.

2.2.2. United Nations Framework Convention on Climate Change and COP21 – Paris Agreement

Climate change is one of the major global challenges of the 21st century that require global response. The adverse impacts of climate change include persistent drought and extreme weather events, rising sea levels, coastal erosion and ocean acidification, further threatening food security, water, energy and health, and more broadly efforts to eradicate poverty and achieving sustainable development. Combating climate change would require substantial and sustained reductions in greenhouse gas emissions (GHGs), which, together with adaptation, can limit climate change risks. The convention responsible for dealing with climate change is called United Nations Framework Convention on Climate Change (UNFCCC).

The UNFCCC was adopted in 1992 and entered into force in 1994. It provides the overall global policy framework for addressing the climate change issue and marks the first international political response to climate change. The UNFCCC sets out a framework for action aimed at stabilising atmospheric concentrations of greenhouse gases to avoid dangerous anthropogenic interference with the climate system.

The Convention has established a variety of arrangements to govern, co-ordinate and provide for oversight of the arrangements. The oversight bodies take decisions, provide regular guidance, and keep the arrangements under regular review in order to enhance and ensure their effectiveness and efficiency. The Conference of Parties (COP), established by Article 7 of the Convention, is the supreme body and highest decision-making organ of the Convention. It reviews the implementation of the Convention and any related legal instruments, and takes decisions to promote the effective implementation of the Convention.

COP 21 was held in Paris from 30 November to 12 December 2015. From this conference, an agreement to tackle global warming was reached between 195 countries. This Agreement shall be open for signature and subject to ratification, acceptance or approval by States and regional economic integration organisations that are Parties to the Convention from 22 April 2016 to 21 April 2017. Thereafter, this Agreement shall be open for accession from the day following the date on which it is closed for signature. The agreement can only enter into force once it has been ratified by 55 countries, representing at least 55% of emissions.

This Agreement, in enhancing the implementation of the Convention, including its objective, aims to strengthen the global response to the threat of climate change,

in the context of sustainable development and efforts to eradicate poverty, including by:

(a) Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognising that this would significantly reduce the risks and impacts of climate change;
(b) Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production;
(c) Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.

In order to achieve the long-term temperature goal set out in Article 2 of the Agreement, Parties aim to reach global peaking of greenhouse gas emissions as soon as possible, recognising that peaking will take longer for developing country Parties, and to undertake rapid reductions thereafter in accordance with best available science, so as to achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century, on the basis of equity, and in the context of sustainable development and efforts to eradicate poverty.

In working towards this goal, advanced economies have already included renewables in their energy mix and have planned to increase their use in order to meet their mitigation goals: Japan aims to derive 22-24% of its electricity production from renewable sources by 2030 and the European Union plans for them to reach 27% of its final energy consumption. Developing countries are also playing their part, including South Africa which has included a goal of 17,8GW of renewables by 2030 within the IRP.

South Africa supports the adoption of the Paris Agreement and will be required to communicate a nationally determined contribution to the global response to climate change every five years from 2020.

2.2.3 White Paper on the Renewable Energy Policy of the Republic of South Africa (2003)

The White Paper on Renewable Energy Policy supplements the Government's overarching policy on energy as set out in its White Paper on the Energy Policy of the Republic of South Africa (DME, 1998). The White Paper on Renewable Energy Policy recognises the significance of the medium and long-term potential of renewable energy. The main aim of the policy is to create the conditions for the development and commercial implementation of renewable technologies. The

position of the White Paper on Renewable Energy is based on the integrated resource planning criterion of:

> *"Ensuring that an equitable level of national resources is invested in renewable technologies, given their potential and compared to investments in other energy supply options."*

The White Paper on Renewable Energy sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa. It also informs the public and the international community of the Government's vision, and how the Government intends to achieve these objectives; and informs Government agencies and organs of their roles in achieving the objectives.

South Africa relies heavily on coal to meet its energy needs because it is well-endowed with coal resources in particular. However, South Africa is endowed with renewable energy resources that can be sustainable alternatives to fossil fuels, but which have so far remained largely untapped. This White Paper fosters the uptake of renewable energy in the economy and has a number of objectives that include:

- » ensuring that equitable resources are invested in renewable technologies;
- » directing public resources for implementation of renewable energy technologies;
- » introducing suitable fiscal incentives for renewable energy and;
- » creating an investment climate for the development of renewable energy sector.

The objectives of the White Paper are considered in six focal areas, namely: financial instruments, legal instruments, technology development, awareness raising, capacity building and education, and market based instruments and regulatory instruments. The policy supports the investment in renewable energy facilities as they contribute towards ensuring energy security through the diversification of energy supply, reducing GHG emissions and the promotion of renewable energy sources.

The White Paper set a target of 10 000GWh to be generated from renewable energy by 2013. The target was reviewed during the renewable energy summit of 2009 held in Pretoria. The summit raised the issue over the slow implementation of renewable energy projects and the risks to the South African economy of committing national investments in the energy infrastructure to coal technologies. Other matters that were raised include potential large scale roll out of solar water heaters and enlistment of Independent Power Producers to contribute to the diversification of the energy mix.

2.2.4 The National Energy Act (34 of 2008)

One of the objectives of the National Energy Act is to promote diversity of supply of energy and its sources. In this regard, the preamble makes direct reference to renewable resources, including solar:

> *"To ensure that diverse energy resources are available, in sustainable quantities, and at affordable prices, to the South African economy, in support of economic growth and poverty alleviation, taking into account environmental management requirements; to provide for increased generation and consumption of renewable energies (Preamble)."*

The National Energy Act aims to ensure that diverse energy resources are available, in sustainable quantities and at affordable prices, to the South African economy in support of economic growth and poverty alleviation, taking into account environmental management requirements and interactions amongst economic sectors, as well as matters relating to renewable energy. The Act provides the legal framework which supports the development of renewable energy facilities for the greater environmental and social good.

2.2.5 The Electricity Regulation Act, 2006 (Act No. 4 of 2006), as amended

The Electricity Regulation Act, 2006, replaced the Electricity Act, 1987 (Act No. 41 of 1987), as amended, with the exception of Section 5B, which provides for the funds for the energy regulator for the purpose of regulating the electricity industry. The Act establishes a national regulatory framework for the electricity supply industry and introduces the National Energy Regulator as the custodian and enforcer of the National Electricity Regulatory Framework. The Act also provides for licences and registration as the manner in which generation, transmission, distribution, trading and the import and export of electricity are regulated.

2.2.6 Renewable Energy Policy in South Africa

Internationally there is increasing development of the use of renewable technologies for the generation of electricity due to concerns such as climate change and exploitation of resources. In response, the South African government ratified the United Nations Framework Convention on Climate Change (UNFCCC) in August 1997 and acceded to the Kyoto Protocol, the enabling mechanism for the convention, in August 2002. In addition, national response strategies have been developed for both climate change and renewable energy.

Investment in renewable energy initiatives, such as the proposed Noupoort CSP Project, is supported by the National Energy Policy (DME, 1998). This policy recognises that renewable energy applications have specific characteristics which need to be considered. The Energy Policy is "*based on the understanding that renewables are energy sources in their own right, and are not limited to small-scale and remote applications, and have significant medium- and long-term commercial potential*". In addition, the National Energy Policy states that "*Renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future*".

The support for the Renewable Energy Policy is guided by a rationale that South Africa has a very attractive range of renewable resources, particularly solar and wind, and that renewable applications are, in fact, the least cost energy service in many cases from a fuel resource perspective (i.e. the cost of fuel in generating electricity from such technology); more so when social and environmental costs are taken into account. In spite of this range of resources, the National Energy Policy acknowledges that the development and implementation of renewable energy applications has been neglected in South Africa.

Government policy on renewable energy is therefore concerned with meeting the following challenges:

» Ensuring that economically feasible technologies and applications are implemented;
» Ensuring that an equitable level of national resources is invested in renewable technologies, given their potential and compared to investments in other energy supply options; and
» Addressing constraints on the development of the renewable industry.

2.2.7 National Development Plan

The National Development Plan (NDP) contains a plan aimed at eliminating poverty and reducing inequality by 2030. The NDP identifies 9 key challenges and associated remedial plans. Managing the transition towards a low carbon national economy is identified as one of the 9 key national challenges. Expansion and acceleration of commercial renewable energy is identified as a key intervention strategy.

The proposed project will support many of the objectives of the National Development Plan (NDP). Some of these objectives are listed below:

» Create 11 million jobs by 2030; and
» Procuring about 20 000MW of renewable electricity by 2030.

Infrastructure is a key priority of the NDP, which identifies the need for South Africa to invest in a strong network of economic infrastructure to support the country's medium- and long-term economic and social objectives. The NDP has been approved and adopted by government and has received strong endorsement from broader society. The plan sets out steps that aim to ensure that, in 20 years, South Africa's energy system looks very different to the current situation: coal will contribute proportionately less to primary-energy needs, while gas and renewable energy resources – especially wind, solar and imported hydroelectricity – will play a much larger role.

2.2.8 Integrated Energy Plan

The development of a national Integrated Energy Plan (IEP) was envisaged in the White Paper on Energy Policy of 1998 and the Minister of Energy, as entrenched in the National Energy Act of 2008, is mandated to develop and publish the IEP on an annual basis. The IEP takes existing policy into consideration and provides a roadmap of the future energy landscape for South Africa which guides future energy infrastructure investments and policy development.

The IEP takes into consideration the crucial role that energy plays in the entire economy of the country and is informed by the output of analyses founded on a solid fact base. It is a multi-faceted, long-term energy framework which has multiple aims, some of which include:

» To guide the development of energy policies and, where relevant, set the framework for regulations in the energy sector.
» To guide the selection of appropriate technologies to meet energy demand (i.e. the types and sizes of new power plants and refineries to be built and the prices that should be charged for fuels).
» To guide investment in and the development of energy infrastructure in South Africa.
» To propose alternative energy strategies which are informed by testing the potential impacts of various factors such as proposed policies, introduction of new technologies, and effects of exogenous macro-economic factors.

Eight key objectives for energy planning were identified:

» Objective 1: Ensure the security of supply
» Objective 2: Minimise the cost of energy
» Objective 3: Increase access to energy
» Objective 4: Diversify supply sources and primary sources of energy
» Objective 5: Minimise emissions from the energy sector
» Objective 6: Promote energy efficiency in the economy

» Objective 7: Promote localisation and technology transfer and the creation of jobs
» Objective 8: Promote the conservation of water

The IEP recognises the potential of renewable energy for power generation.

2.2.9 Final Integrated Resource Plan 2010 - 2030

The Integrated Resource Plan (IRP) 2010-30 was promulgated in March 2011. The primary objective of the IRP 2010 is to determine the long term electricity demand and detail how this demand should be met in terms of generating capacity, type, timing and cost. However, the IRP 2010 also serves as input to other planning functions, *inter alia* economic development, and funding, environmental and social policy formulation. The accuracy of the IRP 2010 is to be improved by regular reviews and updates, and a draft revised Plan is currently available for public comment. The IRP 2010 projected that an additional capacity of up to 56 539MW of generation capacity will be required to support the country's economic development and ensure adequate reserves over the next twenty years. The required expansion is more than two times the size of the existing capacity of the system.

The current iteration of the Integrated Resource Plan (IRP) for South Africa, initiated by the Department of Energy (DoE) after a first round of public participation in June 2010, led to the Revised Balanced Scenario (RBS) that was published in October 2010. The document outlines the proposed generation new build fleet for South Africa for the period 2010 to 2030. This scenario was derived based on the cost-optimal solution for new build options (considering the direct costs of new build power plants), which was then "balanced" in accordance with qualitative measures such as local job creation. In addition to all existing and committed power plants, the RBS included a nuclear fleet of 9.6 GW; 6.3 GW of coal; 17.8 GW of renewables (including wind and solar); and 8.9 GW of other generation sources. This means that 75% of new generation capacity by 2030 will be derived from energy sources other than coal.

2.2.10 Strategic Integrated Projects (SIPs)

The South African Government adopted a National Infrastructure Plan in 2012 with the objective that government aims to transform South Africa's economic landscape while simultaneously creating significant numbers of new jobs, and strengthening the delivery of basic services. The plan also supports the integration of African economies. Socio-economic issues identified within the National Development Plan were placed under 18 different Strategic Integrated Projects (SIPs) to address the spatial imbalances of the past by addressing the needs of the poorer provinces and enabling socio-economic development. The

SIPs cover social and economic infrastructure across all nine provinces (with an emphasis on lagging regions). The SIPs include catalytic projects that can fast-track development and growth.

Amongst these is SIP 8 - *Green energy in support of the South African economy).* This SIP aims at supporting sustainable green energy initiatives on national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP, 2010). The proposed Noupoort CSP Project falls within the ambit of this SIP.

2.3 Provincial and Local Level Developmental Policy

2.3.1 Northern Cape Provincial Growth and Development Strategy (PGDS) (2011)

The Northern Cape Provincial Growth and Development Strategy (PGDS) sets the tone for development planning and outlines the strategic planning direction in the province. Planning for the promotion of economic growth and social development lies at the core of the Government's responsibility to provide a better life for the nation. It is essential to ensure that planning is integrated across disciplines, coordinated within and between different planning jurisdictions and aligned with the budgeting processes of national, provincial and local government. The core purpose of the Northern Cape PGDS is to enable stakeholders from public and private sectors, together with labour and civil society, to determine a plan for sustainable growth and development of the Northern Cape. The main objectives set by the Northern Cape PGDS for development planning in the province are as follows:

» Promoting growth, diversification and transformation of the provincial economy
» Poverty reduction through social development
» Developing requisite levels of human and social capital
» Improving the efficiency and effectiveness of governance and other development institutions
» Enhancing infrastructure for economic growth and social development

The Northern Cape PGDS aims at building a prosperous, sustainable, growing provincial economy to eradicate poverty and improve social development. The proposed solar energy facility will contribute to growth and development of the province by expanding the economic base, diversifying the economy and creating employment opportunities, which will contribute towards reducing poverty.

2.3.2 Northern Cape Provincial Local Economic Development (LED) Strategy (2009)

The Northern Cape Local Economic Development (LED) strategy is intended to build a shared understanding of LED in the province and put into context the role of local economies in the provincial economy. It seeks to mobilise local people and local resources in an effort to fight poverty. The Northern Cape LED strategy investigated the options and opportunities available to broaden the local economic base of the province in order to promote the creation of employment opportunities and the resultant spin-off effects throughout the local economy. Areas of opportunity include:

» Livestock products
» Game farming
» Horticulture
» Agriculture
» Ago-related industries
» Tourism
» Manganese and iron Ore
» Beneficiation of minerals
» Renewable energy

The purpose of the LED is to build up the economic capacity of a local area to improve its economic future and quality of life for all. The LED provides local municipalities with leadership and direction in policy making, in order to administer policy, programmes and projects, and to be the main initiator of economic development programmes through public spending. It is noted in the LED that renewable energy is an area of opportunity to broaden the local economic base and promote the creation of employment opportunities as well as local economy spin-off effects.

2.3.3 Northern Cape Provincial Development and Resource Management Plan / Provincial Spatial Development Framework (PSDF) (2012)

As part of the development planning process that underlies the formulation of the Northern Cape Provincial Spatial Development Framework (PSDF). The PSDF not only gives effect to national spatial development priorities but it also sets out a series of provincial, district and local development priorities for the space economy of the Northern Cape.

The Northern Cape PSDF is premised upon and gives effect to the following five strategic objectives of the National Strategy for Sustainable Development (NSSD 2011-2014):

» Enhancing systems for integrated planning and implementation

» Sustaining our ecosystems and using natural resources efficiently
» Towards green economy
» Building sustainable communities
» Responding effectively to climate change

The PSDF makes reference to the need to ensure the availability of energy. Under the economic development profile of the Northern Cape PSDF, the White Paper on Renewable Energy Policy (2003) discussed a target of 10 000GWh of energy to be produced from renewable energy sources. It was also stated that the total area of high radiation in South Africa amounts to approximately 194 000km^2, of which the majority falls within the Northern Cape. It is estimated that, if the electricity production per km^2 of mirror surface in solar thermal power stations were 30.2MW and only 1% of the area of high radiation were available for solar generation, then generation potential would equate to approximately 64GW. A mere 1.25% of the area of high radiation could therefore meet projected South African electricity demand in 2025 (80GW). It was also stated in the Northern Cape PSDF that the implementation of large CSP facilities have been proposed as one of the main contributors to reducing greenhouse gas emission in South Africa. The Northern Cape PSDF also discusses economic development and that it typically responds to the availability of environmental capital (e.g. water, suitable agricultural soil, mining resources etc.) and infrastructural capital (e.g. roads, electricity, bulk engineering services etc.); over time this has resulted in the distinct development regions and corridors. One of the policies in the NC PSDF is for renewable energy sources (e.g. wind, solar, biomass, and domestic hydro-electricity generation) to comprise 25% of the Province's energy capacity by 2020. Therefore, the proposed project will assist in contributing to the Province's renewable energy target. The Northern Cape PSDF also discusses economic development and that it typically responds to the availability of environmental capital (e.g. water, suitable agricultural soil, mining resources etc.) and infrastructural capital (e.g. roads, electricity, bulk engineering services etc.). One of the policies in the NC PSDF is for renewable energy sources (e.g. wind, solar, biomass, and domestic hydro-electricity generation) to comprise 25% of the Province's energy capacity by 2020. Therefore, the proposed Noupoort CSP project will assist in contributing to the province's renewable energy capacity.

2.4 District and Local Authority Level Developmental Policy

These strategic policies at the district and local level have similar objectives for the respective areas, namely to accelerate economic growth, create jobs, uplift communities and alleviate poverty. The proposed development is considered to align with the aims of these policies, even if contributions to achieving the goals therein are only minor.

2.4.1 Pixley ka Seme District Municipality Integrated Development Plan (IDP) (2012-2016)

The vision for the PKSDM as set out in the IDP is to commit to "commit to be developed municipality where the quality of life for all people in the district will be improved." In terms of the mission statement, the PKSDM sets out to achieve:

» Efficient service delivery
» Optimal human and natural resource development
» Local economic growth and development, job creation and poverty alleviation
» A vibrant tourism industry and
» A safe, secure and community friendly environment

Key development challenges identified for the PKSDM most likely to have a fundamental effect on the long-term economic viability of the district include:

» Optimising on the opportunities presented by the regions geo-political location between Cape Town, Bloemfontein, Johannesburg and Pretoria, which are among the most important cities in South Africa;
» Optimising on the opportunities presented by the N1, N12, N9 and N10 corridors, which already transport many tourists, good and services throughout the year through the region;
» The potential opportunities of the proposed renewable energy hub in the region;
» The HIV/AIDS pandemic and its impact on regional demographics;
» Management of investor risk, and where necessary, direct intervention in order to attract international capital;
» The maintenance and preservation of pristine environment; and
» High levels of unemployment and poverty (PKSDM; 2012: 110).

Key objectives and strategies of relevance to the proposed project include:

LED, Tourism and Poverty Alleviation:
Key identified challenges include high levels of poverty and low skills levels; and a relatively undiversified economy, relying mainly on primary sector activities. Key interventions would include promoting SMMEs; attracting and retaining investors in the region; development of identified development corridors; value-adding to/beneficiation of local produce; and the promotion of tourism development. Policies/targets aimed at addressing these challenges include:
» LED 1: Promote Local Economic Development (LED) in the region;
» LED 2: Increase SMME promotion;
» LED 6: Reduce employment and poverty by 50% each, respectively in the region by 2014.

HIV/ AIDS:

Key identified challenges include low awareness levels, inadequate health care facilities, including a lack of trained professionals, mobile clinics, a hospice, etc.

» Policy HIV 1 focuses on reducing the level HIV/AIDS infections amongst young men and women in the District.

Education, Youth and development:

Key identified challenges include limited or no access to higher learner institutions; lack of IT skills in the region; poor qualification and skills of the community limiting their entry to institutions of higher learning; very few training facilities in the region; and a lack of funds available to the majority of learners.

» Policy Y1 focuses on improving the well-being of young men and women, including improving access to vocational training (Y1.2).

Safety and security:

Key identified challenges include high endemic levels of family and child abuse; and high levels of alcohol abuse.

» Policy SS1 provides for the promotion of a safe and secure environment in the District.

Renewable Energy Hub:

The PKSDM convened a conference on investment and renewable energy which was held from the 14th to the 16th of September 2010. The intention of the conference was to provide insight around virgin opportunities that could be exploited in key sectors of the district economy, namely: mining, tourism, manufacturing, retail, agriculture and agro-processing and also in the renewable energy sector, namely: solar, wind, hydro, biomass, bio-digestion and geo-thermal development. The investment and renewable conference took resolutions on matters including Infrastructure development and rural industrialization and development zones. The PKSDM is currently actively promoting itself as renewable energy hub, and hopes to become the national solar hub. It is hoped that the development of multiple solar energy facilities in the PKSDM would create sufficient critical mass to support the development of local solar-related manufacturing and servicing industry, and potentially even the establishment of a renewables related vocational training centre. Spatially, the concentration of renewable facilities is envisaged in the De Aar area, but also including Prieska, Hanover and Noupoort (where this proposed project is located). Unlike the Gariep/ Orange River valley located to the north (mooted as "Karoo riviera"), the Noupoort area is not considered visually/ tourist sensitive.

The proposed Noupoort CSP project will contribute towards the LED targets in terms of creating employment opportunities in the area, promoting LED in the region, increasing the skills capacity of local community members and stimulating economic growth through local procurement. It is important that benefits from

the proposed development are enhanced for the local area. It is crucial that a minimal number outside workers are brought into the area, to avoid increasing HIV/AIDS and safety and security issues. Overall the project will provide positive benefits in line with PKSDM IDP and the IDP has identified renewable developments - and solar in particular – as a key local economic growth and development strategy, with potential spinoffs in terms of direct long term employment creation, and major potential cumulative downstream benefits in terms of local investment, manufacturing and spending, as well as local tertiary vocational training.

2.4.2 Umsobomvu Local Municipality Integrated Development Plan (IDP) (2012-2017) (2015-2016 review)

The IDP document represents the third review of Umsobomvu Local Municipality IDP for the current five-year local government planning and implementation time-frame, i.e. 2012 - 2017 and considers the 2015/2016 budget cycle. The IDP is regarded as the single most important strategic document of the municipality and consolidates all municipal strategies and documents. The current vision of the Umsobomvu Local Municipality is *"to be the Fastest Economically Developing Municipality in South Africa".* The mission of the ULM is to *"serve the community by delivering quality services and customer care through dedicated staff for the upliftment of the community socially and economically*."

The Umsobomvu Local Municipality IDP indicates that the most critical challenge facing the Municipality is the reduction of poverty. The other challenges that need to be addressed include:

» Ensuring that all citizens have access to basic services such as water, sanitation, electricity and housing;
» Increasing access to services in education, health and social services;
» Stabilising and decreasing the rate of HIV and AIDS infection, tuberculosis etc.;
» Reduction in the rate of crime;
» Economic empowerment;
» The shortage of critical skills;
» Improving skills of the labour force etc.
» Targeting special groups e.g. women, disabled and youth; and
» Sustainable job creation.

To align the needs of the Umsobomvu Local Municipality, strategic objectives have been identified which are in line with the national Key Performance Areas (KPA). The KPA's and key indicators are based on the local priorities and IDP objectives and are as follows:

» KPA 1 – Basic Service Delivery and Infrastructure Development
» KPA 2 – Institutional Development and Municipal Transformation
» KPA 3 – Good Governance and Public Participation
» KPA 4 – Financial Viability and Management
» KPA 5 – Local Economic Development
» KPA 6 – Safety and Security
» KPA 7 – Social Upliftment

The Umsobomvu Local Municipality focus is on economic and social development and service delivery. The proposed CSP Project will contribute to economic and social development through employment opportunities and business opportunities in the local area which will contribute towards reducing the poverty levels in the Umsobomvu Local Municipality.

2.5 Relevant legislative permitting requirements

Table 2.1 overleaf provides an outline of the legislative permitting requirements applicable to the Noupoort CSP Project as identified at this stage in the project process.

Table 2.1: Review of relevant policies, legislation, guidelines, and standards applicable to the proposed Noupoort CSP Project

Legislation	Applicable Requirements
National Environmental Management Act (Act No 107 of 1998)	The EIA Regulations have been promulgated in terms of Chapter 5 of the Act. Listed activities which may not commence without an environmental authorisation are identified within these Regulations. In terms of S24(1) of NEMA, the potential impact on the environment associated with these listed activities must be assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation. In terms of GN R982, R983, R984 and R985 of December 2014, a Scoping and EIA Process is required to be undertaken for the proposed project.
Environment Conservation Act (Act No 73 of 1989)	Developments are required to comply with the limits set within the National Noise Control Regulations (GN R154 dated 10 January 1992).
National Water Act (Act No 36 of 1998)	Water uses under Section 21 of the Act must be licensed, unless such water use falls into one of the categories listed in S22 of the Act or falls under the general authorisation (and then registration of the water use is required). Consumptive water uses may include the taking of water from a water resource and storage - Sections 21a and b. Non-consumptive water uses may include impeding or diverting of flow in a water course - Section 21c; and altering of bed, banks or characteristics of a watercourse - Section 21i.
Minerals and Petroleum Resources Development Act (Act No 28 of 2002)	A mining permit or mining right may be required where a mineral in question is to be mined (e.g. materials from a borrow pit) in accordance with the provisions of the Act. Requirements for Environmental Authorisation of mining related activities are as detailed within the NEMA EIA Regulations (GNR982 – 985). Section 53 Department of Mineral Resources: Approval from the Department of Mineral Resources (DMR) may be required to use land surface contrary to the

Legislation	Applicable Requirements
	objects of the Act in terms of section 53 of the Mineral and Petroleum Resources Development Act, (Act No 28 of 2002): In terms of the Act approval from the Minister of Mineral Resources is required to ensure that proposed activities do not sterilise a mineral resource that might occur on site.
National Environmental Management: Air Quality Act (Act No 39 of 2004)	No air emissions will result from the proposed project and therefore no air emissions license is required to be obtained. Reporting to the Air Emissions Licensing Authority (AELA) on emissions from small boilers (such as may be used for auxiliary power supply sources) would be required. Dust control Regulations have been promulgated under the Air Quality Act. In this regard, a dust monitoring plan may be required to be implemented if required by the AELA.
National Heritage Resources Act (Act No 25 of 1999)	This Act Provides for the protection of all archaeological and palaeontological sites, and meteorites (S35), the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority (S36), and lists activities which require developers any person who intends to undertake to notify the responsible heritage resources authority and furnish it with details regarding the location, nature, and extent of the proposed development (S38). A heritage permit is required should any sites of heritage significance be impacted by the proposed project.
National Environmental Management: Biodiversity Act (Act No 10 of 2004)	» Provides for the MEC/Minister to identify any process or activity in such a listed ecosystem as a threatening process (S53) » A list of threatened and protected species has been published in terms of S 56(1) - Government Gazette 29657. » Three government notices have been published, i.e. GN R 150 (Commencement of Threatened and Protected Species Regulations, 2007), GN R 151 (Lists of critically endangered, vulnerable and protected species) and GN R 152 (Threatened or Protected Species Regulations). » Provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or

Legislation	Applicable Requirements
	protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection, (G 34809, GN 1002), 9 December 2011). » This Act also regulates alien and invader species. » A permit is required to be obtained to impact on any species listed in terms of this Act or associated Regulations. » The Department of Environmental Affairs (DEA) published Regulations on Alien and Invasive Species (AIS) in terms of the National Environmental Management: Biodiversity Act, on Friday 1st August 2014. A total of 559 alien species are now listed as invasive, in four different categories. A further 560 species are listed as prohibited, and may not be introduced into the country.
Conservation of Agricultural Resources Act (Act No 43 of 1983)	» No permitting requirements in terms of this Act are applicable to the project under investigation. » Prohibition of the spreading of weeds (S5) » Classification of categories of weeds and invader plants (Regulation 15 of GN R1048) and restrictions in terms of where these species may occur. » Requirement and methods to implement control measures for alien and invasive plant species (Regulation 15E of GN R1048).
National Forests Act (Act No. 84 of 1998)	» According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that 'no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister'. » A permit is required to be obtained to impact on any species listed in terms of this Act or associated Regulations.
Hazardous Substances Act (Act No 15 of 1973)	This Act regulates the control of substances that may cause injury, or ill health, or

Legislation	Applicable Requirements
	death due to their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products. Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc., nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared as Group I or Group II substance • Group IV: any electronic product; and • Group V: any radioactive material. The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)	The Minister may by notice in the Gazette publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment. The Minister may amend the list by – » Adding other waste management activities to the list. » Removing waste management activities from the list. » Making other changes to the particulars on the list. In terms of the Regulations published in terms of this Act (GN 921 of November 2013), a Basic Assessment or Environmental Impact Assessment is required to be undertaken for identified listed activities in support of an application for a waste license. Any person who stores waste must at least take steps, unless otherwise provided

Legislation	Applicable Requirements
	by this Act, to ensure that: » The containers in which any waste is stored, are intact and not corroded or in any other way rendered unlit for the safe storage of waste. » Adequate measures are taken to prevent accidental spillage or leaking. » The waste cannot be blown away. » Nuisances such as odour, visual impacts and breeding of vectors do not arise; and » Pollution of the environment and harm to health are prevented.
National Road Traffic Act (Act No 93 of 1996)	» The technical recommendations for highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. » Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts. » The general conditions, limitations, and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations. » A permit is required to be obtained for the transportation of abnormal loads.
Astronomy Geographic Advantage Act (Act No. 21 of 2007)	» The Astronomy Geographic Advantage Act (No. 21 of 2007) provides for the preservation and protection of areas within South Africa that are uniquely suited for optical and radio astronomy; for intergovernmental co-operation and public consultation on matters concerning nationally significant astronomy advantage areas and for matters connected thereto. » Chapter 2 of the act allows for the declaration of astronomy advantage areas while Chapter 3 pertains to the management and control of astronomy

Legislation	Applicable Requirements
	advantage areas. Management and control of astronomy advantage areas include, amongst others, the following: * Restrictions on use of radio frequency spectrum in astronomy advantage areas; * Declared activities in core or central astronomy advantage area; * Identified activities in coordinated astronomy advantage area; and * Authorisation to undertake identified activities. The study area falls outside the Sutherland Central Astronomy Advantage Area gazetted in GN R140 of 28 February 2015, the 75km circular buffer centred on the SALT.
Northern Cape Nature Conservation Act, Act No. 9 of 2009	This Act provides for the sustainable utilisation of wild animals, aquatic biota and plants; provides for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; provides for offences and penalties for contravention of the Act; provides for the appointment of nature conservators to implement the provisions of the Act; and provides for the issuing of permits and other authorisations. Amongst other regulations, the following may apply to the current project: » Boundary fences may not be altered in such a way as to prevent wild animals from freely moving onto or off of a property; » Aquatic habitats may not be destroyed or damaged; » The owner of land upon which an invasive species is found (plant or animal) must take the necessary steps to eradicate or destroy such species. » The Act provides lists of protected plant and animal species for the Province. » A permit is required to be obtained to impact on any species listed in terms of this Act or associated Regulations.

DESCRIPTION OF THE PROPOSED PROJECT CHAPTER 3

This chapter provides an overview of the planned Noupoort CSP Project and details the project scope which includes the planning/design, construction, operation and decommissioning activities. This chapter also explores the need and desirability of the project at the preferred site location, site and technology alternatives as well as the 'do nothing' option. Lastly, it explores the use of concentrated solar power as a means of power generation.

This chapter of the scoping report includes the following information required in terms of the EIA Regulations, 2014 - Appendix 2: Content of the Scoping Report:

Requirement	Relevant Section
(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location	The need and desirability for the development of the Noupoort CSP Project within the Remaining Extent of the Farm 207, Portion 1 and Portion 4 of the Farm Carolus Poort 167 is included within section 3.3.
(h)(i) details of all the alternatives considered	The details of all alternatives considered are included within section 3.5.
(h)(ix) the outcome of the site selection matrix	The outcome of the site selection process is supported by the assessment of the receptiveness of the study area for the development of a CSP Project. This outcome is included within section 3.3.1.
(h)(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such	Alternatives were investigated and is included within section 3.5.

3.1 Nature and extent of the Noupoort CSP Project

The project is proposed to be developed on the Remaining Extent of the Farm 207, and Portion 1 and Portion 4 of the Farm Carolus Poort 167 located approximately 4 km north west of Noupoort within the Umsobomvu Local Municipality (Pixley ka Seme District Municipality) in the Northern Cape. This site is highly preferred by virtue of climatic conditions, relief and aspect, the availability of land, and proximity to a viable point of connection to the National grid through Eskom's Newgate Substation. There are a number of authorised projects within 30km of the Noupoort CSP Project site, including a preferred bidder in Round 2 and another preferred bidder in Round 3 of the REIPPP Programme. The site is considered to be located within a renewable energy hub developing within the greater Noupoort area.

3.2 Components of the Proposed Project

The Noupoort CSP facility will utilise parabolic trough technology with a contracted capacity of up to 150MW. Infrastructure associated with the facility includes:

» Solar collector field comprising of all systems and infrastructure related to the control and operation of the parabolic troughs;
» Energy Centre, comprising of the storage media and heat exchanger;
» Power Block, consisting of the steam turbine and generator, as well as the air-cooled condenser and associated feedwater system;
» On-site project substation;
» A new 132kV power line to connect the on-site substation to the Eskom's electricity grid;
» Access roads and fencing around the development area;
» Lined evaporation ponds;
» Gas boiler for the start-up process of the facility;
» Water supply pipeline;
» On-site water storage tanks/reservoirs;
» Water treatment facility;
» Plant assembly facility;
» Offices and workshop areas for maintenance and storage; and
» Temporary laydown areas.

3.3 Need and Desirability of the Development at the Preferred Site Location

The overarching objective for the Noupoort CSP Project is to maximise electricity production through exposure to the solar resource, while minimising infrastructure, operational and maintenance costs, as well as social and environmental impacts. From a regional site selection perspective, this region is considered to be preferred for solar energy development by virtue of its annual solar irradiation values. Due to the nature of the development, the location of the facility is largely dependent on technical and environmental factors such as solar irradiation (i.e. the fuel source), climatic conditions, topography of the site, and access to the grid.

From a local perspective, the project site has specifically been identified by CRESCO Energy (Pty) Ltd as being highly desirable for the development of a CSP Project due to its suitable topography (i.e. in terms of flat terrain), site access (i.e. to facilitate the movement of machinery during the construction phase), land availability (i.e. the land is secured for the intended use), the extent of the site (i.e. the land parcel is able to accommodate the 900ha required for the CSP Project), and enabling optimal placement of the infrastructure considering

potential environmental sensitivities or technical constraints. These favourable characteristics are further explored in the sections below.

At a Provincial level, the Northern Cape has been identified as the area with highest potential for solar renewable energy generation; with high solar radiation levels and the availability of vast tracts of land. There are already a number of CSP projects (and solar PV facilities) constructed and planned in the Province. The development of a solar project in the broader study area is in line with the objectives of the Umsobomvu Local Municipality Integrated Development Plan (IDP) (2012-2017) (2015-2016 review) as well as the Pixley ka Seme District Municipality IDP (2012-2016), as the need for the development of the renewable sector has been identified in the Municipal plans. A more detailed description of the mandates set out by the Municipalities has been explained further in Chapter 2.

3.3.1 Receptiveness of the site to development of a CSP Project

CRESCO Energy (Pty) Ltd considers the site, the Remaining Extent of the Farm 207, and Portion 1 and Portion 4 of the Farm Carolus Poort 167 to be highly preferred for the development of a concentrated solar power facility. The reasons include:

Extent of site: Availability of relatively flat land of sufficient extent can be a restraining factor to a CSP development, as a 150MW parabolic trough facility and the associated infrastructure requires 900ha of land space. The extent of the three farm portions is approximately 3460ha, of which ~900ha is allocated for the siting of the proposed Noupoort CSP Project and associated infrastructure. This is 26% of the land surface area across the three farm portions. This site is, therefore, considered sufficient for the installation of the Noupoort CSP Project allowing for avoidance of environmental sensitivities within the greater project site.

Power transmission considerations: There is an existing Eskom substation situated directly across the project site and is known as the 132kV Newgate Substation, which allows for direct connection of the Noupoort CSP Project. Another substation is situated approximately 3km south-east of the development site and is known as the 66kV Noupoort Substation which also allows for direction connection.

Site access: Access to the site is possible through the use of the Wildfontein road which is aligned along the eastern boundary of the project site.

Current land use considerations and land availability: The project site is currently used for sheep and game farming. There are small cultivated lands

north east in the project site. The Remaining Extent of the Farm 207, and Portion 1 and Portion 4 of Farm Carolus Poort 167 are zoned for Special Solar use, which is consistent with the intended land use. In addition, the individual landowners have agreed to the use of the site for the development of a CSP facility.

Climatic conditions and solar irradiation: Climatic conditions determine the economic viability of a concentrated solar power project as it is directly dependent on the annual direct solar irradiation values for a particular area. The Northern Cape receives the highest average daily direct normal and global horizontal irradiation in South Africa which indicates that the regional location of the project is appropriate for a concentrated solar power project. Direct normal irradiation (DNI) for the Northern Cape Province varies between 2150 and 3200 kWh/m^2/annum (refer to **Figure 3.1**). The DNI for the proposed Noupoort CSP project site is in the region of approximately 2800-2900 kWh/m^2/annum. Factors contributing to the location of the CSP Project include the relatively high number of daylight hours and the low number of rainy days experienced in this region.

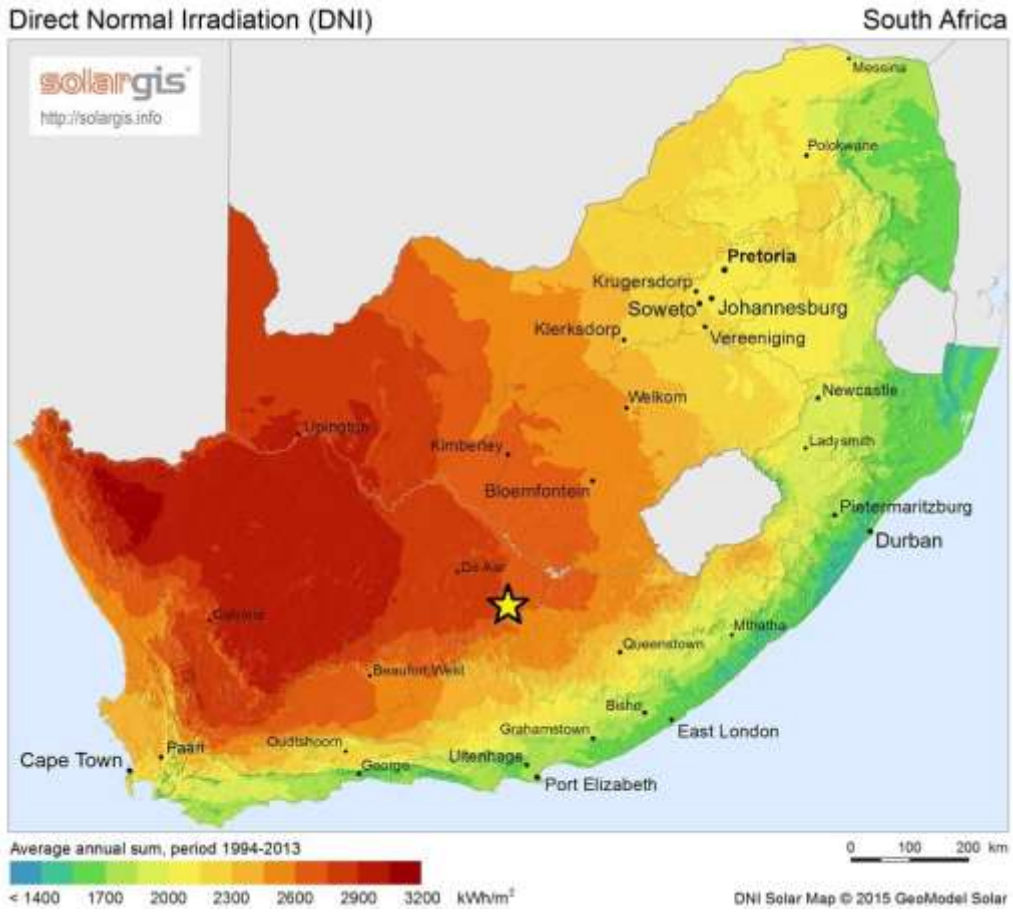

Figure 3.1: Solar irradiation map for South Africa; the location of the proposed Noupoort CSP Project position is shown by the yellow star on the map. (Source: adapted from GeoModel Solar, 2011).

Topographic conditions: The site conditions are optimal for a development of this nature, with the site being of a suitable gradient for the development of a CSP project, with little relief. The region within which the site is located can be described as generally flat to gently undulating and lies at a height of approximately 1 480-1 520m above sea level, sloping towards the Noupoortspruit to the north east.

Access to the Grid: Ease of access into the Eskom electricity grid is vital to the viability of a CSP Project. Projects which are in close proximity to a connection point and/or demand centre are considered favourable, and reduce the losses associated with power transmission. Two options are currently being explored:

» Direct connection to the existing 132kV Newgate Substation situated directly across the project site.
» Connection to the 66kV Noupoort Substation located 3 km south-east of the development site, as well as to the Newgate Substation.

A new 132kV overhead power line will be constructed which will be the connection between the on-site substation and the preferred grid connection point.

Proximity to Towns with a Need for Socio-Economic Upliftment: The Northern Cape Province, like most of South Africa, is marred by unemployment, inequalities and poverty. To this extent the Noupoort CSP Project is situated approximately 4km north west of Noupoort and within a 50km radius of Middelburg. Consequently, local labour would be easy to source, which fits in well with the REIPPP Programme's economic development criteria for socio-economic upliftment. Commercial activity in Noupoort is heavily dependent on railway activity. After a long period of increasingly less demand on the rail network, the town suffered from a drastic decline in local business leading to increasingly dire socio-economic conditions for the local population. Currently, the Umsobomvu Local Municipality's unemployment rate is high at 33%. The development of the CSP Project will create a new avenue for economic and skills development within the Pixley ka Seme District Municipality and the Umsobomvu Local Municipality.

Proximity to Access Road for Transportation of Material and Components: As material and components would need to be transported to the site during the construction phase of the proposed CSP Project, accessibility was a key factor in determining the viability of the project, particularly taking transportation costs (direct and indirect) into consideration and the impact of this on project economics and therefore the ability to submit a competitive bid under the DoE's REIPPP programme.

Sufficient access is available in the surrounding areas and in close proximity to the site for a development of this nature (i.e. a development which is heavily

dependent on the transportation of materials and components). The regional road, R389, is located adjacent to the southern boundary of the site. Direct access to the site is possible through the Wildfontein road which is aligned along the eastern boundary. A railway line is located along the north eastern boundary of the project site.

3.3.2 Benefits of Renewable Energy

The generation of electricity from renewable energy resources offers a range of potential socio-economic and environmental benefits for South Africa. These benefits include:

Increased energy security: The current electricity crisis in South Africa highlights the significant role that renewable energy can play in terms of power supplementation. In addition, given that renewables can often be deployed in a short timeframe and in a decentralised manner close to consumers, they offer the opportunity for improving grid strength and supply quality in the short-term, while reducing expensive distribution losses. As a result of the power constraints in the first half of 2015, power generators meant to be the "barely-ever-used" safety net for the system (the diesel-fired gas turbines) were running at >30% average load factor in the first half of 2015. Load shedding occurred during 82 days in the first half of 2015 (out of 181 days). Results of a CSIR Energy Centre study for the period January to June 2015 (CSIR, August 2015), concluded that the already implemented renewable projects (wind and solar) within the country avoided 203 hours of so-called 'unserved energy'. During these hours the supply situation was so tight that some customers' energy supply would have had to be curtailed ('unserved') if it had not been for the renewables sector contribution. The avoidance of unserved energy cumulated into the effect that during 15 days from January to June 2015 load shedding was avoided entirely, delayed, or a higher stage of load shedding prevented thanks to the contribution of the wind and PV projects[2].

Resource saving: It is estimated that the achievement of the targets in the Renewable Energy White Paper will result in water savings of approximately 16.5 million kilolitres per annum. As an already water-stressed nation, it is critical that South Africa engages in a variety of water conservation measures, particularly due to the detrimental effects of climate change on water availability. Renewable energy also translates into revenue savings, as fuel for renewable energy facilities is free while compared to the continual purchase of fuel for conventional power stations. Results of a CSIR Energy Centre study for January – June 2015 (CSIR, August 2015) have quantified the contribution from

[2] http://ntww1.csir.co.za/plsql/ptl0002/PTL0002_PGE157_MEDIA_REL?MEDIA_RELEASE_NO=7526896

renewable energy to the national power system and the economy over the first 6 months of 2015 compared to the 12 months of 2014:

2015 (6 months)	**2014 (12 months)**
R3.60 billion saving in diesel and coal fuel costs	R3.64 billion saving in diesel and coal fuel costs
200 hours of unserved energy avoided, saving at least an additional R1.20 billion–R4.60 billion for the economy	120 hours of unserved energy avoided, saving at least an additional R1.67 billion for the economy
Generated R4.0 billion more financial benefits than cost	Generated R0.8 billion more financial benefits than cost

Exploitation of South Africa's significant renewable energy resource: At present, valuable renewable resources including biomass by-products, solar radiation and wind power remain largely unexploited. The use of these energy flows will strengthen energy security through the development of a diverse energy portfolio in South Africa.

Economics: As a result of the excellent solar resource within South Africa and competitive procurement processes, both concentrated solar power and solar PV power are now proven in South Africa as cheaper forms of energy generation than coal power. Renewables offer excellent value for money to the economy and citizens of South Africa.

Pollution reduction: The releases of by-products through the burning of fossil fuels for electricity generation have a particularly hazardous impact on human health and contribute to ecosystem degradation. The use of solar radiation for power generation is a non-consumptive use of a natural resource.

Climate friendly development: The uptake of renewable energy offers the opportunity to address energy needs in an environmentally responsible manner and thereby allows South Africa to contribute towards mitigating climate change through the reduction of greenhouse gas (GHG) emissions. South Africa is estimated to be currently responsible for approximately 1% of global GHG emissions (and circa half of those for which Africa is responsible) and is currently ranked 9th worldwide in terms of per capita carbon dioxide emissions. The renewable energy sector saved South Africa 1.4 million tons of carbon emissions over the first 6 months of 2015[3].

Support for international agreements: The effective deployment of renewable energy provides a tangible means for South Africa to demonstrate its commitment to its international agreements under the Kyoto Protocol, and for cementing its status as a leading player within the international community.

[3] http://www.iol.co.za/capetimes/renewable-energy-saving-sa-billions-csir 1.1903409#.VkNjdJq6FeU

Employment creation: The development, procurement, installation, maintenance and management of renewable energy facilities have significant potential for job creation and skills development in South Africa. Employment for South African citizens including people from communities local to the IPP operations in the Northern Cape were 11 652 job years as at the end of June 2015 (Department of Energy, 2015).

Acceptability to society: Renewable energy offers a number of tangible benefits to society including reduced pollution concerns, improved human and ecosystem health and climate friendly development.

Support to a new industry sector: The development of renewable energy offers the opportunity to establish a new industry within the South African economy, which will create jobs and skill local communities which have potential for further renewable energy projects.

Protecting the natural foundations of life for future generations: Actions to reduce the country's disproportionate carbon footprint can play an important part in ensuring our role in preventing dangerous anthropogenic climate change; thereby securing the natural foundations of life for generations to come. This is the basis of sustainable development.

3.4 Concentrated Solar Power as a Power Generation Technology

Solar generating facilities use the energy from the sun to generate electricity. Concentrating Solar Power (CSP) goes one step further by collecting the incoming solar radiation and concentrating it onto a receiver tube (containing water as the heat transfer fluid) to generate heat, which in turn is used to generate electricity. The sections below describe the technology and infrastructure comprising the project. The Noupoort CSP Project will utilise parabolic trough technology with a contracted capacity of 150MW.

3.4.1 Parabolic Trough Technology proposed for the 150MW Project

Parabolic trough technology is comprised of a heat collection system (a solar field), an Energy Centre and a Power Block. The heat collection system is comprised of the solar collector assembly (SCA) which includes parabolic troughs (i.e. the reflectors) and cylindrical tubes containing the heat transfer fluid (i.e. the receivers) located in the focal point of the parabolic surface. There are 8 collectors on each SCA. Each SCA tracks the sun on a set of rails, thereby allowing for maximum generation capacity as the sun's trajectory changes on a daily and seasonal basis, while eliminating the need for levelling and minimising habitat destruction (**Figure 3.2**).

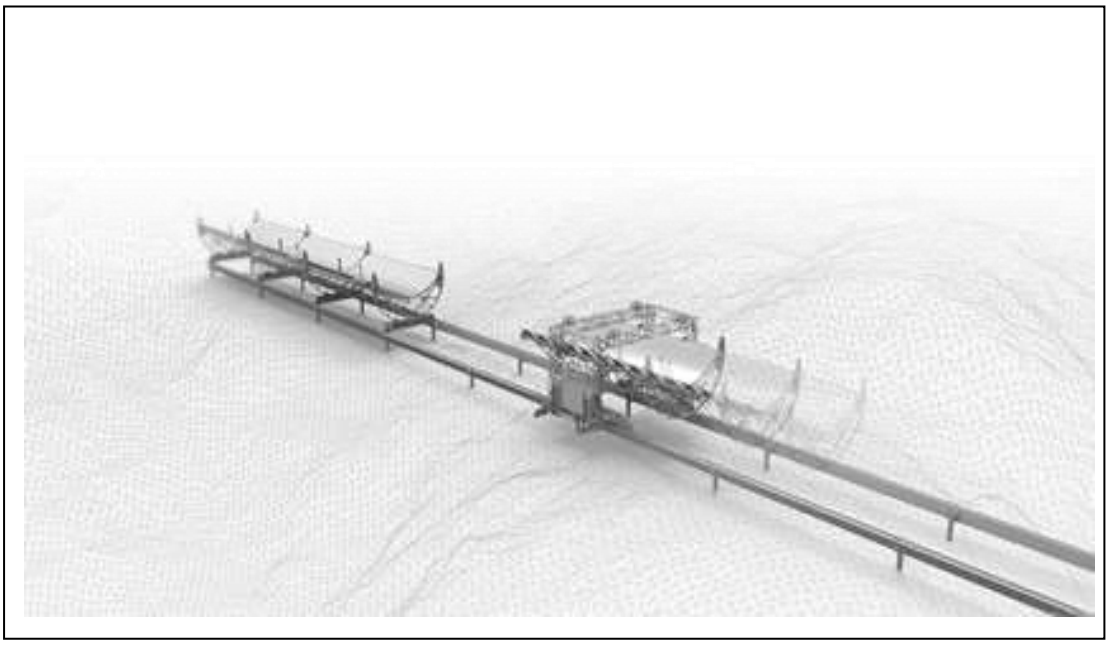

Figure 3.2: Diagram of the solar collector assembly (SCA) for the sun to steam technology (courtesy of Brenmiller Energy).

The Energy Centre is built from larger heat exchanger units and consist of the storage media (rocks) and tubes for the heat transfer fluid (HTF) coming from the solar field and for the water/steam media, working in counter-flow (refer to **Figure 3.3**). The heat from the solar field creates steam from the HTF (water) in a closed loop system which heats the storage media in the Energy Centre. Condensed water enters in a counter flow and superheated steam (at 480-500ºC) is released directly into the turbine inlet, turning the turbine and therefore generating electricity (refer to **Figure 3.4**). The Energy Centre is able to produce steam over a period of 12-18 hours over a 24 hour period (6 solar hours on average, plus an additional 6 – 12 hours from storage, depending on the Energy Centre discharge rate).

Figure 3.3: Photograph illustrating the pipes conveying the superheated steam from the solar field to the Energy Centre (courtesy of Brenmiller Energy).

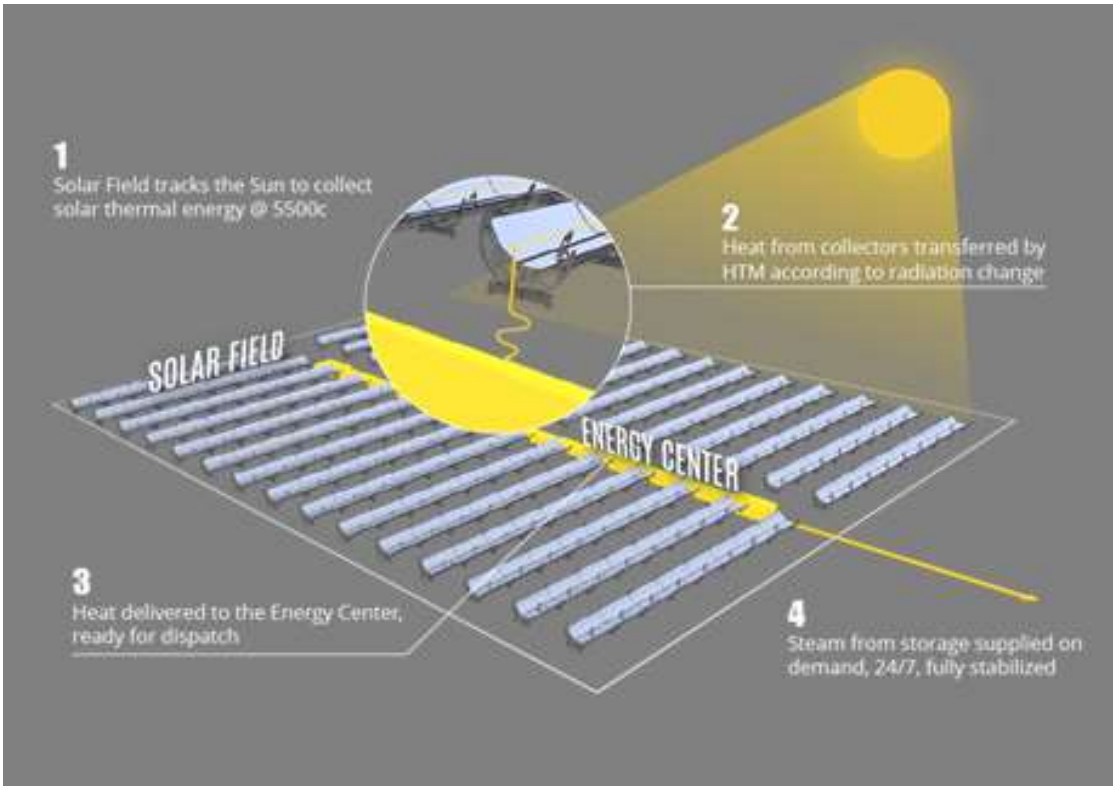

Figure 3.4: Conceptual illustration of the sun to steam parabolic trough system (courtesy of Brenmiller Energy).

The final waste stream from the facility is wastewater, which will be evaporated via an evaporation ponds (~7ha).

The purpose of the evaporation ponds are to receive the water discard stream from the generation process. The evaporation ponds will be located on the project site and within the development footprint. The proposed facility will be operated as a Zero Liquid Effluent Discharge (ZLED) facility; therefore no wastewater from the power generation process will be permitted to be released into the environment or any natural water bodies. The evaporation ponds will have a surface area of a ~7ha and be approximately 2m deep.

3.4.2 Description of the Associated Infrastructure

Associated infrastructure includes the Energy Centre including the heat exchanger and storage media, Power Block including the power island and HTF system, access roads, water supply pipeline and storage tanks/reservoirs, water treatment facility, lined evaporation ponds, on-site substation and overhead power line, temporary laydown areas, plant assembly facility and workshop and office buildings.

A summary of the details and dimensions of the planned infrastructure associated with the project is provided in **Table 3.2**.

Table 3.2: Details or dimensions of typical structures required for the Noupoort CSP Project

Infrastructure	Footprint and dimensions
Parabolic trough solar field	~600 ha Up to 5m (max. height in morning) and 7.9m (max. height in afternoon)
Energy Centre	2ha
Power Block	4ha
Access road	Entrance access road – 12m in width and Internal access roads - 6m in width
Water storage reservoirs and tanks	Two ponds 200m X 200m each 10m deep
Packaged water treatment plant	30m x 30m 15m in height
Temporary laydown area	5ha of which 1 ha will be utilised for a warehouse during operations
Workshop building (maintenance) and office buildings	1ha
On-site substation	50m x 50m, 30m in height

Evaporation pond	~7ha, ~2m deep
Any other infrastructure (storage of hazardous substances such as fuel, water treatment additives and chemicals etc.)	20m x 20m, 5m in height

3.5 Alternatives Considered in the Scoping Phase

In accordance with the requirements outlined in Appendix 2 of the EIA Regulations 2014, the consideration of alternatives including site and technology alternatives and the "do-nothing" alternative should be undertaken. The following sections address this requirement.

3.5.1 Site Alternatives

No site alternatives are to be assessed for the location of the Noupoort CSP Project, as a suitable site was determined using a 'funnel-down approach'. Several farm portions were initially considered for the CSP development (refer to **Figure 3.2**). These include:

» Portion 1 of Farm Carolus Poort 167;
» Portion 4 of Farm Carolus Poort 167;
» Portion 8 of Farm Carolus Poort 167;
» Remaining Extent of Farm 207;
» Portion 2 of Farm 117; and
» Municipal land situated north of the town of Noupoort.

The viability or feasibility of the use of the land parcels was further considered by the project developer. Municipal land was eliminated from the process due to the requirement for the project company to have rights over the land for the duration of the Power Purchase Agreement to be signed with Eskom. Portion 8 of Farm Carolus Poort 167 was eliminated due to obvious watercourses traversing the site. This alternative was also technically not feasible due to the distance from the Newgate Substation. Portion 2 of the Farm 117 was excluded from further assessment due to topographical issues.

As ecological- and avifaunal investigations were undertaken during the early-stages of the Environmental Impact Assessment process, environmental sensitive areas could be identified to ensure avoidance. Following the early assessment of Portion 1 of the Farm Carolus Poort 167, it was determined that approximately 50% of the farm portion was unsuitable due to environmental sensitive areas.

The possibility of utilising Portion 1 and Portion 4 of the Farm Carolus Poort 167, as well as the Remaining Extent of the Farm 207 was investigated. Based on the

findings, the three remaining land parcel options were selected collectively as the preferred site alternative due to the proximity to the Newgate Substation. CRESCO Energy (Pty) Ltd considers these farm portions to be highly favourable and the most suitable location for the development of the Noupoort CSP Facility and all associated infrastructure.

3.5.2 Layout and Design Alternatives

A broader project site of approximately 3460ha is being considered, within which the development area for the proposed project of approximately 900ha in extent would be appropriately located. The site can adequately accommodate the facility with a contracted capacity of up to 150MW. It is anticipated that the facility and its associated infrastructure (i.e. on-site substation and internal roads, etc.) can be appropriately positioned within the larger site to avoid areas of environmental sensitivity. The development footprint of the project would comprise up to 26% of the total extent of the farm portions. Therefore, the extent of the site allows for the identification of layout design and site-specific alternatives. The opportunity presented through the EIA process will allow for the assessment of the most environmentally-acceptable layout and design alternative.

The Scoping Phase aims to identify potentially environmentally sensitive areas within the site which should be avoided by the proposed development as far as possible. These areas will need to be considered in greater detail during the EIA Phase through site-specific specialist studies. The information from these studies will be used to inform layout alternatives for the proposed project and inform recommendations regarding a preferred alternative.

During the EIA phase, site-specific studies will be undertaken to assess the impact of the proposed development, and to delineate areas of sensitivity within the earmarked farm portions. Once the constraining environmental factors have been determined, the layout for the proposed CSP Project can be finalised, and assessed in detail.

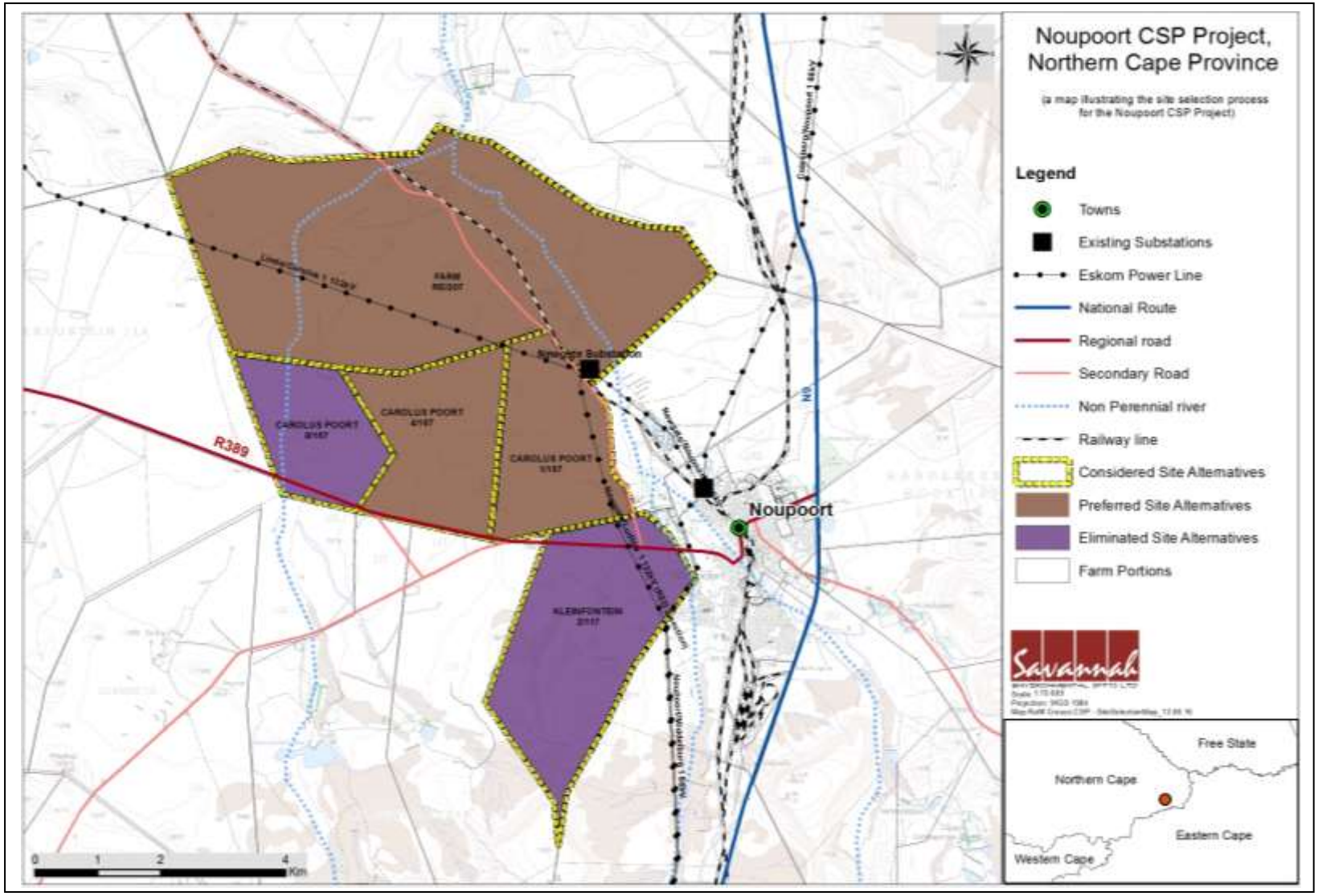

Figure 3.2: **A** map illustrating the sites considered for the location of the Noupoort CSP Project.

3.5.3 Technology Options

Solar energy is considered to be the most suitable renewable energy technology for this site, based on the location, ambient conditions and energy resource availability. The following technology alternatives have been considered though prefeasibility assessments. Details of the technology alternatives considered and the decision of technology for this project are explained below:

Solar generation technology options

Concentrated solar power (CSP) technology was selected over solar photovoltaic (PV) technology as it can deliver electrical energy on demand e.g. in peak hours when it is most needed by Eskom, whereas solar photovoltaic technology will only produce electrical energy during daylight hours when sunshine conditions permit.

Parabolic trough CSP technology was selected over salt tower CSP technology for use at this site as it is currently the most proven technology for CSP. In contrast to other CSP trough technology, the technology proposed for the Noupoort CSP project is designed for rapid deployment and easy maintenance. The trough technology proposed for this project will be based on a floating field concept. The floating field concept provides above ground installation of parabolic trough sections using a set of rails with no need for land levelling and minimal ground disturbance, which also allows for easier maintenance. The heat transfer media (HTF) used at the solar field is also water based, non-toxic and inexpensive and allows operating at high temperature without typical operational problems such as freezing.

CSP cooling technology options

CSP plants are designed to use water for cooling at the back-end of the thermal cycle. There are different types of cooling technologies available (discussed below for comparative purposes). Dry cooled technology is, however, the cooling technology that will be used for the Noupoort CSP Project.

Dry Cooling

Dry cooling by air cooled condensers (ACC) consists of large sections of finned air cooled heat exchangers (with mechanical draft), and the turbine exhaust steam passes through the heat exchangers forming condensate. This arrangement uses no cooling water, and therefore requires no makeup for evaporation losses. ACC cooling can reduce the total make-up water demand considerably, leaving only the process consumption and service water as major users, but is limited by its sensitivity to ambient temperature, negative effect on performance and capital expenditure.

Wet cooling system

A wet cooling tower is a conventional design and is the most common and economic alternative. This form of technology application and system design is based on the one hand by convective heat transfer, and on the other hand, evaporation of the water (increase in the air's humidity). As a result, the cooling water temperature that can be obtained from a wet cooling tower is not solely operative from the ambient temperature but also from the air humidity (air with 100% humidity). This type of technology results in severe water loss of which the primary reasons for loss of water in the cooling tower. This technology is not preferred based on evaporation losses and the need for cooling towers.

The cooling system to be used for the Noupoort CSP Project is a dry cooling system. This is also consistent with the Department of Water and Sanitation requirements. Therefore no alternative technology is considered.

3.5.4 Grid Connection Alternatives

The grid connection point for the facility will be finalised based on input from Eskom and the environmental assessment. However, two alternatives are being considered at this point of the assessment process:

» Direct connection to the existing 132kV Newgate Substation (situated directly adjacent to the development area) via a 500m overhead power line, depending on the location of the on-site substation; and
» Direct connection to the 66kV Noupoort Substation (located 3km south-east of the development area), as well as the Newgate Substation. The combined length of the overhead power line will be ~4km, depending on the location of the on-site substation.

The power line route/s for the grid connection solution/s will be assessed in detail within the EIA phase of the project. A corridor of 500m in width will be assessed, within which the most appropriate power line servitude can be aligned.

3.5.5 Water source alternatives

CSP technologies function through the generation of steam to drive a conventional steam turbine and generator. Therefore, suitable and sufficient water resources will be required over the life of the facility. During its operation the Noupoort CSP Project will require approximately 320 000m^3 of water per annum. During its 3 year construction phase, approximately 320 000m^3 per annum will be required. The Umsobomvu Local Municipality is considered to have sufficient availability of water to provide the annual water requirement for the Noupoort CSP Project. Therefore no water source alternative is to be assessed.

The water supplied by the Municipality will either be stored on site in water tanks, or transported via a new water pipeline that will need to be constructed. Water from the pipeline will be pumped to a holding reservoir for supply buffering. The water pipeline route will be determined and appropriately assessed in the EIA phase.

3.5.6 Access Road(s) Alternative

At the current stage of the assessment process, access to the site is possible through the use of the existing Wildfontein road which is aligned along the eastern boundary of the project site. This alternative is preferred as it provides easy access to the project site off the R389. Therefore no other access road alternatives are considered feasible for assessment.

3.5.7 The 'Do-Nothing' Alternative

The 'do-nothing' alternative is the option of not constructing the proposed Noupoort CSP Project. Should this alternative be selected, the benefits of the renewable energy project will not be realised. The generation of electricity from renewable energy resources can offer a range of socio-economic and environmental benefits for South Africa. Other benefits include:

» Increased energy security: The current electricity crisis in South Africa highlights the significant role that renewable energy can play in terms of power supplementation, and specifically CSP as it uses conventional steam generation coupled to storage which enhances despatchability, i.e. being capable of supplying energy during the peak demand periods when it is most needed. In addition, given that renewables can often be deployed in a decentralised manner close to consumers, they offer the opportunity for improving grid strength and supply quality, while reducing expensive transmission and distribution losses.
» Exploitation of our significant renewable energy resource: At present, valuable national resources including biomass by-products, solar radiation and wind power remain largely unexploited. The use of these energy flows will strengthen energy security through the development of a diverse energy portfolio.
» Pollution reduction: The releases of by-products through the burning of fossil fuels for electricity generation have a particularly hazardous impact on human health and contribute to ecosystem degradation.
» Climate friendly development: The uptake of renewable energy offers the opportunity to address energy needs in an environmentally responsible manner and thereby allows South Africa to contribute towards mitigating climate change through the reduction of greenhouse gas (GHG) emissions.

South Africa is estimated to be responsible for ~1% of global GHG emissions and is currently ranked 14th worldwide in terms of per capita CO_2 emissions.

» Support for international agreements: The effective deployment of renewable energy provides a tangible means for South Africa to demonstrate its commitment to its international agreements under the Kyoto Protocol, and for cementing its status as a leading player within the international community.
» Employment creation: The sale, development, installation, maintenance and management of renewable energy facilities have significant potential for job creation in South Africa.
» Acceptability to society: Renewable energy offers a number of tangible benefits to society including reduced pollution concerns, improved human and ecosystem health and climate friendly development.
» Support to a new industry sector: The development of renewable energy offers the opportunity to establish a new industry within the South African economy.
» Protecting the natural foundations of life for future generations: Actions to reduce our disproportionate carbon footprint can play an important part in ensuring our role in preventing dangerous anthropogenic climate change, thereby securing the natural foundations of life for generations to come.

At this stage in the process, it is considered that the benefits of the proposed project would outweigh the costs. The "do nothing" option will be further assessed within the EIA phase of the process in order to confirm the above conclusion.

3.6 Proposed Activities during the Project Development Stages

In order to construct the concentrated solar power project and its associated infrastructure, a series of activities will need to be undertaken during the design, pre-construction, construction, operation, and decommissioning phases which are discussed in more detail below.

3.6.1 Design and Pre-Construction Phase

Conduct Surveys

Prior to initiating construction, a number of surveys will be required including, but not limited to:

» Geotechnical survey - the geology and topography of the development footprint will be surveyed. The geotechnical study will focus on topographical constraints, foundation conditions, potential for excavations, and the availability of natural construction materials. The geotechnical examination will include surface and subsurface exploration, soil sampling and laboratory analysis.

» Site survey - will be done for the finalisation of the design layout of the solar arrays, and the other associated infrastructure. The micro-siting footprint will consider any environmental sensitivity identified during the EIA Phase investigations and will need to be confirmed in line with the Environmental Authorisation issued for the CSP Project.

3.6.2 Construction Phase

Establishment of an Access Road to the Site

Access is possible through the use of the Wildfontein road which is aligned along the eastern boundary of the site. The entrance access road will be 12m wide. Within the development footprint itself, access will be required from new/existing roads for construction purposes (and limited access for maintenance during operation). All internal (gravel) access roads will be 6m in width. The final access road layout will be determined following the identification of site related sensitivities.

Undertake Site Preparation

Site preparation activities will include clearance of vegetation at the footprint of each component and the establishment of internal access roads. These activities will require the stripping of topsoil which will need to be stockpiled, backfilled and/or spread on site. Land levelling and ground disturbance in terms of the solar field will be minimal as the SCA will be installed on a set of rails which is able to accommodate uneven terrain, unlike most other parabolic trough plant installations.

Transport of Components and Equipment to Site

All components and equipment required during the construction phase of the CSP Project will be transported to site by road. Some of the components may be defined as abnormal loads in terms of the Road Traffic Act (Act No. 29 of 1989)[4] by virtue of the dimensional limitations (i.e. length and weight). Typical civil engineering construction equipment will need to be brought to the site (e.g. excavators, trucks, graders, compaction equipment, cement trucks, etc.) as well as components required for the establishment of the substation and power line.

Establishment of Laydown and Assembly Areas on Site

Laydown and assembly (including the mirror assembly area) areas including storage areas of approximately 5ha will be required for the typical construction equipment which will be required on site.

[4] A permit will be required for the transportation of these abnormal loads on public roads.

Construction of Energy Centre, Power block and Substation

The Energy Centre is built from large heat exchanger units and consist of the storage media and tubes for the heat transfer media. The Power Block consist of the power island and the HTF system (i.e. piping, pumps, and vacuum system). The position of the Energy Centre, Power Block and substation within the development footprint will be informed by the final positioning of the solar generating components.

The construction of the Energy Centre, Power Block and substation would require a survey of the site, site clearing and levelling and construction of access road/s (where required), construction of a level terrace, assembly, erection, installation and connection of equipment, and rehabilitation of any disturbed areas and protection of erosion sensitive areas.

Establishment of Ancillary Infrastructure

Ancillary infrastructure includes a power line for connection to the Eskom national grid, water supply pipeline, a water treatment plant, evaporation ponds (for wastewater from the generation process), gas boiler and water storage facilities (tanks or reservoir) on the site. A trough assembly plant, temporary storage area, laydown areas for building equipment/material, control room, office area, chemical storage area, security gate building, warehouse, maintenance rooms and parking area will also be required. The location and number will be determined during the EIA phase.

The establishment of the buildings will require the clearing of vegetation and levelling of the development site and the excavation of foundations prior to construction. Land levelling and ground disturbance will be minimal as the SCA is installed on a set of rails which are able to accommodate variation in terrain.

Water Usage Associated with the Noupoort CSP Project

Water treatment works will be required, as well as evaporation ponds. The water treatment works will include a primary treatment or basic sand filtration plant at the supply source, as well as a reverse osmosis and deionisation packaged water treatment plant at the site. Water will be supplied by the municipality and stored in tanks or transported to site via a water supply pipeline and stored in a reservoir. Water storage reservoir and tanks will be located on the identified site itself. The water use of the project during construction will be 320 000m^3 per annum and will include:

» Potable water
» Fire protection water
» Concrete preparation
» Dust suppression

Construction of power line/s

A power line is constructed by surveying the power line route, construction of foundations for the towers, installation of the towers, stringing of conductors and finally the rehabilitation of disturbed areas and protection of erosion sensitive areas.

Undertake Site Rehabilitation

Once construction is completed and once all construction equipment is removed, the site must be rehabilitated where practical and reasonable. The site will revert back to the current use of sheep and game farming. On full commissioning of the CSP Project, any access points to the site which are not required during the operational phase will be closed and rehabilitated.

Storage and Handling of Hazardous substances

The construction phase will require the handling and storage of materials including fuel, water treatment additives and chemicals. The combined capacity of storage containers will not exceed 500m³.

3.6.3 Operation Phase

The proposed CSP Project is expected to be operational for a minimum of 20 years. The project will operate continuously, 7 days a week, for 24 hours. While the project will be largely self-sufficient upon completion of construction, monitoring and periodic, as needed maintenance activities will be required. Key elements of the Operation and Maintenance plan include monitoring and reporting the performance of the project, conducting preventative and corrective maintenance, receiving visitors, and maintaining security of the project.

Water Usage Associated with the Noupoort CSP Project

Water treatment works will be required, as well as evaporation ponds. The water treatment works will include a primary treatment or basic sand filtration plant at the supply source, as well as a reverse osmosis and deionisation packaged water treatment plant at the site. Water will be supplied by the municipality and stored in tanks or transported to site via a water supply pipeline and stored in a reservoir. Water storage reservoir and tanks will be located on the identified site itself. It is estimated that 320 000 m³ of water per year will be required for the operation phase of the project. The water usage of the project will include (refer to **Table 3.3** above):

» Makeup water for the steam generator;
» Heat transfer fluid;
» Service water;
» Potable water;

» Water for washing of troughs; and
» Fire protection water.

Table 3.3: Estimated water consumption for the 150MW CSP Plant

Description: consumption	**Approximate annual use (m^3/year)**
Raw water consumption during operation	320 000
Description: water uses	**Approximate annual use (m^3/year)**
Mirror washing	191 400
Other water uses (i.e. potable water, fire protection water)	128 600

Site Operation and Maintenance

It is anticipated that a full-time security, maintenance and control room staff will be required on site. Each component within the solar thermal plant will be operational except under circumstances of mechanical breakdown, unfavourable weather conditions or maintenance activities.

Non-hazardous solid wastes (maintenance-derived wastes) will be recycled to the extent practical. Those maintenance-derived wastes that cannot be recycled will be transported for disposal at an appropriate landfill.

3.6.4 Decommissioning Phase

Depending on the continued economic viability of the solar energy facility following the initial 20 year operational period, the facility will be decommissioned. The decommissioning phase will extend over a period of approximately 4 months. All the existing components will be extracted from the ground and iron and steel components will be recycled where possible. The following activities will form part of the project scope during the decommissioning of the facility:

Site Preparation

Site preparation activities will include confirming the integrity of the access to the site to accommodate the required equipment (e.g. laydown areas) and the mobilisation of decommissioning equipment.

Disassembly and Removal/Replace of Existing Components

When the Project is ultimately decommissioned, the equipment to be removed will depend on the proposed land use for the site at that time. At this time, all above ground facilities that are not intended for future use at the site will be removed. All components of the solar field will be extracted from the ground, and

the surface restored to the original contours. Much of the above ground wire and steel, of which the system is comprised are recyclable materials and would be recycled to the extent feasible. The components of the plant would be deconstructed and recycled or disposed of in accordance with regulatory requirements. The site will be rehabilitated and can be returned to sheep and game farming practises.

Future plans for the site and infrastructure after decommissioning

The plant capacity would have degraded by approximately 15% over 20 years as a result of ageing infrastructure. The plant will potentially have the opportunity to generate power for a Merchant Market operation (i.e. the client would sell power on bid basis to the market).

APPROACH TO UNDERTAKING THE SCOPING PHASE CHAPTER 4

An Environmental Impact Assessment (EIA) process refers to that process (in line with the EIA Regulations) which involves the identification of and assessment of direct, indirect, and cumulative environmental impacts associated with a proposed project or activity. The EIA process comprises two main phases: i.e. **Scoping Phase** and **EIA Phase**. The EIA process culminates in the submission of an EIA Report (including an Environmental Management Programme (EMPr)) to the competent authority for decision-making. The EIA process is illustrated below in **Figure 4.1**:

Figure 4.1: The phases of an Environmental Impact Assessment (EIA) Process

The Scoping Phase for the proposed Noupoort CSP Project is being undertaken in accordance with Section 24 (5) of the National Environmental Management Act (No 107 of 1998). In terms of the EIA Regulations (2014) of GN R982, GN R983, GN R984 and GN R985, a Scoping and EIA Study is required to be undertaken for this proposed project. In accordance with these Regulations, this scoping process aims at identifying and evaluating potential issues associated with the proposed project, and defining the extent of studies required within the EIA phase. This was achieved through an evaluation of the proposed project involving desk-top specialist studies, limited field surveys, as well as a consultation process with the Interested and Affected Parties (I&APs), including directly impacted landowners, adjacent landowners, relevant State departments, ward councillors and other key stakeholders. This chapter serves to outline the process which was followed during the Scoping Phase of the EIA process.

4.1. Legal Requirements as per the EIA Regulations, 2014

This chapter of the scoping report includes the following information required in terms of Appendix 2: Content of the Scoping Report of the EIA Regulations, 2014:

Requirement	Relevant Section
(d) a description of the scope of the proposed activity, including (i) all listed and specified activities triggered and (ii) a description of the activities to be undertaken, including associated structures and infrastructure	All listed activities that are triggered through the development of the CSP Project and a description of the activities to be undertaken are included in Table 4.1 within section 4.2.
(e) a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process	Chapter 2 provides a description of the policy and legislative context. Legislation, policies, plans, guidelines, municipal development planning frameworks and instruments associated and considered for the development of the CSP Project is included within Table 2.1 and section 2.2 of Chapter 2. Section 4.2 of this chapter confirms the Listed Activities as per Listing Notices 1, 2 and 3 which are triggered by the project.
(h)(ii) details of the public participation process undertaken in terms of Regulation 41 of the Regulations, including copies of the supporting documents and inputs	The public participation process that has been undertaken (including the identification of stakeholders, the registration of interested and affected parties, the distribution of notifications and publishing of adverts, consultation and involvement of the public and the identification and recording of issues and concerns) for the scoping phase of the CSP Project is detailed within section 4.4.2 and Appendix C.
(h)(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them	All issues and concerns raised by interested and affected parties to date have been included within Section 4.4.2 and the Comments and Responses Report of Appendix C. A summary of the issues raised is provided in Table 4.4 below.

4.2. Relevant Listed Activities

In terms of the EIA Regulations, 2014 (GN R983, GN R984 and GN R985), the following listed activities are triggered by the proposed facility:

Table 4.1: Listed activities triggered by the proposed Noupoort CSP Project

Number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Description of each listed activity as per project description:
GN R983, 08 December 2014	9 (i)	The development of infrastructure exceeding 1000 metres in length for the bulk transportation of water or storm water- (i) with an internal diameter of 0,36 meters or more. ***The proposed development will include the construction of a water supply pipeline exceeding 1 000 metres in length and with an internal diameter of 0,36 meters or more.***
GN R983, 08 December 2014	11 (i)	The development of facilities or infrastructure for the transmission and distribution of electricity- (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts. ***The Noupoort CSP Project will require the construction of an on-site substation and a 132kV overhead power line outside an urban area to connect to Eskom's electricity grid.***
GN R983, 08 December 2014	12 (xii) (a) (c)	The development of (xii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse. ***The facility including associated infrastructure will be located within 32m of watercourse features occurring on the site.***
GN R983, 08 December 2014	13	The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014. ***Associated infrastructure include water storage tanks and water treatment plant with the combined capacity that exceeds***

Number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Description of each listed activity as per project description:
		50 000 m³.
GN R983, 08 December 2014	14	The development of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres. ***Hazardous substances such as fuel will be required to be stored on site. The storage containers will have a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.***
GN R983, 08 December 2014	19 (i)	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from- (i) a watercourse ***The construction activities associated with the facility and/or associated infrastructure will require the infilling or depositing of more than 5 cubic metres of material into, and the excavation or moving of soil or rock of more than 5 cubic metres from a watercourse.***
GN R983, 08 December 2014	24 (ii)	The development of – (ii) a road with a reserve wider than 13,5 metres, or where no reserve exists where the road is wider than 8 metres. ***Access and internal roads wider than 8m are required to be constructed in order to access the project site from the public road.***
GN R983, 08 December 2014	28 (ii)	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture of afforestation on or after 01 April 1998 and where such development (i) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare. ***The Noupoort CSP Project is proposed to be constructed outside an urban area with an***

Number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Description of each listed activity as per project description:
		extent of approximately 900ha.
GN R984, 08 December 2014	1	The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more; ***The total electricity output for the CSP facility will be 150MW.***
GN R984, 08 December 2014	6	The development of facilities or infrastructure for any process or activity which requires a permit or license in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent. ***A Water Use License will be required for the discharge of wastewater to the evaporation ponds.***
GN R984, 08 December 2014	15	The clearance of an area of 20 hectares or more of indigenous vegetation. ***The clearance of more than 20 hectares of indigenous vegetation will be undertaken during construction of the facility. The development footprint will be up to 900ha in extent.***

On the basis of the above listed activities, a Scoping and an EIA Process is required to be undertaken for the proposed project. This process is to be undertaken in two phases as follows:

» The Scoping Phase includes the identification of potential issues associated with the proposed project through a desktop study and consultation with I&APs and key stakeholders through a public participation process. The entire farm portion is considered within this process at a desk-top level. Through this study, areas of sensitivity within the broader site are identified and delineated in order to identify any environmental fatal flaws, and sensitive or no go areas. Following a 30-day review period of the Scoping report, this phase culminates in the submission of a final Scoping Report and Plan of Study for EIA to the DEA.
» The EIA Phase involves a detailed assessment of potentially significant positive and negative impacts (direct, indirect, and cumulative) identified in the Scoping Phase. This phase includes detailed specialist investigations and a public participation process. Following a 30-day review period of the EIA

report, this phase culminates in the submission of a Final EIA Report and an Environmental Management Programme (EMPr), including recommendations of practical and achievable mitigation and management measures, to DEA for decision-making.

4.3. Objectives of the Scoping Phase

This Scoping Report documents the evaluation of the potential environmental impacts of the proposed Noupoort CSP Project and forms part of the EIA process. The Scoping Phase was conducted in accordance with the requirements of the EIA Regulations in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998).

This Scoping Phase aims to:

» Identify and evaluate potential environmental (biophysical and social) impacts and benefits of all phases of the proposed development (including design, construction, operation and decommissioning) within the broader study area through a desk-top review of existing baseline data and specialist studies, including limited field work.
» Identify potentially sensitive environmental features and areas within the broader site in order to inform the preliminary design process of the facility.
» Define the scope of studies to be undertaken within the EIA process.
» Provide the authorities with sufficient information in order to make a decision regarding the scope of issues to be addressed in the EIA process, as well as regarding the scope and extent of specialist studies that will be required to be undertaken as part of the EIA Phase of the process.

The following objectives of the scoping process (in line with Appendix 2 of the EIA Regulations of 2014) have been met, through the undertaking of a consultative process and with the assistance of specialist input.

» The identification of relevant policies and legislation regarding the activities to be undertaken have been identified and considered within this scoping report.
» Activities to be undertaken for the development of the Noupoort CSP Project have been identified and motivated in terms of the need and desirability for the activities to take place.
» Impacts associated with the undertaking of the identified activities and technology have been identified and has resulted in the identification of suitable and preferable location and technology alternatives associated with the development of the CSP Project. The preferred site (Remaining Extent of the Farm 207, and Portion 1 and Portion 4 of the Farm Caroluspoort 167) for the development of the proposed CSP Project has been identified by the applicant through a site selection process.

» Preferred areas for the development, which are areas associated with a medium environmental sensitivity, have been identified within the site through a consultative process which includes an impact assessment process (on a desktop level and limited field work).
» Key issues associated with the CSP Project to be addressed within the assessment phase for further detailed study and ground-truthing have been identified and listed within this scoping report.
» The level of assessment, expertise and the extent of further consultation to be undertaken, with the aim of determining the extent of associated impacts of the activities through the life cycle of the CSP Project, have been identified and included within this Scoping report.

4.4. Overview of the Scoping Phase

The Scoping Phase has been undertaken in accordance with the EIA Regulations published in Government Gazette No 38282 in December 2014, in terms of NEMA. Key tasks undertaken within the scoping phase included:

» Consultation with relevant decision-making and regulating authorities (at National, Provincial and Local levels).
» Submission of the completed application form for authorisation to the competent authority (DEA) in terms of Regulations 5 and 16 of Government Notice R982 of 2014.
» Undertaking a public participation process throughout the Scoping process in accordance with Chapter 6 of Government Notice R982 of 2014 in order to identify issues and concerns associated with the proposed project.
» Undertaking of independent specialist studies in accordance with Appendix 6 of Government Notice R982 of 2014.
» Preparation of a Scoping Report and Plan of Study for EIA in accordance with the requirements of Appendix 2 of Government Notice No R982 of 2014.
» Preparation of a Comments and Response Report detailing key issues raised by I&APs as part of the Scoping phase.

The tasks are discussed in detail below.

4.4.1. Authority Consultation and Application for Authorisation in terms of GNR982 of 2014

In terms of the Energy Response Plan, the National Department of Environmental Affairs (DEA) is the competent authority for all energy related projects. As the project falls within the Northern Cape, the Department of Environment and Nature Conservation (DENC) is the commenting authority for the project. Consultation with these authorities will be undertaken throughout the Scoping process. Authority consultation has included the following:

» Submission of the application for authorisation to DEA;
» Submission of the Scoping Report for review and comment by:
  * the competent authority;
  * state department that administers a law relating to a matter affecting the environment relevant to an application for an environmental authorisation; and
  * organs of state departments which have jurisdiction in respect of the activity to which this application relates,

A record of consultation undertaken with the competent authority will be contained in **Appendix B** of the Final Scoping Report. A record authority consultation undertaken with organ of state departments undertaken during the Scoping Phase is included within **Appendix C**.

4.4.2. Public Participation Process

Public participation is an essential and regulatory requirement for an environmental authorisation process and is guided by Regulations under NEMA, specifically Regulations 41 - 44 of the EIA Regulations (GN R982 of December 2014).

The sharing of information forms the basis of the public participation process and offers the opportunity to Interested and Affected Parties (I&APs) to become actively involved in the EIA Process from the outset. The public participation process is designed to provide sufficient and accessible information to I&APs in an objective manner. The public participation process affords I&APs opportunities to provide input into and receive information regarding on the EIA process in the following ways:

» During the Scoping Phase:
  - identify issues of concern and suggestions for enhanced benefits;
  - verify that their issues have been recorded;
  - assist in identifying reasonable alternatives, where required; and
  - contribute relevant local information and knowledge to the environmental assessment.

» During the EIA Phase:
  - contribute relevant local information and knowledge to the environmental assessment;
  - verify that their issues have been considered in the environmental investigations; and
  - comment on the findings of the environmental assessments.

» During the decision making phase:
    - be advised of the outcome of the competent authority's decision, and how and by when the decision can be appealed.

The public participation process therefore aims to ensure that:
» Information containing all relevant facts in respect of the application is made available to stakeholders and I&APs.
» Participation is facilitated in such a manner that I&APs are provided with a reasonable opportunity to comment on the proposed development.
» Adequate review periods are provided to I&APs to comment on the findings of the Scoping and EIA Reports.

In terms of the requirement of Chapter 6 of the EIA Regulations of December 2014, the following key public participation tasks are required to be undertaken:

» Fixing a notice board at a place conspicuous to the public at the boundary or on the fence of—
    (i) the site where the activity to which the application relates is or is to be undertaken; and
    (ii) any alternative site mentioned in the application;
» Giving written notice to:
    (i) the owner or person in control of that land if the applicant is not the owner or person in control of the land;
    (ii) the occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
    (iii) owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
    (iv) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;
    (v) the municipality which has jurisdiction in the area;
    (vi) any organ of state having jurisdiction in respect of any aspect of the activity; and
    (vii) any other party as required by the competent authority.
» Placing an advertisement in:
    (i) one local newspaper; and
    (ii) in at least one provincial newspaper.
» Open and maintain a register/ database of interested and affected parties and organs of state.
» Release of a Scoping and EIA Report for Public Review
» Preparation of a Comments and Responses Report which documents all of the comments received and responses from the project team.

In compliance with the requirements of Chapter 6 of the EIA Regulations, 2014, the following summarises the key public participation activities conducted to date.

i. Placement of Site Notices

Site notices (in English and Afrikaans) have been placed at visible points along the boundaries of the site (Remaining Extent of the Farm 207, and Portion 1 and Portion 4 of the Farm Caroluspoort 167). Additional project notices have been placed at the Umsobomvu Local Municipality offices in Noupoort and at the Umsobomvu Local Municipality offices in Colesberg. Photographs of the site notices are included in Appendix C.

ii. Identification of I&APs and establishment of a database

I&APs have been identified through a process of networking and referral, obtaining information from Savannah Environmental's existing stakeholder databases, liaison with potentially affected parties in the study area and a registration process involving completion of a registration and comment sheet. The key stakeholder groups identified include authorities, local and district municipalities, ward councillors, government bodies and state owned companies, directly affected and adjacent landowners, public stakeholders and non-governmental organisations. An initial list of stakeholders identified and registered is listed in **Table 4.2** below:

Table 4.2: List of Stakeholders identified during the Scoping Phase

Organs of State
National Government Departments
Department of Agriculture, Forestry and Fisheries (DAFF)
Department of Communications
Department of Energy (DoE)
Department of Environmental Affairs (including the Conservation & Biodiversity Directorate)
Department of Mineral Resources (DMR)
Department of Rural Development and Land Reform (DRDLR)
Department of Water and Sanitation (DWS)
Government Bodies and State Owned Companies
Eskom SOC Limited
National Energy Regulator of South Africa (NERSA)
Sentech
South African Civil Aviation Authority (CAA)
South African Heritage Resources Agency (SAHRA)
South African National Roads Agency Limited (SANRAL)
Square Kilometre Array: Southern Africa

Telkom SA Ltd
Provincial Government Departments
Ngwao-Boswa Ya Kapa Bokone (Northern Cape Provincial Heritage Resources Authority)
Northern Cape Department of Agriculture, Land Reform and Rural Development
Northern Cape Department of Environment and Nature Conservation (DENC)
Northern Cape Department of Roads and Public Works
Local Government Departments
Pixley ka Seme District Municipality
Umsobomvu Local Municipality
Key Stakeholders
BirdLife South Africa
Landowners
Affected landowners and tenants
Neighbouring landowners and tenants

As per Regulation 42 of the EIA Regulations, 2014 all relevant stakeholder and I&AP information has been recorded within a register of I&APs (refer to **Appendix C** for a listing of recorded parties).

While I&APs have been encouraged to register their interest in the EIA process from the onset, the identification and registration of I&APs will be on-going for the duration of the EIA process. The register of I&APs will be updated throughout the EIA process, and will act as a record of the parties involved in the public participation process.

iii. Newspaper Advertisements

During the Scoping Phase, a newspaper advertisement will be placed to notify and inform the public of the proposed EIA process being undertaken for the CSP facility, announce the availability of the Scoping Report for review and invite members of the public to submit comments and register as I&APs for this process. This advert will be placed in the Graaff-Reinet Advertiser at the onset of the review period of the Scoping Report

Copies of all the advertisement tear sheets will be included within **Appendix C** of the final Scoping Report which will be submitted to the competent authority.

iv. Consultation

In order to provide information regarding the proposed Noupoort CSP Project and the EIA process, a background information document (BID) has been compiled (refer to **Appendix C**). The BID and a written notice notifying I&APs of the EIA process was distributed to identified stakeholders and I&APs in April 2016. Copies

of the BID have been made available at public venues within the surrounding areas of the study area. The BID is also available electronically on the Savannah Environmental website.

In order to accommodate the varying needs of stakeholders and I&APs within the communities surrounding of the study area, as well as capture their views, issues and concerns regarding the project, various opportunities have been and will continue to be provided in order for I&APs to have their issues noted. I&APs have been consulted through the following means:

» Focus group meetings (pre-arranged and stakeholders invited to attend – for example with municipal managers and ward councillors)
» One-on-one consultation meetings (for example with directly affected or surrounding landowners)
» Telephonic consultation sessions
» Written, faxed or email correspondence
» The draft Scoping Report has been released for a 30-day review period from 30 June 2016 – 1 August2016. The comments received from I&APs will be captured within a Comments and Responses Report, and will be included within the Scoping Report.

A summary of consultation activities undertaken as part of the public participation process to date is provided in Table 4.3 below:

Table 4.3 Consultation undertaken with I&APs for the Noupoort CSP Project

Scoping Phase	Activity	Date
	Distribution of the background information document and letters announcing the EIA process and inviting I&APs to register on the project's database. These letters were distributed to organs of state departments, ward councillors, affected landowners, neighbouring landowners within the study area and key stakeholder groups.	4 April 2016
	Placement of site notices on-site and at public venues located within the study area.	7 – 8 April 2016
	Focus group meetings held with officials from the Umsobomvu Local Municipality.	7 April 2016
	One-on-one meetings held with directly affected and adjacent landowners.	7 – 8 April 2016
	Distribution of notification letters announcing the availability of the Scoping Report for review to I&APs via email notifications and registered post.	30 June 2016
	Distribution of the Scoping Report and notification letters inviting comment on the report via courier to organ of state departments.	30 June 2016

	Placement of advertisements in the Graaff-Reinet Advertiser at the onset of the review period of the Scoping Report.	30 June 2016
	30-day review period for the Scoping Report for comment.	30 June 2016 – 01 August 2016

A record of all consultation undertaken is included in **Appendix C**.

v. Identification and Recording of Issues and Concerns

Issues and comments raised by I&APs to date have been synthesised into a Comments and Responses Report, and summarised in **Table 4.4** below. The Comments and Responses Report includes detailed responses from members of the EIA project team and/or project proponent. Additional comments and issues raised during the review period of the Scoping Report will be included in the final Scoping Report that will be submitted to the DEA. The Comments and Response Report is included in the Scoping Report within **Appendix C**.

Table 4.4: Summary of issues raised through the Public Participation Process

Summary of main issues raised by I&APs	Summary of response from EAP
The Umsobomvu Local Municipality noted that with previous renewable energy projects, construction workers were sourced from Middleburg and the revenue was therefore taken to another Municipality.	An economic development specialist has been appointed by the Noupoort CSP Project whereby an intensive community needs- and opportunity analysis will be undertaken. During this process, the skills levels, job creation opportunities etc. will be investigated. Should the project be selected as a Preferred Bidder approaching Financial close, the process to recruit construction workers as well as where to house them (if applicable) etc. will be clearly defined.
The Umsobomvu Local Municipality identified the need for an accredited skills training programme to be implemented as part of the project. The municipal officials felt that local workers should benefit from the project on a long term basis and not only during the construction phase.	In accordance with the Department of Energy's IPP programme, funding for skills transfer becomes available to the project only during the operation phase. Should the project's financial model allow for skills transfer during the construction phase, it will be implemented. Furthermore, enterprises will be identified for mentoring, training and coaching with the intent to procure services from these businesses during the operation phase, as far as reasonably practical.
Landowners were concerned that there	Two grid connection options are being

would be insufficient grid capacity available at the Newgate Substation and queried whether alternative grid connection options were being considered.	considered by the project proponent: i. A direct connection to the 132kV Newgate Substation, ii. A direct connection to the 66kV Noupoort Substation, as well as to the 132kV Newgate Substation.
Landowners queried the need for an avifaunal impact study. They sought clarity on what impact the birds in the area would have on the project. It was noted that Blue Cranes and Korhaans are prevalent in the study area.	Several bird species (including Blue Cranes) have been identified within the site and areas utilised for roosting and breeding have been demarcated as No-go or sensitive areas. The area available for development are restricted by the birds as project layout will need to avoid all No-go areas.
An adjacent landowner expressed his concern regarding the visual impact that the project may have. He queried whether the reflection from the facility would be seen from far away.	The visual desk-top scoping assessment indicates that the construction of the CSP facility will have a visual impact to a limited extent on relatively natural areas surrounding the development area. The character of the affected area will change which will have the effect of industrialising the character of the landscape surrounding it. However, as the site is located immediately adjacent to a town centre and there is a windfarm already under construction in close proximity to the town, this change will be minimal. A Visual Impact Assessment (VIA) will be undertaken in the EIA phase of the proposed project to assess the potential impact in detail and to recommend appropriate mitigation measures.
An adjacent landowner asked why the project developer selected the proposed site. He felt that the project should be constructed further away from the town of Noupoort.	The proposed site is considered to be highly desirable for the development of a CSP project due to its suitable topography (i.e. in terms of flat slope), site access (i.e. to facilitate the movement of machinery during the construction phase and operations staff in the long-term), land availability (i.e. the land is secured for the intended use), the extent of the site (i.e. the land parcel is able to accommodate the 900 ha required for the facility), and enabling optimal placement of the infrastructure considering potential environmental sensitivities or technical

	constraints. The site selected is also in close proximity to grid connection options, namely the Newgate and Noupoort substations. Furthermore, the site selected has already been zoned for solar use.
Both the directly affected landowners stated that farming infrastructure, including windmills and animal feeding troughs would be removed in order to accommodate the project. It was further noted that the artificial wetland identified on the boundary of Portion 1 and 4 of the farm Carolus Poort 167 would be removed once the windmill is moved.	It is noted that the farming infrastructure would be moved in order to accommodate the project. If open water sources are removed, it will reduce the risk of Blue Cranes colliding with the project infrastructure but not eliminate it.
I&APs queried where the water required for the project would be sourced from.	The developer is considering sourcing water from the local municipality and the Umsobomvu Local Municipality has approved water allocation to the Noupoort CSP Project.

4.4.3. Review of the Scoping Report

The Scoping Report is available for 30 days for review from **30 June 2016 – 01 August 2016** at the following locations:

» Hard copy at the Hanover Public Library, 16 Darling Road.
» Hard copy at the Noupoort Public Library, 4 Shaw Street.
» Available for download at www.savannahSA.com.

All registered I&APs have, at the commencement of the review period, been notified of the availability of the Scoping Report for review via email and registered post (refer to **Appendix C**).

4.4.4. Authority and State Department comments on the Scoping Report

Organs of State/Authorities who have jurisdiction over matters relating to the environment, have been invited to comment on the Scoping Report (refer to **Appendix C**). Copies of the Scoping Report have been submitted to the following State departments for review and comments:

» Department of Agriculture, Forestry and Fisheries (DAFF)
» Department of Energy (DoE)

» Department of Environmental Affairs: Biodiversity and Conservation Directorate (DEA)
» Department of Mineral Resources (DMR)
» Department of Rural Development and Land Reform (DRDLR)
» Department of Water and Sanitation (DWS)
» Eskom SOC Limited
» South African Heritage Resources Agency (SAHRA)
» South African National Roads Agency Limited (SANRAL)
» Square Kilometre Array: Southern Africa
» Ngwao-Boswa Ya Kapa Bokone (Northern Cape Provincial Heritage Resources Authority)
» Northern Cape Department of Agriculture, Land Reform and Rural Development
» Northern Cape Department of Environment and Nature Conservation (DENC)
» Northern Cape Department of Roads and Public Works
» Pixley ka Seme District Municipality
» Umsobomvu Local Municipality

4.4.5. Evaluation of Issues Identified through the Scoping Process

Issues (both direct and indirect environmental impacts) associated with the proposed project identified within the scoping process have been evaluated through desk-top studies. In identifying and evaluating potential impacts, the following specialists have provided input into the scoping process, as outlined in **Table 4.3** below.

Table 4.3: List of specialists providing an evaluation of the potential impacts associated with the Noupoort CSP Project.

Specialist	Area of Expertise	Refer Appendix
Gerhard Botha (Enviro-Niche Consulting)	Ecology	Appendix D
Johan van Niekerk (Independent Ornithologist)	Avifauna	Appendix E
Jaco van der Walt (Heritage Contracts and Archaeological Consulting CC (HCAC))	Heritage and Archaeology	Appendix F
Elize Butler (Bloemfontein National Museum)	Palaeontology	Appendix G
Garry Paterson (ARC)	Soils and Agricultural Potential	Appendix H
Candice Hunter (Savannah Environmental)	Social	Appendix I
Dr Neville Bews (Neville Bews and Associates)	Social Peer Review	Appendix I1
Jon Marshall (Afzelia Environmental Consultants)	Visual	Appendix J

In order to evaluate issues and assign an order of priority, the following methodology was used to identify the characteristics of each potential issue/impact:

» *the nature,* which includes a description of what causes the effect, what will be affected and how it will be affected
» *the extent,* wherein it is indicated whether the impact will be local (limited to the immediate area or site of development), regional or national.
» identify *sensitive receptors* that may be impacted on by the proposed facility and the types of impacts that are most likely to occur.
» the *significance* of potential impacts in terms of the requirements of the EIA Regulations (including (nature, significance, consequence, extent, duration and probability of the impacts, the degree to which these impacts a) can be reversed; (b) may cause irreplaceable loss of resources; and (c) can be avoided, managed or mitigated.
» identify the potential impacts that will be *considered further* in the EIA Phase through detailed investigations.

The evaluation of the issues resulted in a description of the nature, significance, consequence, extent, duration and probability of the identified issues, as well as recommendations regarding further studies required within the EIA phase. Specialist Scoping Reports are contained within **Appendices D – J**.

4.4.7. Finalisation of the Scoping Report

The final stage in the Scoping Phase will entail the capturing of comments from stakeholders and I&APs on the Scoping Report in order to finalise the Scoping Report for submission of the final Scoping Report to the Department of Environmental Affairs for consideration. The final Scoping report will include an updated Comments and responses report detailing all comments submitted during the review period, as well as where these issues have been addressed in the scoping report, or how these can be addressed in the EIA phase. Copies of all comments will also be submitted in the final report.

DESCRIPTION OF THE RECEIVING ENVIRONMENT CHAPTER 5

This section of the Scoping Report provides a description of the environment that may be affected by the Noupoort CSP Project. This information is provided in order to assist the reader in understanding the possible effects of the proposed project on the environment. Aspects of the regional, local, and site-specific biophysical, social, and economic environment that could directly or indirectly be affected by, or could affect, the proposed development have been described. This information has been sourced from both existing information available for the area as well as collected field data, and aims to provide the context within which this EIA is being conducted.

This chapter of the scoping report includes the following information required in terms of the EIA Regulations, 2014 - Appendix 2: Content of the Scoping Report:

Requirement	Relevant Section
(h)(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects	The environmental attributes associated with the development of the CSP Project is included as a whole within this chapter. The environmental attributes that are assessed within this chapter includes the following:
	• The regional setting refers to the location of the site. This is included in section 5.1.
	• The climatic conditions associated with the Noupoort area, as well as the site. This is included in section 5.2.
	• The biophysical characteristics of the area including topography, soil types, agricultural potential, ecological profile and avifaunal profile. This is included within section 5.3.
	• The social characteristics, including the socio-economic profiles of the regional context and local context. This is included in section 5.4.
	• Available access and transportation routes in the region of the study area and surrounding the site. This is included in section 5.1.
	• The visual quality of the area is included in section 5.5.
	• Heritage features that occur in the region, including archaeological and

Requirement	Relevant Section
	palaeontological resources. This is included in section 5.6 and section 5.7.

A more detailed description of each aspect of the affected environment is included within the specialist reports contained within **Appendices D – J**.

5.1 Regional Setting: Location of the Study Area

The proposed project site[5] is located approximately 4 km north west of Noupoort in the Northern Cape Province, approximately 40km of Middleburg and approximately 60km of Hanover and Colesberg. Noupoort is a town in the eastern Karoo region that principally revolved around the railways and is still used as a traction change-over facility from diesel to electric locomotives on the Noupoort-Bloemfontein line. It links up with the electric line to De Aar, part of the main artery for iron ore and manganese exports from the Northern Cape through Port Elizabeth Harbour on the south coast. Commercial activity in Noupoort is heavily dependent on railway activity. Noupoort is considered to be the centre of the karakul sheep and dried fruit industries.

The study area falls within the Umsobomvu Local Municipality, which prides itself as a natural transportation route for people travelling to destinations such as Cape Town, Port Elizabeth, Gauteng and Bloemfontein since two of the major national roads, namely N1 and N9 pass through the Municipality. The regional road, R389, is located adjacent to the southern boundary of the site, while the Wildfontein road which is aligned along the eastern boundary. This local municipality is one of eight local municipalities that fall within the greater Pixley ka Seme District which is situated south east within the Northern Cape Province.

5.2 Climatic Conditions

The long-term average annual rainfall in this region of the Northern Cape is only 340 mm, with a year-round distribution, with a peak typically in the summer months. Rainfall events are erratic, both locally and seasonally and therefore cannot be relied on for agricultural practices. The average evaporation is 2 183mm per year, peaking at 9.9mm per day in December.

The climate of the Noupoort area has the following characteristics (as illustrated in **Figure 5.1**): i) rainfall occurs mainly in summer and autumn with very dry winters; ii) the mean annual rainfall is about 417mm, with March typically being the wettest month, averaging at about 72 mm and July being

[5] Project site is defined as the site on which the project is proposed on and refers to the Remaining Extent of the Farm 207, Portion 1 and Portion 4 of the Farm Carolus Poort 167.

the driest with an average of only 11 mm; iii) the average annual temperature in Noupoort is 13.6°C, with January being the warmest (ave. 20.6°C) and July being the coldest (ave 5.2°C). Frost is frequent to very frequent in winter (mean frost days up to 50 days per year).

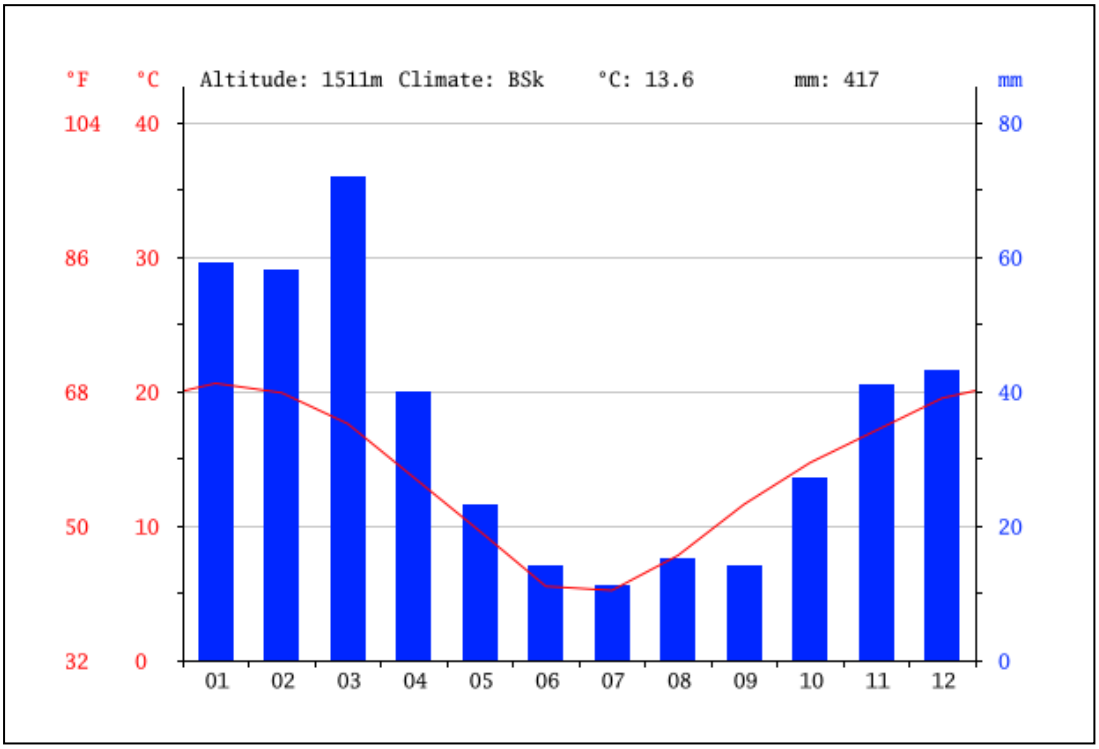

Figure 5.1: Climate graph for the town of Noupoort, Northern Cape.

5.3 Biophysical Characteristics of the Study Area

The following section provides an overview and description of the biophysical characteristics of the study area.

5.3.1 Topography

The area is generally flat to gently undulating and lies at a height of between 1 480 - 1 520 m above sea level, sloping (with an average slope of 14%) towards the Noupoortspruit to the north-east. The south-western and far northern portions of the site are more undulating and characterised by low ridges and outcrops. The northern and eastern boundary of the Remaining Extent of Farm 207 is demarcated by a high, steep sloping (26%), but narrow dolerite ridge. The highest point of the study area is associated with this range (1601m asl), while the lowest areas are associated with the valley-bottom wetland systems associated with the tributary of the Noupoortspruit (1463m asl) as well as the Noupoortspruit valley (1468m asl).

The development site is situated within the distal parts of the footslopes of the Afrikasberg Mountains, where it marks the transition into an extensive flat plains area extending to the north and west. To the east of the town of Noupoort the landscape becomes more rugged marking the western slopes of the Kikvarsberge Mountains.

5.3.2 Geological Profile

The geology of the area comprises of parent material from the Karoo Sequence. The study area is dominated by mostly siliciclastic (sandstone) rocks and within limited areas mudstone and shale, all of which belonging to the Adelaide Subgroup (Beaufort Group) (refer to **Figure 5.2**). An intrusion of Karoo Dolerite Suite is present in most of the central portion of the Remaining Extent of the Farm 207 extending into north-western corner of Portion 4 of the Farm Carolus Poort 167. This intrusion is characterised by fine grained felsic rock and is absent from Portion 1 of the Farm Carolus Poort 167. Small Jurassic Karoo Dolerite dykes / sills are present in the south-west and northern sections of the study area. Pedisediments are frequent, especially to the eastern boundary of the study area.

5.3.3 Soil Types and Agricultural Potential

The broader study area is dominated by the Da and Ib land type group. The Da group refer to soils where the red B-horizon (subsoil) has a strong to very strongly developed structure, usually also with a high clay content. The soil is therefore mostly imperfectly to poorly drained and the strong structure in the subsoil places a restriction on root development. Due to the fact that most of these soils have a sandier topsoil on a clay subsoil, they are usually sensitive to erosion if poor management practices are exercised, specifically overgrazing (Land Type Survey Staff, 1987). The Ib group of land types refers to land types with a soil pattern difficult to accommodate elsewhere. These land types are characterised by exposed rock (exposed country rock, stones or boulders) covering 60 – 80% of the area.

The Da14, Da 26, Da77 and Ib316 land types have been identified within the study area as described in **Table 5.1** and **Figure 5.3**.

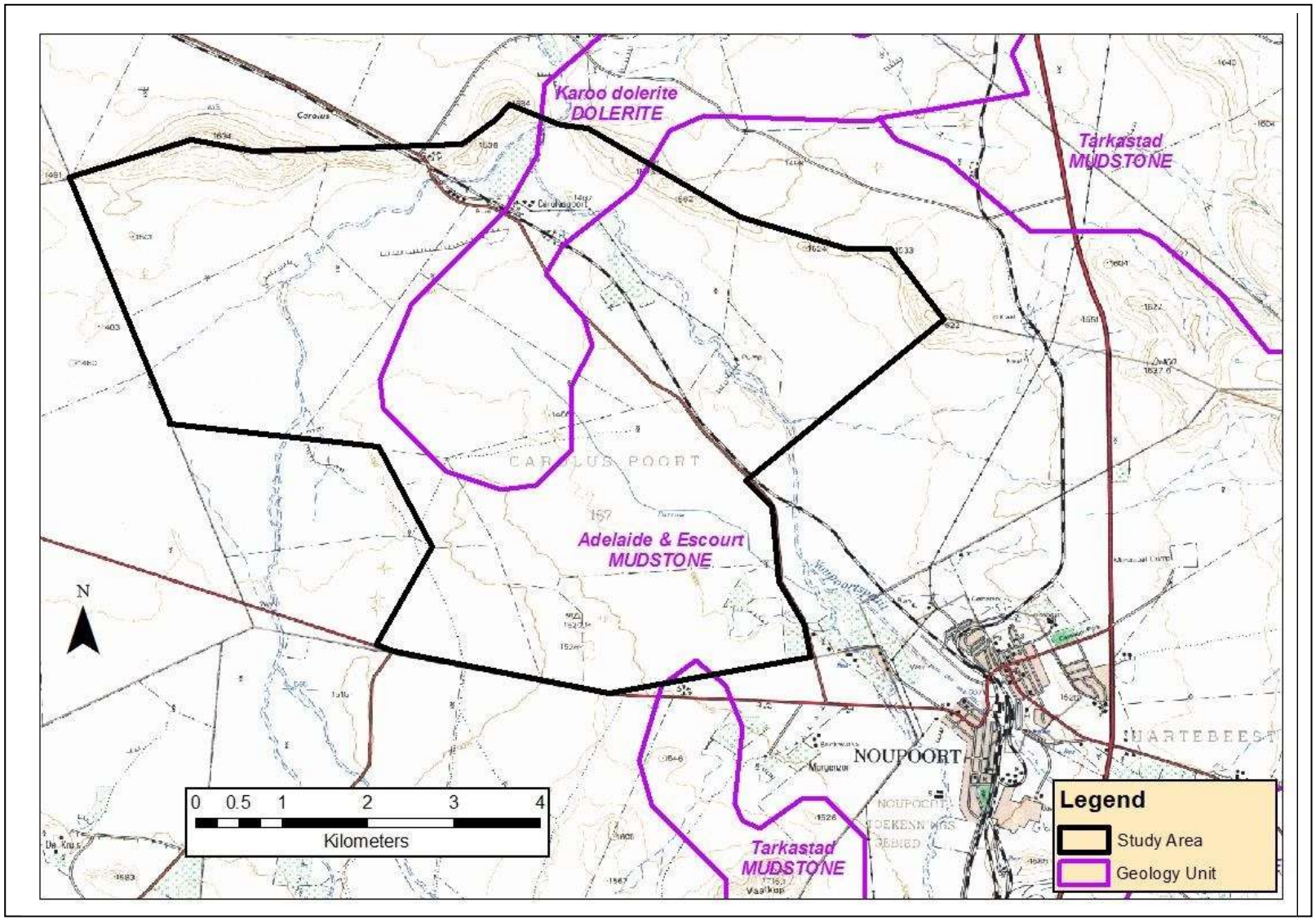

Figure 5.2: Map showing predominant geological units for the broader study area, including the site earmarked for the Noupoort CSP Project site.

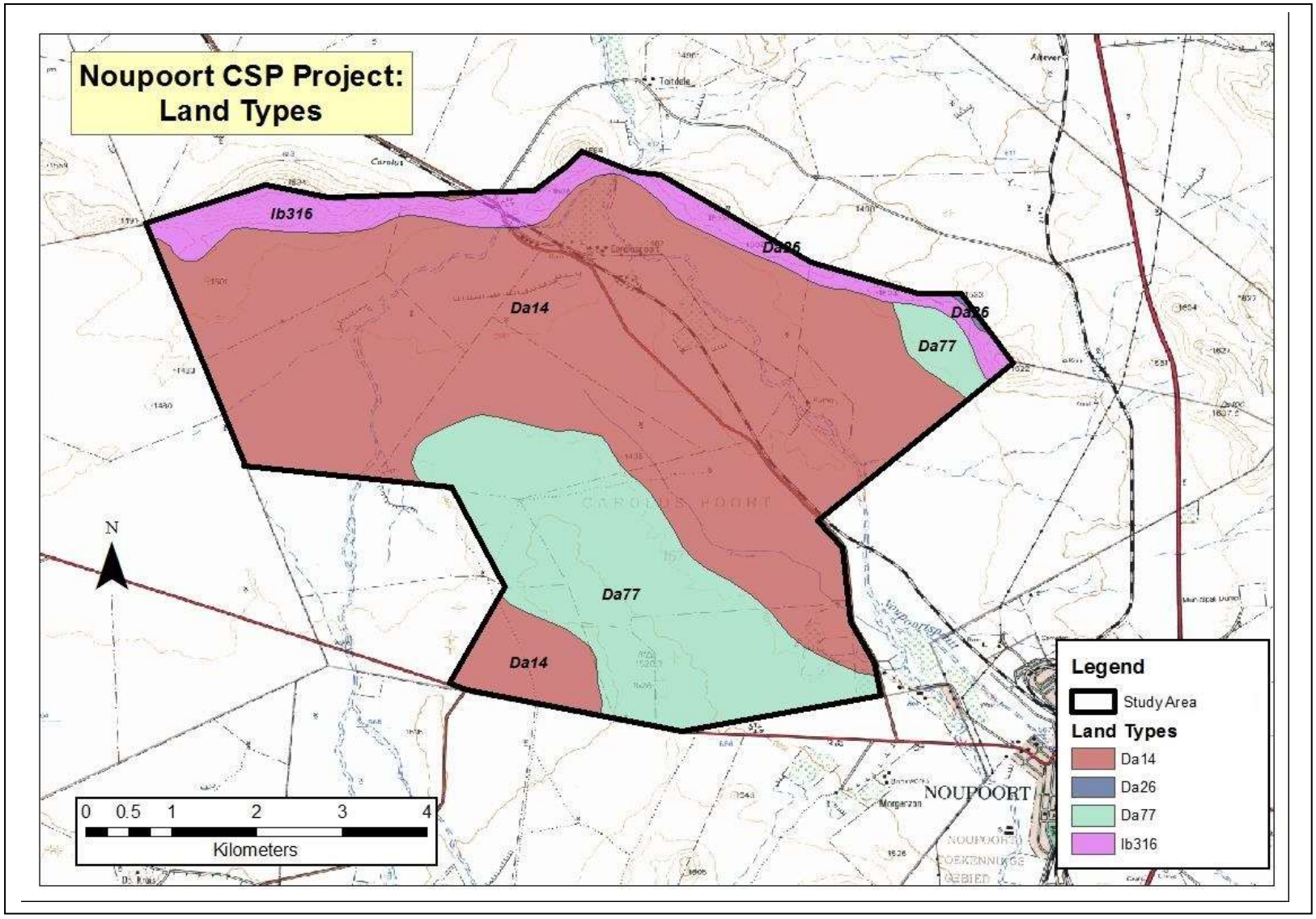

Figure 5.3: Map indicating land types of the project site for the Noupoort CSP Project.

Table 5.1: Characteristics of land types occurring within the study area.

Land Type	Depth (mm)	Dominant soils	Characteristics
Da14	450-1000	Swartland 10/11/21	Red-brown, sandy loam topsoil on red-sandy clay loam to clay loam, structured subsoil, sometimes calcareous.
	450-1000	Swartland 31/41	Brown, sandy loam topsoil on brown, structured subsoil, sometimes calcareous.
Da26	450-1000	Swartland 10/11/21	Red-brown, sandy loam topsoil on red-brown, sandy clay loam to clay loam, structured subsoil, sometimes calcareous.
	50-200	Mispah/Glenrosa	Brown, sandy loam to sandy clay loam topsoil on hard to weathering rock.
Da77	450-1200	Swartland 21/31 + Valsrivier 21/41	Red-brown, sandy loam topsoil on red and brown, sandy clay loam to clay loam, structured subsoil, usually calcareous.
	450-1000	Swartland 10/11	Red-brown, sandy loam topsoil on brown, clay loam, structured subsoil, non-calcareous.
Ib316	-	Rock	Exposed rock outcrops.
	50-100	Mispah 10	Brown, sandy loam to sandy clay loam topsoil on hard rock.

Much of the area comprises red to reddish-brown, duplex soils of the Swartland and Valsrivier forms (**Table 5.1**). Duplex soil are most common in the sub-humid and drier parts of South Africa. The main characteristic of these soils are that the orthic-A horizon often has a weak structure and when it contains sufficient fine particles (especially silt and fine sand with some clay) it may become hard or very hard when dry – a feature known as hard-setting (Fey, 2010). The topsoil abruptly overlies a structured, clayey, often calcareous subsoil horizon. The B horizon is often sufficiently hard and dense to be an impediment to both root growth and water movement. Salinity may be evident in the more arid duplex soils, especially within or immediately below the B horizon. The amount of organic material is also generally low for this group.

These soils are very susceptible to erosion when the topsoil horizon becomes exposed, either by agricultural activity or overgrazing by livestock. As a consequence, the agricultural potential is low to moderate at best, and there is a strong requirement for continuous management measures if these soils are to be

utilised. In addition, the very low rainfall in the area indicate that the only means of cultivation would be by irrigation. Some cultivated lands can be seen to the east of the study area, close to the Noupoortspruit, but in general the study area is devoid of cultivation agricultural activities.

Erosion risk

Erodibility and the impediment presented by the B horizon to water and plant roots are the most notable concerns relating to duplex soils. The main cause of erosion is clay dispersion, which give rise to surface crusting, which in turn reduces the infiltration of rainwater and intensifies surface runoff. Gully erosion can become especially severe in the cumulic forms derived from deep pedisediments on concave footslopes (as appears to be present along the southern boundary of the study area) once the main solum is breached and highly unstable subsoil clay is exposed. Slaking and spalling of the subsoil leads to undercutting and eventual collapse of the topsoil.

5.3.4 Hydrology and Geohydrology

The study area is located within the distal (southern) portion of the Upper Orange River Water Management Area (Vanderkloof Sub Catchment area) and within the D32G sub-quaternary catchment area (Seekoei River). The most prominent river system within region is the ephemeral Noupoortspruit River which is a tributary of the Seekoei River. According to the Present Ecological State (DWS PES, 1999) the condition of the Noupoortspruit River is classified as Class C, which indicates that the river has undergone moderate levels of modifications.

The broader study area is characterised by a complex of wetland systems (**Figure 5.4** and **Figure 5.5**). These systems largely surround the project site, and converge on the northern boundary of the site. This project site is situated within a valley/low lying section along the distal parts of the footslopes, where the landscape starts to even out into a flat outstretched plain. The channelled valley-bottom wetlands are mostly associated with the Noupoortspruit River and its tributary. Apart from these channelled wetlands, most are unchannelled valley-bottom wetlands and due to the gradual and low slope of the area water rather flows slowly as a sheet of outstretched water within these wetland systems towards the Noupoortspruit and tributary where they join up to form channelled drainage lines. The morphology and hydrological regime of these wetland systems have already been greatly altered and transformed by numerous anthropogenic activities, including numerous dam structures of various sizes, artificial channels, channelling surface flow from the surrounding wetlands towards the dams, gravel pits and ploughing for cultivation.

Rainfall in the Karoo is usually erratic and associated with thunderstorms and short spells of flashfloods, where most of the water flows as surface water

towards the lower lying areas and therefore a good cover of plants is important in preventing erosion during such downpours. Apart from the main channels of the Noupoortspruit and its tributary, other smaller channels associated with these wetlands can either be natural due to the natural acceleration of water where slopes increase resulting in channel beds being formed or unnatural. Natural channels usually have a shallow and narrow morphology with overspill or flooding sections adjacent to these channels. Unnatural channels have formed in areas where the vegetation cover has been removed and the exposed soils subject to the effects of erosion. Where there is an increase in slope on the site, and where the soils are characterised by sandy colluvial soils, erosion gullies and rills have formed. Trampling and overgrazing has most likely contributed to the accelerated effect of erosion noted in the study area. Although these gullies and rills are relative restricted, an increase in stocking rates and continual overgrazing may lead to the spread of these channels and gullies, losing valuable grazing land and causing a change in the hydrological dynamics of the study area.

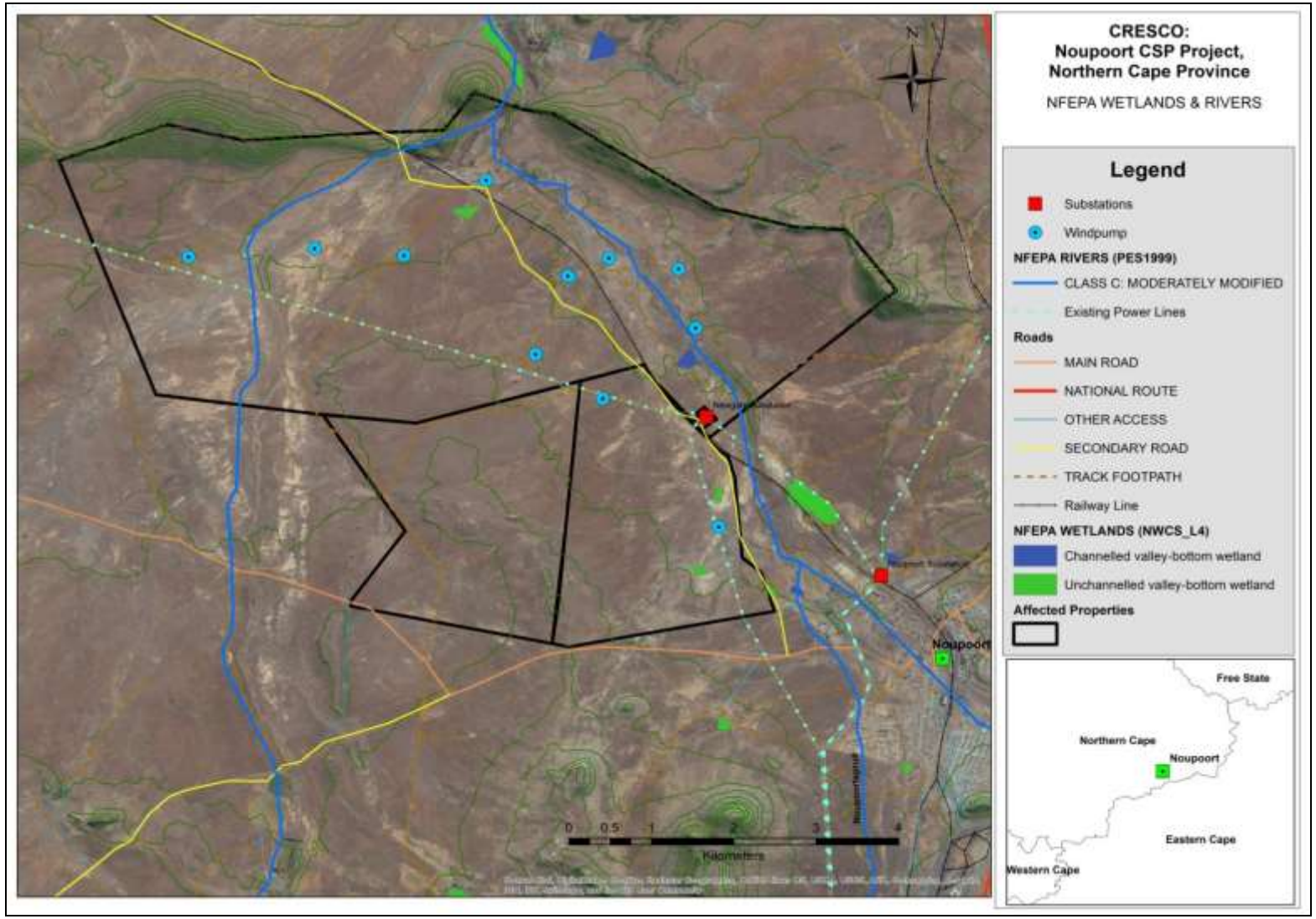

Figure 5.4: Wetlands and rivers as identified within the National Freshwater Priority Areas (NFEPA) found within the broader study area.

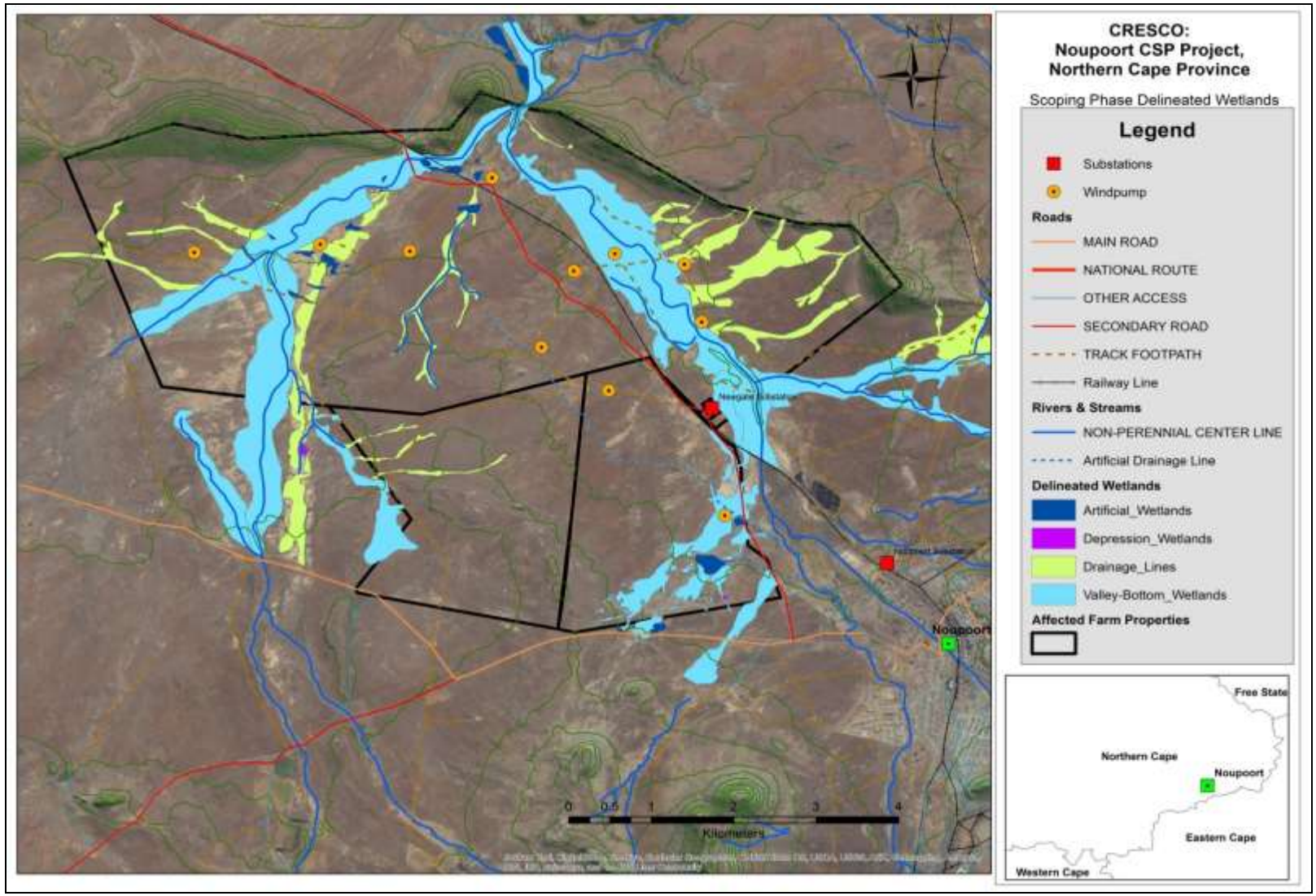

Figure 5.5: Delineated wetlands and drainage lines (without buffers) within and surrounding the Noupoort CSP Project site

5.3.5 Ecological Profile

Vegetation

The study area is situated in the Nama-Karoo biome and Upper Karoo Bioregion. The vegetation type in and surrounding the study area is identified as Eastern Upper Karoo (NKu 4). The distribution of the vegetation type is spread across the Northern Cape, Eastern Cape and Western Cape Provinces, between Carnarvon and Loxton in the west, De Aar, Petrusville and Venterstad in the north, Burgersdorp, Hofmeyr and Cradock in the east and the Great Escarpment as well as Sneeuberge-Coetzeesberge mountain chain in the south. This vegetation type has been described by Mucina and Rutherford (2006) as a flats and gently sloping plains dominated by dwarf microphyllous shrubs, with 'white' grasses of the genera *Aristida* and *Eragrostis*. The grass cover increases along a gradient from southwest to northeast.

Important taxa found within this vegetation unit include:

» Tall Shrubs: *Lycium cinereum, L. horridum, L. oxycarpum.*

» Low Shrubs: *Chrysocoma ciliata, Eriocephalus ericoides subsp. ericoides, E. spinescens, Pentzia globosa, P. incana, Phymaspermum parvifolium, Salsola calluna, Aptosimum procumbens, Felicia muricata, Gnidia polycephala, Helichrysum dregeanum, Pteronia glauca* and *Rosenia humilis.*

» Succulent Shrubs: *Euphorbia hypogaea, Ruschia intricata*.

» Herbs: *Indigofera alternans, Pelargonium minimum, Tribulus terrestris*

» Geophytic Herbs: *Moraea pallida, Moraea polystachya, Syringodea bifucata, S. concolor*

» Succulent Herbs: *Psilocaulon coriarium, Tridentata jucunda, T. virescens*

» Graminoids: *Aristida congesta, A. diffusa, Cynodon incomplectus, Eragrostis bergiana, E. bicolor, E. lehmanniana, E. obtusa, Sporobolus fimbriatus, Stipagrostis ciliata, Tragus koelerioides, Aristida adscensionis, Chloris virgata, Cyperus usitatus, Digitaria eriantha, Eragrostis curvula, Fingerhuthia africana, Themeda triandra*.

Conservation status of broad vegetation types

The vegetation types of South Africa have been categorised according to their conservation status which is, in turn, assessed according to the degree of transformation and rates of conservation. The status of a habitat or vegetation

type is based on how much of its original area still remains intact relative to various thresholds. **Table 5.2** indicates the conservation status of the Eastern Upper Karoo vegetation type found within and surrounding the project area. According to Mucina and Rutherford (2006) only 2% of the unit has been transformed, largely due to building of dams. The alien plant *Medicago laciniata* is a very common and widespread alien plant within this unit.

Table 5.2: Conservation status of the vegetation type occurring in and around the study area.

Vegetation Type	Target (%)	Transformed (%)	Erosion (%)n		Conservation Status	
			Moderate	High	Driver *et al*., 2005; Mucina & Rutherford, 2006	National Ecosystem List (NEM:BA)
Eastern Upper Karoo	21%	2%	60%	38%	Least Threatened	Least Threatened

Protected and Listed Plant Species

Of the species that are considered to occur within the geographical area under consideration, there are 10 species which are regarded conservation-worthy. Three species recorded in the quarter degree grids are listed on the Red List plant species. According to the South African Red List Categories, one is listed as Critically Endangered (*Gnaphalium simii*), one species as Endangered (*Brunsvigia litoralis*), 5 species as rare (*Euryops petraeus, Gethyllis longistyla, Syringodea pulchella, Kogelbergia verticillata* and *Selago retopilosa*) and one species as declining (*Boophane disticha*). The remaining two species (*Howorthia bolusii var. bolussi* and *Trichodiadema rogersiae*) are regarded as data deficient.

According to Mucina and Rutherford (2006) 8 species are known to be endemic to the Eastern Upper Karoo namely; *Chasmatophyllum rouxii, Hertia cluytiifolia, Rabiea albinota, Salsola tetrandra, Phymaspermum scoparium, Aspalathus acicularis subsp. planifolia, Selago persimilis* and *Selago walpersii*. None of these endemic species or species endemic to South Africa has been recorded within the POSA Species List for the relevant degree grid.

Apart from the Red Data species, a further 124 species are protected within the Northern Cape Nature Conservation Act, Act 9 of 2009 (NCNCA). No tree species were recorded within the Quarter Degree Grids that are protected according to the National Forest Act (NFA).

5.3.6 Faunal Communities

Mammals

The potential diversity of mammals within the study area is moderate with as many as 58 terrestrial mammals potentially occurring within the area. The

diversity of habitat types found within the greater area, as well as within the study area itself provide a wide spectrum of niches that may potentially be occupied by these species. Habitat diversity within the greater environment includes slopes, escarpments and plateaus of mountains to the south and east, plains to the north and west, dolerite and sandstone outcrops and various forms of wetlands (most are ephemeral). Within the study area itself habitat diversity include the dolerite and sandstone outcrops to the south (various micro-niches created within these outcrops), sloping plains (these plains contain both elements of karroid shrublands as well as grasslands, contributing furthermore to the potential biodiversity), ephemeral wetlands and artificial water bodies (e.g. dams and water points).

A number of antelope species have been recorded by the ADU (Animal Demographic Unit) within the 3124 Degree Grid. Most of these antelope species are confined by fences and occur only where farmers have introduced them or allow them to persist and should be considered as part of the farming system rather than as wildlife per se. Some of these South African indigenous antelope species do not have a natural distribution within the specific region but as mentioned have been introduced by farmers. Such antelope species include; Black Wildebeest (*Connochaetes gnou*) Blesbuck (*Damaliscus dorcas* subsp. *phillipsi*), Grey Rhebok (*Pelea capreolus*), Mountain Reedbuck (*Redunca fulvorufula*), Greater Kudu (*Tragelaphus strepsiceros*) and Springbok (*Antidorcas marsupialis*). Both Duiker (*Sylvicapra grimmia*) and Steenbok (*Raphicerus campestris*) are adaptable species that are able to tolerate high levels of human activity.

There are, however, several factors which will reduce the actual number of species present with the study area. This includes fractured landscape (fences of small grazing camps, roads etc.), surrounding agricultural practices (e.g. cultivation), the presence of large roads (such as R389) and other anthropogenic activities.

Table 1: Species listed as conservation-worthy within the South African Red Data Base (SA RDB) as well as IUCN Red List.

Species	Common Name	Statues
Chlorotalpa sclateri	Sclaters Golden Mole	SA RDB: Protected
Atelerix frontalis	South African Hedgehog	SA RDB: Protected
Smutsia temminckii	Ground Pangolin	IUCN: VU and SA RDB: VU
Hyanena brunnea	Brown Hyena	IUCN: NT and SA RDB: Protected
Felis nigripes	Black-footed cat	IUCN: VU and SA RDB: Protected
Mellivora capensis	Honey Badger	SA RDB: Protected
Vulpes chama	Cape Fox	SA RDB: Protected

Connochaetes gnou	Black Wildebeest	SA RDB: Protected
Neoromicia capensis	Cape Serotine Bat	SA RDB: Protected & NCNCA

Reptiles

Of the 36 reptilian species that have been recorded within the 3124 degree grid, six species have been recorded within the quarter degree grid (3124 BB). None of these species (recorded within the relevant degree grid) are listed as Red Data species. Of the 36 reptilian species 11 are regarded as region endemic.

Regional Endemic Reptile Species: *Cordylus cordylus* (Cape Girdled Lizzard), *Pseudocordylus microlepidotus* subsp. *fasciatus* (Karoo Crag Lizzard), *Afroedura karroica* (Karoo Flat Gecko), *Pachycactylus mariquensis* (Marico Gecko), *Pachydactylus oculatus* (Golden Spotted Gecko), *Tetradactylus tetradactylus* (Cape Long-tailed Seps), *Pedioplanis burchelli* (Burchell's Sand Lizard), *Duberria lutrix* subsp. *lutrix* (South African Slug-eater), *Acontias breviceps* (Short-headed Legless Skink), *Trachylepis homalocephala* (Red-sided Skink), *Homopus femoralis* (Greater Padloper).

Amphibians

Of the 11 amphibian species that have been recorded within the 3124 degree grid, seven species have been recorded within the quarter degree grid (3124BB). None of these species (recorded within the relevant quarter degree grids) are listed as Red Data species. One species, however, has been recorded within the expanded (degree grids) area with red data status. The Giant Bull Frog (*Pyxicephalus adspersus*) is classified as Near Threatened within the Atlas and Red Data book of the frogs of South Africa, Lesotho and Swaziland (2004). These species prefer and breed in the shallows of temporary rain filled depressions in grassland and dry savannah. The wetland systems identified within the study area are unlikely to be a suitable habitat for these species (and will be confirmed during the EIA Phase).

5.3.7 Avifauna

Three groups of priority species can be described following the surveys undertaken as part of the on-site monitoring, namely Red Data species, the resident avifaunal community, and waterbirds. No range restricted species are known to occur in the vicinity of the project site.

Red Data Species

The 23 Red Data species in the SAC9Q-block during SABAP1 and SABAP2 are recorded. This include eight Endangered species, six Vulnerable species, and nine Near-Threatened species. The following seven species were recorded on the site during the three site visits:

» *Martial Eagle (Endangered), occasional visitor*: An adult was seen perched on a power line tower during the March 2016 survey. It is expected that this species would visit the site from time to time. In addition to utilising power line towers for nesting (Dean 1975; Tarboton & Allan 1984; D. J. van Niekerk, pers. obs.), these birds are also susceptible to collisions with power lines and electrocution incidents with electricity infrastructure has been reported (e.g. Anderson 2000a).
» *Ludwig's Bustard (Endangered), occasional visitor*: Single adults were recorded during the December 2015 survey. The most serious threat that the proposed project will pose to these birds will be the potential for collision with overhead power lines. According to Jenkins & Smallie (2009) these birds "may have the worst avian collision risk profile on record", referring specifically to collisions with power lines.
» *Secretary bird (Vulnerable), breeding resident*: During the December 2015 survey, an adult was seen foraging daily. During the February 2016 survey, an adult Secretary bird was observed roosting on a tree south-west within the proposed site. In the recent past these birds have also nested in a tree along the southern border of the proposed site where a bird was seen foraging in the field during the March 2016 survey. No active nesting activity was recorded during the surveys.
» *Verreauxs' Eagle (Vulnerable), breeding resident*: A pair was seen on several occasions along the low mountain range north of the project site, where they probably breed. This species was not recorded away from this mountainous area during the surveys, reflecting their typical close association with mountains and rocky areas with cliffs, which also provides suitable habitat for their main prey, the Rock Hyrax *Procavia capensis* (Boshoff *et al*. 1991; Davies 1994; Gargett 1990; Steyn 1982).
» *Blue Crane (Near-Threatened), breeding resident*: Blue Cranes frequently utilise the proposed project site for feeding and resting, often in the vicinity of artificial water sources and livestock feeding troughs (opportunistic feeders). Breeding activities have been noted in the western branch of Noupoortspruit (by the landowner, H. du Toit, *pers. comm*.). During the March 2016 survey an immature Blue Crane accompanied by adult Blue Cranes were also recorded in the same area.
» *Karoo Korhaan (Near-Threatened), breeding resident*: At least three pairs hold territories in areas within the proposed development site, and were recorded during the surveys.
» *African Rock Pipit (Near-Threatened), breeding resident*: This species is closely associated with the mountain range north of the project site.

The following species have not been recorded during the surveys, but are considered likely to utilise the study area as occasional visitors:

» *Greater Flamingo & Lesser Flamingo (Near-Threatened), might be occasional visitors*: These two flamingo species have been recorded in the surrounding

QDGCs during SABAP12 and it is possible that they will visit wetlands in the proposed site when inundated. Both species are vulnerable to collisions with power lines, partly due to their behaviour of flying at night (Prinsen *et al*. 2011; Van Rooyen 2003).

Resident avifaunal community

The resident avifaunal community comprises five Red Data species (Secretary bird, Verreauxs' Eagle, Blue Crane, Karoo Korhaan, African Rock Pipit), ten endemic species (i.e. the latter three Red Data species as well as the Grey-winged Francolin, Blue Korhaan, Large-billed Lark, Sickle-winged Chat, Karoo Scrub Robin, Cloud Cisticola, Karoo Prinia), plus 30 other more widespread taxa which includes Northern Black Korhaan, Grey-backed Sparrow-lark and Cape Longclaw (refer to Table 1B of **Appendix E**).

Waterbirds

Waterbirds constitute more than a quarter (26.2%) of all bird species likely to be found in the SAC9Q-block. The nearest permanent open water source to the proposed development is the Noupoort Water Treatment Works (refer to **Figure 3** of **Appendix E**). This wetland complex was visited on a number occasions during the December 2015 survey with more than a third (37.0%) of the 73 species recorded there being waterbirds. By contrast, only six (9.5%) of the 63 species recorded in the proposed site during December 2015 represented aquatic species.

The location of wetlands and the occurrence of many waterbird species in the area implies that regular movement of birds over the proposed site during the day and night at certain times of the year, particularly when the ephemeral wetlands are inundated, can be expected. Incidental observations made during the February 2016 survey already indicated such movement on a north-east - south-west axis across wetland system 1 (WLS1).

5.4 Social Characteristics of the Site and Surrounding Area

The project site is located approximately 4 km north west of Noupoort within the Umsobomvu Local Municipality which falls within the Pixley ka Seme District Municipality in the Northern Cape.

5.4.1 Regional Context

Northern Cape Province:

The Northern Cape is the largest province in South Africa and covers an area of approximately 372 899 km^2 which constitutes approximately 30% of the country. However, the Northern Cape has the country's smallest population with a little over 1 million people (population 1 145 861), which is 2.2% of South Africa’s

population, and an extremely low population density of three people per square kilometre. The capital of the Northern Cape is Kimberley, located on the Province's eastern border.
Other important towns are Noupoort, the centre of the karakul sheep and dried fruit industries, and the most northerly wine-making region of South Africa, Springbok, located in the heart of the Namaqualand spring flower country, and De Aar, the hub of the South African railway network.

Pixley ka Seme District Municipality (PKSDM):
The PKSDM is one of the five district municipalities in the Province and is the second-largest. Two of the major dams in South Africa, the Vanderkloof and Gariep Dams, are situated on the borders of the district municipality.

The main economic sectors in the PKSDM are as follows; Finance and business services (22.5%), manufacturing (17.4%), trade and accommodation (15.4%), government services (12.9%), transport and communication (11.3%), mining (6.8%), community and social services (5.6%), construction (3.3%) and agriculture (2.7%). Renewable energy projects in the various local municipalities within the District are key projects for the PKSDM. Other key investment opportunities include mining (uranium and diamond deposits) and rail revitalisation.

According to the PKSDM IDP 2015-2016, the PKSDM proactively took bold steps towards diversification of the District economy from one that relies on mining and agriculture. The Pixley ka Seme District 2010 Investment and Renewable Energy Conference was an important milestone aimed at 'Setting the District on a Growth Path' through innovative local economic development initiatives. The PKSDM is declared as a Renewable Energy Hub seeking to attract foreign direct investments into solar, wind, hydro and biomass projects.

5.4.2 Local Context

Umsobomvu Local Municipality (ULM):
The ULM economical activities are dominated largely by agriculture, financial services, trade, hospitality industry, tourism and transport. The main economic sector in the ULM is agriculture. The area is known as an agricultural area dedicated almost entirely to horses and merino sheep. By virtue of the ULM geographic location the ULM prides itself as a natural transportation route for people travelling to destinations such as Cape Town, Port Elizabeth, Gauteng and Bloemfontein since two of the major national roads, namely N1 and N9, pass through the Municipality.

Noupoort is a town in the eastern Karoo region that principally revolved around the railways and is still used as a traction change-over facility from diesel to

electric locomotives on the Noupoort-Bloemfontein line. It links up with the electric line to De Aar, part of the main artery for iron ore and manganese exports from the Northern Cape through Port Elizabeth Harbour on the south coast. Commercial activity in Noupoort is heavily dependent on railway activity. After a long period of increasingly less demand on the rail network, the town suffered from a drastic decline in local business leading to increasingly dire socio-economic conditions for the local population.

Baseline Characteristics of the Umsobomvu Local Municipality (ULM):

General baseline characteristics and challenges of the ULM are as follows (Census, 2011 and ULM IDP 2015/2016):

» The Municipality has a population of ~28 376 which is 15.2% of the total population of the PKSDM.
» Of the ~28 376 population, about 51.8% are female, while 48.2% are male.
» More than 62.6% of the population comprise the Black African ethnic group and 30.6% comprise the coloured ethnic group.
» There is a reasonably low population growth rate in the rural areas. The average growth rate is -1.29% per annum.
» A review of the existing level of education by population indicates a clear shortage of skilled manpower in the Municipality.
» There are low levels of literacy amongst the members of the community. The level of education influences growth and economic productivity of a region. In the ULM 16.3% of the population have no schooling, 23.1% have completed matric and only 6.3% of the population have higher education. This means that majority of the population have a low-skill level and would need job employment in low-skill sectors.
» Inadequate schools especially in the rural areas results in many young people having to travel long distances to areas where the schools exist.
» No tertiary institution is available.
» The social dimension of the local municipality is characterised by high and rising levels of poverty which is caused by:
  - Landlessness;
  - Unemployment;
  - Vulnerability (deprivation, insecurity, defencelessness and exposure to risk);
  - Lack of control over any resources;
  - Limited or no access at all to basic services e.g. water and shelter and
  - Lack of income opportunities.
» Unemployment is rife in all the local municipalities within the District. The ULM's unemployment rate is high at 33% (in 2011).
» The Economically Active Population (EAP) (individuals that are aged 15-64 that are either employed or actively seeking employment) accounts for 62.8% of the entire population.

» High levels of poverty and low levels of education.
» Households that have either no income or low income fall within the poverty level (R0- R38 200 per annum) accounts for 67.1%. A middle-income is classified as earning between R38 201 - R307 600 per annum. Approximately 29.7% of the households earn a middle income and 3.4% of households earn a high income that is classified as earning R307 601 or more per annum. A high percentage of household income falls within the poverty level. The high poverty level has social consequences such as not being able to pay for basic needs and services.
» The greatest social problems in the ULM are illiteracy, poverty and lack of basic service infrastructure. The ULM has a declining economy. Poor households are a result of a lack of wage income, either due to unemployment or low-paying jobs.
» Access to basic services such as electricity, toilets and piped water is also closely correlated with poverty.

5.5 Visual Quality

Landscape character is defined as, "a distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another". Landscape Character is a composite of a number of influencing factors including:

- Landform and drainage;
- Nature and density of development; and
- Vegetation patterns.

Landform and Drainage

The town of Noupoort, and the proposed project site to the west of Noupoort are situated on the gentle slopes of a valley, which is bounded to the south and south-east by high terrain and ridge lines. The terrain slopes in a north-westerly direction.

There are two dominant topographical units/ terrain types of the region, which may be described as: *gently sloping hillslopes (within which the site and the town of Noupoort fall; and ridgelines (to the south-east)*. These ridgelines are likely to limit visibility from the south and south-east. Outliers may also be present extending into the flatter areas to the north. These will have an influence on local visibility.

Nature and Density of Development

Drainage lines and their provision of water have to a large extent, dictated settlement pattern and landuse in this arid region, as has the railway line, which was built in 1883. The present day railway line runs parallel to the N9 (north-south). Commercial activity in Noupoort is heavily dependent on railway activity.

The study area has a predominant rural natural character (grassland, cattle and sheep farming) with limited development outside the urban area of Noupoort. Apart from the densely populated urban settlement of Noupoort, the majority of the study area is sparsely populated (less than 10 people/ km^2) and consists of a landscape of wide-open spaces with very little development. Farming homesteads dot the countryside at irregular intervals. Tourism is not well-developed within the area.

Vegetation Patterns

Two vegetation types are noted, Eastern Mixed Nama Karoo (on the valley slopes to the north-west) and South-Eastern Mountain Grassland (on the ridgelines to the north-east). Both vegetation types are low and therefore unlikely to be significant in either defining character or providing any form of Visual Absorption Capacity (VAC).

5.6 Heritage

South Africa has a long and complex Stone Age sequence of more than 2 million years. The broad sequence includes the Later Stone Age, the Middle Stone Age and the Earlier Stone Age. Each of these phases contains sub-phases or industrial complexes, and within these we can expect regional variation regarding characteristics and time ranges. For Cultural Resources Management (CRM) purposes it is often only expected/ possible to identify the presence of the three main phases. Yet sometimes the recognition of cultural groups, affinities or trends in technology and/or subsistence practices, as represented by the sub-phases or industrial complexes, is achievable (Lombard 2011). The three main phases can be divided as follows:

- Later Stone Age; associated with Khoi and San societies and their immediate predecessors. Recently to ~30 thousand years ago.
- Middle Stone Age; associated with Homo sapiens and archaic modern humans. 30-300 thousand years ago.
- Earlier Stone Age; associated with early Homo groups such as *Homo habilis* and *Homo erectus*. 400 000-> 2 million years ago.

The Northern Cape has a wealth of heritage sites and if any ridges, hills, pans, drainage lines or dongas occur in the study area Stone Age artefact scatters might be expected. Concentrations of stone tools point to activities that took place at various stages over the past 1.5 million years, representing the different groups of people who inhabited or moved across the landscape over time. Herder shelters are expected along ridges (Sampson 1985).

Historical finds include middens, structural remains and cultural landscape. The study area has been fallow for a number of years and no agricultural activities occurred recently on the farm. It is assumed that the farm was utilised for

grazing in the past and features dating to this period associated with farming can occur as is evident by water furrows indicated on maps of the study area. It is unknown if these furrows are older than 60 years. Noupoort was a busy military centre during the war and Anglo Boer war artefacts can also be expected. Graves and informal cemeteries can be expected anywhere on the landscape.

5.7 Palaeontology (Fossils)

The development area is primarily represented by sedimentary rocks of the late Permian to early Triassic, Adelaide Subgroup, and Katberg Formation, Tarkastad Subgroup Beaufort Group. Karoo Dolerite is present in the proposed development area. The dolerite represents magma intrusions into the Karoo Supergroup sediments during the Jurassic volcanic period which occurred during the breakup of Gondwana (183 ± 2 Ma). The sills and dykes have thermally metamorphosed or baked the adjacent sediments and therefore fossils are absent from the Karoo Dolerite Suite.

The Balfour and Katberg Formations underlying the project area form part of the *Daptocephalus and Lystrosaurus a*ssemblage zones. These biostratigraphic zones include a rich and diverse vertebrate fauna of exceptionally high scientific significance due to their part in recording the evolutionary transition from reptiles to mammals. Regardless of the sparse and sporadic occurrence of fossils in this biozone a single fossil can have a huge scientific importance as many vertebrate fossil taxa are known from a single fossil.

SCOPING OF ISSUES ASSOCIATED WITH THE NOUPOORT CSP PROJECT CHAPTER 6

This chapter serves to describe environmental issues and potential impacts (direct, indirect and cumulative impacts) that have been identified to be associated with the proposed Noupoort CSP Project and associated infrastructure, and to make recommendations for further studies required to be undertaken in the EIA phase. The scoping process has involved review of existing information (including previous detailed studies undertaken), limited field work, input from the project proponent, stakeholders, and the public.

Environmental issues associated with construction and decommissioning activities associated with the Noupoort CSP Project may include, among others, impacts on biodiversity (fauna, flora and ecological integrity), loss of habitat, soil erosion, and impacts on the social environment and current land use. Environmental issues specific to the operation of the Noupoort CSP Project could include visual impacts, impact on land use and agricultural potential and disturbance to birds and other fauna.

The significance of impacts associated with the Noupoort CSP facility and its associated infrastructure is dependent on site-specific factors, and therefore impacts can be expected to vary significantly from site to site. Sections 6.4 and 6.5 provide a summary of the findings of the scoping study undertaken for the construction and operation phases of the proposed Noupoort CSP Project. Impacts of the proposed facility are described and evaluated, and recommendations are made regarding further studies required within the EIA Phase of the process.

The Noupoort CSP Project will have a contracted capacity of up to 150MW with a development footprint of approximately 900ha within the project site which is approximately 3460ha, and will include the following infrastructure:

» Solar collector field comprising of all systems and infrastructure related to the control and operation of the parabolic troughs;
» Energy Centre, comprising of the storage media and heat exchanger;
» Power Block, consisting of the steam turbine and generator, as well as the air-cooled condenser and associated feedwater system;
» On-site project substation;
» A new 132kV power line to connect the on-site substation to the Eskom's electricity grid;
» Access roads and fencing around the development area;
» Lined evaporation ponds;

» Gas boiler for the start-up process of the facility;
» Water supply pipeline;
» On-site water storage tanks/reservoirs;
» Water treatment facility;
» Plant assembly facility;
» Offices and workshop areas for maintenance and storage; and
» Temporary laydown areas.

The cumulative impacts associated with the proposed facility are expected to be associated with the scale of the project together with other similar projects in the area. The potential for cumulative impacts associated with multiple facilities in the area are expected to be associated predominantly with the potential for visual impact, potential impacts on ecology, and impacts on land use and the social environment within the vicinity of the project.

This chapter serves to describe the identified potential environmental impacts associated with the proposed CSP Project and to make recommendations for further studies required to be undertaken in the EIA phase, and/or recommendations for the management of these impacts for inclusion in the Environmental Management Programme (EMPr) to be prepared as part of the EIA Phase.

Specialist scoping reports are included within **Appendix D to J** wherein the potential issues relating to the project are identified. A discussion of the potential cumulative impacts associated with the proposed project at this stage of the process is presented in Section 6.6.

6.1 Legal Requirements as per the EIA Regulations, 2014

This chapter of the scoping report includes the following information required by Appendix 2: Content of the Scoping Report of the EIA Regulations, 2014 (GNR982):

Requirement	Relevant Section
(h)(v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts (aa) can be reversed (bb) may cause irreplaceable loss of resources and (cc) can be avoided, managed or mitigated.	The impacts and risks identified for both the construction and operation phases are included within section 6.4 and section 6.5.
(h)(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives	The methodology used for the assessment of potential impact and risks is detailed in section 6.2.

Requirement	Relevant Section
(h)(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects	The impacts and risks identified for both the construction and operation phases is included within the section 6.4 and section 6.5.
(h)(viii) the possible mitigation measures that could be applied and level of residual risk	Possible mitigation measures and the level of residual risk associated with the impacts is included within the section 6.4 and section 6.5.

6.2 Methodology for Impact and Risk Assessment during the Scoping Phase

The following methodology was used to describe and evaluate the main issues and potential risks and impacts associated with the proposed Noupoort CSP Project during the scoping phase:

» The identification of potential sensitive environments and receptors that may be impacted on by the proposed development and the types of impacts (i.e. direct, indirect and cumulative[6]) that are most likely to occur. This was achieved through a review of existing baseline information, desk-top investigations and limited field work.
» Description of the nature, significance, consequence, extent, duration and probability of potential impacts, as well as the degree to which these impacts are reversible, may cause irreplaceable loss of resources and can be avoided, managed or mitigated during the construction and operation phases.
» The identification of potential risks to the development and the environment, and identification of 'No-Go' areas within the broader site, where applicable.
» The compilation of a summary of the potential impacts that will be considered further in the EIA Phase through specialist assessments.

6.3 Assumptions made during the Evaluation of Potential Impacts

While evaluating potential impacts associated with the development of the Noupoort CSP Project, it was assumed that the development footprint of 900ha will include the footprints of the CSP components (i.e. solar collector field, Power Block and Energy Centre), associated infrastructure (i.e. substation, internal access roads, evaporation ponds, ancillary buildings and laydown areas). Other

[6] A cumulative impact refers to the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities (Environmental Impact Assessment Regulations, 2014).

assumptions applicable to the studies undertaken within the Scoping Phase include:

» All information provided by the developer to the environmental team was correct and valid at the time it was provided.
» It is assumed that the project site identified by the developer represents a technically suitable site for the establishment of the proposed solar facility.
» It is assumed that the proposed connection to the National Grid is correct in terms of viability and need.
» Studies assume that any potential impacts on the environment associated with the proposed development will be avoided, mitigated, or offset.
» This report and its investigations are project-specific, and consequently the environmental team did not evaluate any other power generation alternatives.

Refer to the specialist studies in **Appendices D – J** for specialist study specific limitations.

6.4 Evaluation of potential impacts associated with the construction and decommissioning of the Noupoort CSP Project

The sections below provide an indication of the potential direct and indirect environmental issues and impacts which have been identified during the Scoping phase of the EIA process, and which may be relevant during the construction (and decommissioning) phase of the Noupoort CSP Project.

6.4.1 Impact on Ecology

Impacts on vegetation and protected plant species

The most likely and significant impact associated with the project will be on vegetation as a result of transformation of the site. The proposed development will require site clearance, and lead to direct loss of vegetation. Consequences of the impact occurring may include:

- general loss of habitat for sensitive species;
- loss in variation within sensitive habitat due to loss of portions of it;
- reduction in biodiversity;
- increased potential for fragmentation (depending on location of impact);
- disturbance to processes maintaining biodiversity and ecosystem goods and services; and
- loss of ecosystem goods and services.

The largest portion of the study area is covered by near-natural to natural Eastern Upper Karoo vegetation which is classified as Least Threatened (Mucina & Rutherford, 2006) (refer to **Figure 6.1**). Although the development will impact some elements of this vegetation type at a local scale, it is highly unlikely that this development will impact the status of this vegetation type (impact on a regional scale) as the development footprint is a small restricted area when compared to the widespread extent of this vegetation type (most widespread vegetation type in the country) and the extent of natural vegetation still available. In addition, the development is considered to be an impact in the long-term, not a permanent impact.

The vegetation within the sensitive features including ridgelines, outcrops and wetlands as well as a buffer area surrounding these habitats is regarded as sensitive due to its functionality. Natural vegetation is considered to be essential for protection against the effects of erosion, which is potential risk within these areas.

There is the potential for several protected and red data species as well as species protected under the relevant provincial legislation (NCNCA) to be present within the study area. Such species are especially vulnerable to infrastructure development due to the fact that they cannot move out of the path of the construction activities, but are also affected by overall loss of habitat. Threatened species (red

data species) include those listed as critically endangered, endangered or vulnerable. For any other species a loss of individuals or localised populations is unlikely to lead to a change in the conservation status of the species. However, in the case of threatened plant species, loss of a population or individuals could lead to a direct change in the conservation status of the species, and possible extinction. This may arise if the proposed infrastructure is located where it will impact on such individual or populations. Consequences may include:

» fragmentation of populations of affected species;
» reduction in area of occupancy of affected species; and
» loss of genetic variation within affected species.

These may all lead to a negative change in conservation status of the affected species, which implies a reduction in the chances of the species' overall survival chances.

The nature and extent of such impacts can be evaluated, and the impacts can be largely mitigated through avoidance of identified sensitive areas and listed species, by allowing a minimum clearance of vegetation (restricted to the absolute necessary areas), or allowing for search and rescue of individuals where this is viable.

Direct Faunal impacts

Faunal species will primarily be affected by transformation and overall loss of habitat. Increased levels of noise, pollution, disturbance and human presence will be detrimental to fauna. Sensitive and shy fauna would move away from the area during the construction phase as a result of the noise and human activities present, while some slow-moving species and species confined and dependant on specified habitats would not be able to avoid the construction activities and might be at risk. Some mammals and reptiles would be vulnerable to illegal collection or poaching during the construction phase as a result of the large number of construction personnel that are likely to be present. This impact is highly likely to occur during the construction phase and would also potential occur with resident fauna within the facility after construction.

Threatened species (red data species) include those listed as critically endangered, endangered or vulnerable. For any other species a loss of individuals or localised populations is unlikely to lead to a change in the conservation status of the species. However, in the case of threatened animal species, loss of a population or individuals could lead to a direct change in the conservation status of the species,

possible extinction. This may arise if the proposed infrastructure is located where it will impact on such individual or populations. Consequences may include:

- » fragmentation of populations of affected species;
- » reduction in area of occupancy of affected species; and
- » loss of genetic variation within affected species.

These may all lead to a negative change in conservation status of the affected species, which implies a reduction in the chances of the species' overall survival chances.

Disturbance of faunal species can be maintained to a minimum and low significance by implementing effective mitigation measures.

Impacts on wetlands and watercourses

Construction may lead to some direct or indirect loss of or damage to wetlands and drainage lines. This will lead to localised loss of wetland habitat and may lead to downstream impacts that affect a greater extent of wetlands or impact on wetland function and biodiversity. Where these habitats are already stressed due to degradation and transformation, the loss may lead to increased vulnerability (susceptibility to future damage) of the habitat. Physical alteration to wetland can have an impact on the functioning of those wetlands. Consequences may include:

- » increased loss of soil;
- » loss of or disturbance to indigenous wetland vegetation;
- » loss of sensitive wetland habitats;
- » loss or disturbance to individuals of rare, endangered, endemic and/or protected species that occur in wetlands;
- » fragmentation of sensitive habitats;
- » impairment of wetland function;
- » change in channel morphology in downstream wetlands, potentially leading to further loss of wetland vegetation; and
- » reduction in water quality in wetlands downstream.

By implementing mitigation measures, including the exclusion of wetlands and drainage lines as well as the determined buffer areas from the development footprint area, these habitat types can retain their character and functionality.

Soil erosion and associated degradation of ecosystems

This impact along with the loss of vegetation is probably the most significant impact to the ecological environment that may occur due to the proposed development. Soil erosion is a frequent risk associated with the clearing of vegetation and disturbance associated with the construction phase of the development and may continue occurring throughout the operation phase. Service roads and installed infrastructure will generate increased direct runoff during intense rainfall events and may exacerbate the loss of topsoil and the effects of erosion. These eroded materials may enter the nearby streams and rivers and may potentially impact these systems through siltation and change in chemistry and turbidity of the water.

With effective mitigation measures in place including regular monitoring the occurrence, spread and potential cumulative effects of erosion may be limited to an absolute minimum.

Alien Plant Invasions

Major factors contributing to invasion by alien invader plants includes habitat disturbance and associated destruction of indigenous vegetation. Consequences of this may include:

» further loss and displacement of indigenous vegetation;
» change in vegetation structure leading to change in various habitat characteristics;
» change in plant species composition;
» change in soil chemistry properties;
» loss of sensitive habitats;
» loss or disturbance to individuals of rare, endangered, endemic and/or protected species;
» fragmentation of sensitive habitats;
» change in flammability of vegetation, depending on alien species;
» hydrological impacts due to increased transpiration and runoff; and
» impairment of wetland function.

Although the potential severity of this impact may be high, it can be easily mitigated through regular alien control.

Impact: Impacts on Flora and fauna species and habitats

The project site is located within Eastern Upper Karoo vegetation type, which is classified as Least Threatened and is the most widespread vegetation type in the country. Habitats occurring in the project site include:

» dolerite and sandstone outcrop to the south (various micro-niches created within these outcrops);
» sloping plains (these plains contain both elements of karroid shrublands as well as grasslands); and
» ephemeral wetlands and artificial water bodies (e.g. dams and water points).

Issue	Nature of Impact during the Construction Phase	Extent of Impact	No-Go Areas
Disturbance to and loss of indigenous natural vegetation	Construction of infrastructure will lead to direct loss of vegetation, causing a localised or more extensive reduction in the overall extent of vegetation. Consequences of the clearing and loss of indigenous natural vegetation occurring may include: » Increased vulnerability of remaining vegetation to future disturbance, including extreme climatic events; » General loss of habitat for sensitive fauna and flora species; » Loss in variation within sensitive habitats due to loss of portions of it; » General reduction in biodiversity; » Increased fragmentation (depending on the location of the impact) and associated reduced viability of species populations; » Alteration of the habitat suitable for plant populations by altering surface structure. This will change species composition and associated species interactions. » Disturbance to processes maintaining biodiversity and ecosystem goods and services; and » Loss of ecosystem goods and services.	Local	» The valley-bottom wetland system and associated buffer areas; and » Dolerite outcrops and ridge.

Description of expected significance of impact:

The area seems to be generally homogenous and given the extensive amount of potentially intact vegetation in the area, there is likely to be little overall disruption to the broad-scale connectivity of the landscape, and that sufficient intact habitat would remain in the broader area to retain the overall ecological functioning of the landscape. Indigenous natural vegetation will be permitted underneath the trough. The extent (local), nature and subsequently the significance of this impact can be reduced with the implementation of mitigation measures such as avoidance of potential sensitive

areas and listed species, by allowing a minimum clearance of vegetation (restricted to the absolute necessary areas). The duration of the impact will be restricted to the construction phase.			
Disturbance or loss of threatened / protected plants	Several Red Data and protected plant species could potentially occur in the study area. Flora is affected by overall loss or alteration of habitat and due to its limited ability to extend or change its distribution range. Where the location of infrastructure will impact on individuals or populations of threatened plant species, consequences may include: » Fragmentation and decline of populations of affected species; » Reduction in area of occupancy of affected species; and » Loss of genetic variation within affected species; Alteration of the habitat suitable for plant associations by altering surface structure. This will change species composition and associated species interactions and species ability to persist. These may all lead to a negative change in conservation status of the affected species, which implies a reduction in the chance of survival of the species.	Local	None at this stage.
Description of expected significance of impact: The nature of the development which includes the partial clearance of vegetation within the development footprint will result in a localised loss of habitat as well as a loss of localised populations of protected and/or listed plants. Vegetation will be permitted to remain underneath the trough system, although this will be maintained throughout the operation phase. The extent, nature and subsequently the significance of this impact can be reduced with the implementation of mitigation measures, including avoidance were possible, a vegetation rehabilitation plan, or a plan for search and rescue of protected and listed plants prior to construction commencing. Due to the extent and availability of habitat surrounding the proposed development area, this localised impact will most likely not have a significant impact on the greater area of occupancy of affected species as well as a loss of genetic variation. Therefore, the significance regarding a potential change in status and/or the overall survival of the species can be regarded as low and unlikely.			
Loss of habitat for fauna species of conservation concern	The proposed development will reduce the current extent of habitat available for use by fauna. Fauna species of conservation concern are indirectly affected primarily by loss of or alteration of habitat and associated resources. Animals are mobile and, in most cases, can move away from a potential threat, unless they are bound to a specific habitat	Local	» Wetland habitats. » The ridge and dolerite outcrop - may serve as a habitat for some protected species and should

	that is also spatially limited and will be negatively impacted by a development. For any species, a loss of individuals or localised populations is unlikely to lead to a change in the conservation status of the species. However, in the case of threatened animal species, loss of a suitable habitat, population, or individuals could lead to a direct change in the conservation status of the species. This may arise if the proposed infrastructure is located where it will impact on such individuals or populations or the habitat that they depend on. Consequences may include: » Loss of populations of affected species; » Reduction in area of occupancy of affected species; » Loss of genetic variation within affected species; and » Future extinction debt of a particular species. There are a number of red data species that have been recorded for the wider area within which the study area is located. Their presence and the necessity to keep their habitats intact in the study area need to be confirmed during a field survey.		provisionally be classified as a No-Go area (shall be confirmed during EIA phase).
Description of expected significance of impact: Some habitat loss for faunal species is an inevitable consequence of the development but is not likely to be of broader significance (to be confirmed during EIA phase). Faunal disturbance and human presence would be highest during the construction phase and terrestrial faunal impacts are also likely to be largely concentrated to this phase of the development. The extent, nature and subsequently the significance of this impact can be reduced with the implementation of mitigation measures, including avoidance of no-go areas.			
Disturbance to migration routes and associated impacts to species populations	Site preparation and construction activities may interfere with current migration routes of fauna species. This may lead to: » Reduced ability of species to move between breeding and foraging grounds, reducing breeding success rates; » Increased mortality rates due to fatal collisions with infrastructure;	Site and surroundings	The valley-bottom wetland system and associated buffer areas.

	and » Reduced genetic variation due to reduced interaction amongst individuals or populations as a result of fragmentation effects caused by the proposed developments.		
Description of expected significance of impact: The extent of the impact will be limited to the area surrounding the site and the site itself. Some habitat loss for faunal species is an inevitable although due to the extent of the development and the location, the development will most likely not affect important migration routes and populations. The impact will be probable, but is unlikely to be significant.			
Impacts on wetlands	NFEPA along with available Google imagery show that a number of wetland habitats may be present within the study area. » The nature of the site preparation and construction activities for the proposed development will change surface characteristics, rainfall interception patterns and runoff characteristics of the area; » This may affect the geohydrology, susceptibility to erosion and potential erosion rates of the landscape, which may lead to a significant alteration to or loss of habitat for fauna and flora species, especially those that depend on riparian and wetland habitats; and » A decline in ecosystem functionality of smaller wetlands and riparian areas will impact lower-lying larger wetlands, while also reducing the ability of the environment to buffer effects of extreme climatic events.	Local and regional	The valley-bottom wetland system and associated buffer areas.
Description of expected significance of impact: The proposed development is unlikely to affect the catchment integrity and functionality of surrounding ecosystems or groundwater resources, or be detrimental to the functioning of habitats as these can be avoided by the development footprint. The extent of the impact will be local and regional. The extent, nature and subsequently the significance of this impact can be reduced by avoidance of valley-bottom wetland and associated buffer areas.			
Establishment and spread of declared weeds and alien invader plants.	Major factors contributing to invasion by alien invader plants include excessive disturbance to vegetation, creating a window of opportunity for the establishment of alien invasive species. In addition, regenerative material of alien invasive species may be introduced to the site by machinery traversing through areas with such plants or materials that may contain regenerative materials of such species. Consequences of	Local and regional	None identified at this stage.

	the establishment and spread of invasive plants include: » Loss of indigenous vegetation; » Change in vegetation structure leading to change in or loss of various habitat characteristics; » Change in plant species composition; » Altered and reduced food resources for fauna; » Change in soil chemical properties; » Loss or disturbance to individuals of rare, endangered, endemic and/or protected species; » Fragmentation of sensitive habitats; » Change in flammability of vegetation, depending on alien species; » Hydrological impacts due to increased transpiration and runoff; » Increased production and associated dispersal potential of alien invasive plants, especially to lower-lying wetland areas, and » Impairment of wetland function.		

Description of expected significance of impact:

With mitigation measures including regular monitoring and effective eradication and management methods in place the significance of impact associated with Invasive Alien Plants is expected to be low and local. With the absence of these mitigation measures the significance of invasion of invasive alien plants may potentially be high and may furthermore extend outside the boundary of the development footprint area affecting natural vegetation. Although this is a potential worst case scenario in the absence of mitigation measures as mentioned.

Gaps in knowledge & recommendations for further study

» Although previous collection records from the Noupoort area exist, the study area itself may not have been previously surveyed and there may be additional species that have not yet been captured in the existing species databases for the area.

» The initial desk-top investigation of the study area indicates that a few protected and Red Data species as well as sensitive habitats potentially occur on the site. However, once the final layout has been designed in accordance to findings of a field investigation, the likelihood that the development will compromise the survival of any species of conservation concern is expected to be limited.

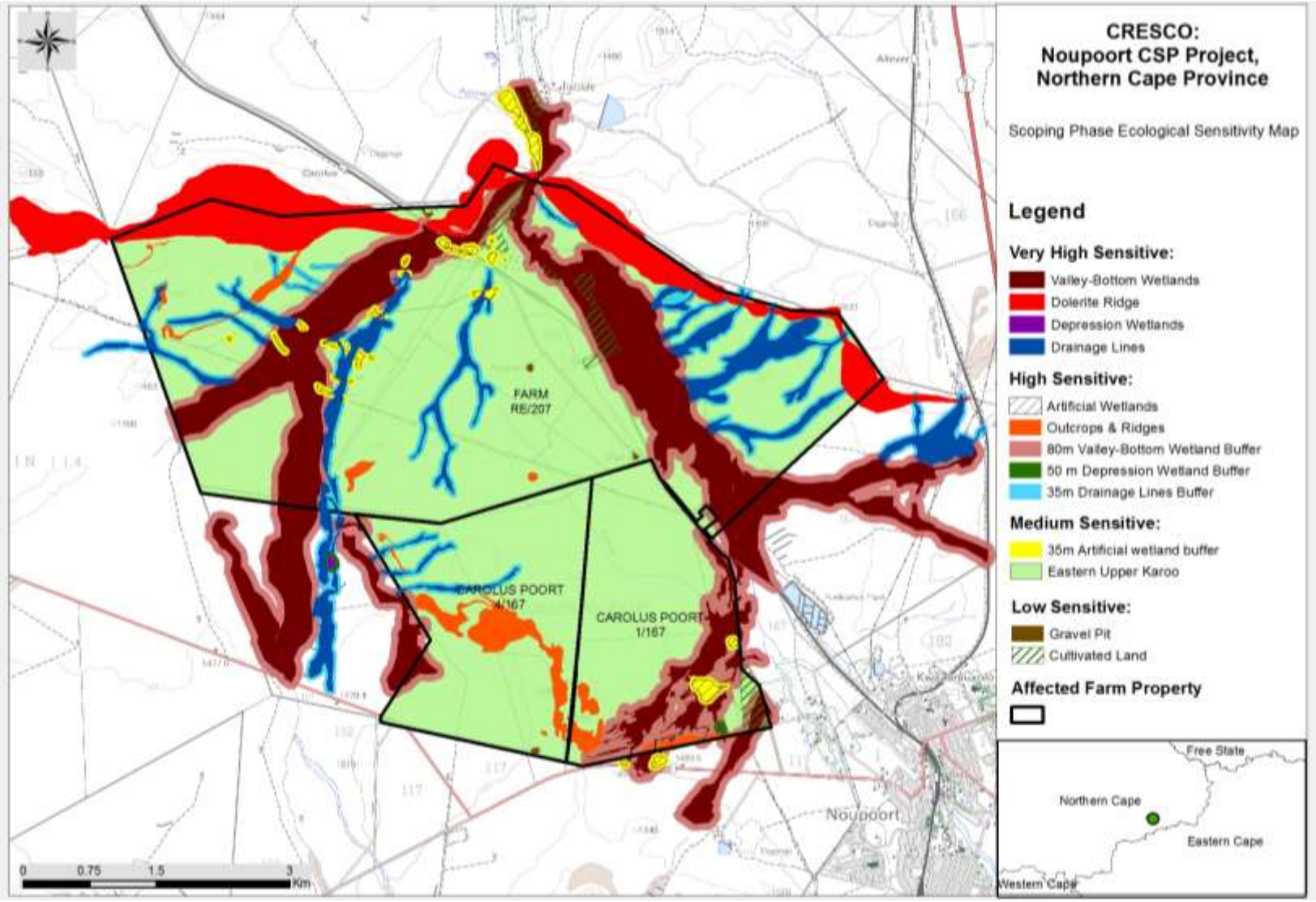

Figure 6.1: Scoping phase Ecological Sensitivity Map for the site proposed for the Noupoort CSP Project

6.4.2. Impact on Avifauna

Three groups of priority species can be described following the surveys undertaken as part of the on-site monitoring, namely Red Data species, the resident avifaunal community, and waterbirds. No range restricted species are known to occur in the vicinity of the project site.

Red Data species

The 23 Red Data species recorded in the SAC9Q-block during SABAP1 and SABAP2 are listed in Table 1A of **Appendix E**. This include eight Endangered species, six Vulnerable species, and nine Near-Threatened species. The following seven species were recorded in the proposed development site during the three site visits: Martial Eagle, Ludwig Bustard, Secretary bird, Verreaux's Eagle, Blue Crane, Karoo Korhaan and African Rock Pipit. The Greater Flamingo and the Lesser Flamingo have not yet been recorded in the development site but are considered likely to utilise the study area as occasional visitors.

Resident avifaunal community

The resident avifaunal community of the proposed development site comprises five Red Data species (Secretary bird; Verreauxs' Eagle; Blue Crane; Karoo Korhaan; African Rock Pipit), ten endemic species (i.e. the latter three Red Data species as well as the Grey-winged Francolin; Blue Korhaan; Large-billed Lark; Sickle-winged Chat; Karoo Scrub-Robin; Cloud Cisticola; Karoo Prinia), plus 30 other more widespread taxa (refer to Table 1B, **Appendix E**). All of these species can potentially be impacted during the construction phase where habitat clearing coincides or overlaps with the breeding season of these birds. Although the suggested mitigation will reduce the risk of active nests and their contents being destroyed in most species, parts of the area will still be permanently transformed in ways which will cause the displacement of the individuals of some species.

Waterbirds

Waterbirds constitutes more than a quarter (26.2%) of all bird species likely to be found in the SAC9Q-block. The nearest permanent open water source to the proposed development is the Noupoort WTW (refer to **Figure 6.2**), located ~1km to the east of the site. This area was visited on numerous occasions during the December 2015 trip with more than a third (37.0%) of the 73 species recorded there being waterbirds. By contrast, only six (9.5%) of the 63 species recorded within the project site during December 2015 represented aquatic species.

Impact: Disturbance and displacement of birds

Destruction of habitat and nests, and displacement of birds during the construction of roads and the CSP structures. Roads can also cause erosion.

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Disturbance and displacement of birds and destruction of nests	Birds will experience habitat loss during the construction of the Noupoort CSP Project.	Local	Drainage lines and wetlands associated with the eastern and western valley-bottom Wetlands of the Noupoortspruit.

Description of expected significance of impact

If the No-Go and High sensitive areas are effectively avoided by the proposed construction activities, its impact on the five breeding resident Red Data species are predicted to be negligible. However, intrusion of the construction activities into these areas are likely to increase the negative impact risks for these species. In such cases the impact may entail temporary disturbance, temporary or permanent displacement, destruction of nests and or failed breeding attempts. Non-threatened breeding resident bird species occurring inside and outside the No-Go and High sensitive areas are susceptible to impacts similar to those indicated above. However, regardless of the location of the proposed development it is unavoidable that some of these birds will be negatively impacted, particularly when the construction period overlaps with their breeding season. One possible mitigation strategy would be to schedule construction activities to occur outside the breeding season, but since these non-threatened birds are of low conservation concern, and because construction activities is likely to take place over a continuous and extended period of time, it is unlikely to be a feasible strategy.

Gaps in knowledge & recommendations for further study

The December 2015 survey coincided with a widespread drought and all the major wetlands in the eastern portion of the project site were dry. Subsequent rainfall inundated these wetlands and incidental observation during the February 2016 site visit indicated that they attract many birds. From an impact assessment perspective a survey when the wetland areas are inundated will be an important time of the annual cycle to monitor. It will also be important for observations to be undertaken when grass cover is prominent. Therefore, assuming a normal rainfall pattern for the rest of the year, another data collection trip/survey will be undertaken in the second quarter of 2016 while the wetlands are still inundated and when grasses will be more prominent.

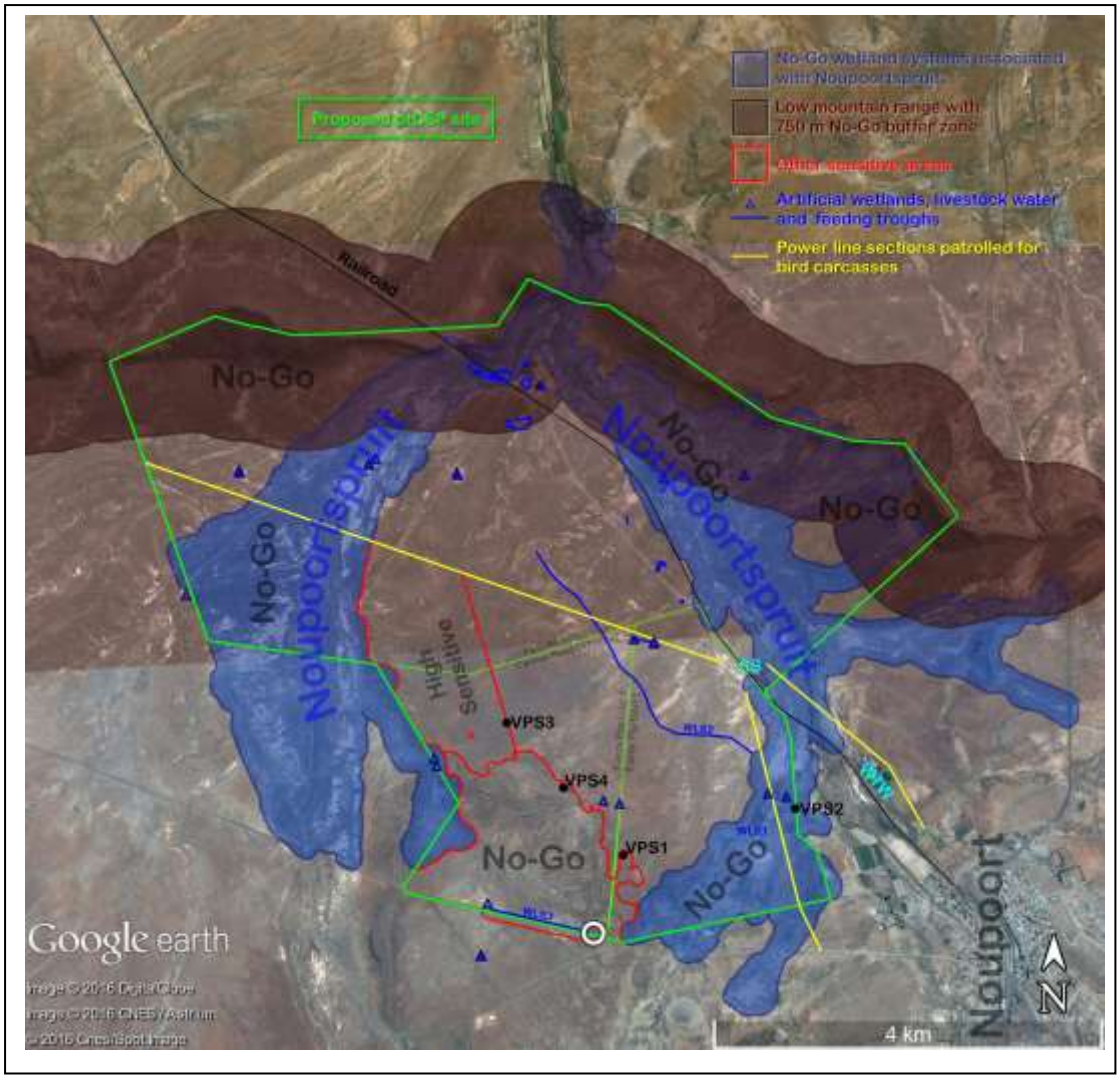

Figure 6.2: Scoping phase Avifaunal Sensitivity Map for the site proposed for the Noupoort CSP Project

6.4.3. Impact on Land Use, Soil and Agricultural Potential

The overall impacts of the proposed Noupoort CSP Project on agriculture and soil conditions will be low, principally because of the climatic conditions and the low agricultural and grazing potential of the site. There are small cultivated lands situated only north-east in the project site. The soil and rock type properties tend to be very homogenous in the area and the whole site can be better utilised for power generation in comparison to any other practise. However, due to the predominance of duplex soils, the hazard of water erosion when topsoil is disturbed may be significant, as these areas are considered to be highly susceptible to erosion.

This project site is not regarded as a viable commercial farming site and would be suited for the development of a renewable energy facility, such as the Noupoort CSP Project.

<table>
<tr><td colspan="4">Impact: Loss of agricultural land
Loss of agricultural land due to the direct impact by the infrastructure’s footprint during all phases of the project. The agricultural potential for the project site are considered to be low and there are small cultivated lands situated only north east in the project site, situated within the valley-bottom wetland system demarcated as a no-go area.</td></tr>
<tr><th>Issue</th><th>Nature of Impact</th><th>Extent of Impact</th><th>No-Go Areas</th></tr>
<tr><td>Loss of agricultural land due to the direct impact by the infrastructure’s footprint during all phases of the project.</td><td>Although likely to occur at the extent of the development footprint, this impact is expected to be of low significance as a result of the limited agricultural potential of the site.</td><td>Site (confined to areas within the site where infrastructure will be located).</td><td>Small cultivated lands north east in the project site, located within the valley-bottom wetland system demarcated as a no—go area.</td></tr>
<tr><td colspan="4">Description of expected significance of impact
Impacts of the proposed projects on agricultural potential are expected to be of low significance. The area for avoidance are the cultivated areas along the Noupoortspruit. At the end of the project life, it is anticipated that removal of the structures would enable the land to be returned to more or less a natural state following rehabilitation, with little impact, especially given the low prevailing agricultural potential.</td></tr>
<tr><td colspan="4">Gaps in knowledge & recommendations for further study
Considering that the broad soil types occurring on and surrounding the site are homogeneous, coupled with the fact that there is limited potential for</td></tr>
</table>

agricultural activity within the project site, no further detailed soil investigation will be required in order to further assess the impact. It can confidentially be stated that the impact on agricultural potential will be low. The study undertaken by the Agricultural Research Council (ARC-IWR) confirmed that the overall impacts of the proposed facility on agriculture and soil conditions will be of low significance, predominantly because of the climatic conditions and the low agricultural and grazing potential of the site. The possibility to house substantial commercial farming practices (agriculture or grazing) on the property is not realistic, because of the dominant climatic conditions and prevailing soil conditions. Irregular rainfall, along with other soil-related factors, lead to low agricultural potential.

As a result of the low significance of impacts, no further studies are required to be undertaken. Mitigation measures recommended within the project site are however to be included within the project Environmental Management Programme (EMPr), which is to be compiled in the EIA Phase of the process.

Impact: Loss of soil resources

Loss of soil resources as a result of erosion during all phases of the project. Most of the project site comprises of duplex soils. These soils are very susceptible to erosion, especially water erosion when the topsoil is disturbed.

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Loss of soil resources as a result of erosion during all phases of the project (especially water erosion).	Soil erosion is a natural process whereby the ground level is lowered by wind or water action and may occur as a result of inter alia chemical processes and/or physical transport on the land surface. Accelerated erosion is a common occurrence on construction sites where soil is loosened and vegetation cover is stripped. This impact can be largely minimised through the implementation of appropriate mitigation measures.	Site (confined to areas within the site where surface vegetation is removed).	None identified.

Description of expected significance of impact

The significance of increased susceptibility to water erosion are low if mitigated. Mitigation measures would be to ensure that little surface disturbance as possible occurs. Where vegetation is removed for construction, specific measures would need to be put in place during both the construction and operation phases, which would include: absolute minimum removal of vegetation; soil conservation measures; re-vegetation as soon as possible; regular monitoring of erosion situation.

There is the potential for the loss of soil resources through erosion, particularly during the construction phase. This impact can be effectively minimised through the implementation of appropriate mitigation measures including implementation of an appropriate stormwater management plan

and regular monitoring of the occurrence, spread and potential cumulative effects of erosion. Impacts post-mitigation are expected to be of low significance.
Gaps in knowledge & recommendations for further study Erosion is a common occurrence on construction sites where soil is loosened and vegetation cover is stripped. The nature of the development will only include the partial clearance of vegetation within the development footprint. Vegetation will be permitted to remain underneath the trough system, and will be maintained throughout the operation phase. As a result of the low significance of impacts, no further studies are required to be undertaken. Mitigation measures recommended within the project site are included within the project Environmental Management Programme (EMPr), which is to be compiled in the EIA Phase of the process.

6.4.4. Visual Impacts

The construction of the proposed Noupoort CSP Project will have an impact to a limited extent on relatively natural areas surrounding the project site. However, the character of the affected areas will change and will have the effect of industrialising the character of the landscape surrounding it. As the project site is located immediately adjacent to a town centre and there is a wind farm already under construction in close proximity to the town, this change will be minimal. This will be seen in the context of an existing urban area and a railway line that runs close to the site which is likely to provide a degree of industrialisation.

Possible visual receptors:

» Area receptors and areas critical to quality of life include activity areas that could be sensitive to their outlook such as protected areas or areas that are important for tourism potential and their cohesive rural agricultural character. The town of Noupoort may be classed as an area receptor.
» Linear receptors includes routes through the area which are comprised of two main routes; the N9, which links Colesberg (at the National N1), and Middleburg, bypassing Noupoort leading towards George; and the R389, which links Noupoort to Hanover (at the National N1), and bypasses the proposed site to the south. Two minor roads lead off the R389, one leads in a northerly direction immediately east of the site, whilst the other leads in southerly direction, some distance west of the site. A third minor road leads away from Noupoort in an easterly direction. In addition, a railway line runs from the south through Noupoort and splits into two lines on the northern outskirts of the town. One line continues north whilst the other line leads towards the north west and bypasses the proposed project site at its northern boundary.

» Point receptors include isolated and small groups of homesteads that are generally associated with the drainage lines/ water availability areas. In total there are approximately 20 homesteads within the approximate limit of visibility (10.1km) of which three homesteads area situated within 1km from the project site.

Impact: Visual impact on surrounding areas as a result of construction activities.			
Issue	**Nature of Impact**	**Extent of Impact**	**No-Go Areas**
Visual impact during construction	During the construction period, there will be a noticeable increase in heavy vehicles utilising the N9, R389 and minor roads to the development site that may cause, at the very least, a visual nuisance to other road users and land owners in the area. In this environment, dust from construction work is also likely to represent a significant visual impact. Mitigation entails proper planning and management of the construction sites to forego residual visual impacts.	Local	In order to protect the more natural landscape areas outside the influence of the urban area, it appears that the ridgeline and areas of the site to the west of the site should be avoided.
Description of expected significance: Given the nature of the adjacent road and the distance between the road and the developments, the significance of the possible impact is anticipated to be low, and there will be no irreplaceable loss. The impact will reverse on decommissioning of the facility, and thus mitigation is unlikely to be necessary.			
Gaps in knowledge & recommendations for further study Minor undulations in landform and density of vegetation could have significant influence on the visibility and nature of views of the development. A site visit is required to assess this in detail.			

6.4.5. Heritage Impacts

The Northern Cape has a wealth of heritage sites and if any ridges, hills, pans, drainage lines or dongas occur in the study area Stone Age artefact scatters might be expected. Concentrations of stone tools point to activities that took place at various stages over the past 1.5 million years, representing the different groups of people who inhabited or moved across the landscape over time. Herder shelters are expected along ridges (Sampson 1985).

Historical finds include middens, structural remains and cultural landscape. The project site has been fallow for a number of years and no agricultural activities occurs on the project site except small cultivated lands north east in the project site. It is assumed that the project site is currently utilised for grazing, as well as in the past, and features dating to this period associated with farming can occur as is evident by water furrows indicated on maps of the study area. The age of these structures historically used for agriculture are unknown. Noupoort was a busy military centre during the war and Anglo Boer war artefacts can also be expected in the broader area. Graves and informal cemeteries can be expected in the broader area.

The following impacts can be expected to heritage resources in the area:

» direct impacts to heritage resources including damage and destruction of sites;
» possible indirect impacts including impacts on the cultural landscape and sense of place of the area;
» cumulative impacts including the permanent destruction of heritage resources throughout the wider region due to renewable energy and associated developments in the area; and
» residual risks for the proposed project include depletion of the archaeological record of the wider Noupoort region.

Impact: Disturbance and destruction of archaeological sites

Construction activities could directly impact on graves, archaeological sites and historical sites, should this occur within the development footprint.

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Disturbance and destruction of archaeological sites and graves.	Construction activities could result in irreversible damage or destroy heritage resources and depletion of the archaeological record of the area.	Low to Medium on a local scale.	None identified. To be confirmed through fieldwork.

Description of expected significance of impact

Significance of sites, mitigation and significance of possible impact can only be determined after the field work has been conducted, but based on previous work in the area Middle Stone Age and LSA artefact scatters of medium to high heritage significance and grave sites can be expected. It should be possible to mitigate impacts to sites by micro-adjustments to the layout in order to preserve the sites. Alternatively grave sites can be relocated and Stone Age sites can be test excavated and mapped if warranted by the site. All these mitigation measures will require adherence to the NHRA and the required permits from the SAHRA.

Gaps in knowledge & recommendations for further study

The study area has not been subjected to a cultural resource survey and it is assumed that information obtained for the wider region is applicable to the study area. To address these gaps it is recommended that a field study should be conducted to confirm the presence of heritage resources after which

mitigation will be recommended.

6.4.6. Impact on Palaeontology

The development area is primarily represented by sedimentary rocks of the late Permian to early Triassic, Adelaide and Tarkastad Subgroup, Beaufort group, Karoo Supergroup, while Karoo Dolerite is also present in the proposed development area. The Balfour and Katberg Formations underlying the project area form part of the *Daptocephalus and Lystrosaurus a*ssemblage zones. These biostratigraphic zones include a rich and diverse vertebrate fauna of exceptionally high scientific significance due to their part in recording the evolutionary transition from reptiles to mammals. Regardless of the sparse and sporadic occurrence of fossils in this biozone a single fossil can have a huge scientific importance as many vertebrate fossil taxa are known from a single fossil. There is a possibility that fossil heritage will be recorded in the proposed development area. Probable significant impacts on palaeontological heritage during the construction phase are high, but the intensity of the impact on fossil heritage is rated as medium.

Impact: Loss of palaeontological heritage within the development area			
Issue	**Nature of Impact**	**Extent of Impact**	**No-Go Areas**
Loss of unique fossil heritage	The solar field will be installed on a set of rails with no need for land levelling and minimal ground disturbance. Construction of associated infrastructure including the Power Block (that is, excluding the solar field) has the potential to permanently modify the existing topography and may disturb damage, destroy or permanently seal-in fossils at or below the ground surface and are then no longer available for scientific research or as cultural heritage. This impact would, however, be at a much smaller scale than the full extent of the facility. Any fossils occurring in the project site are potentially scientifically and culturally significant and any negative impact on them would be of high significance. Although fossil heritage could be present, the destruction or inadvertent relocation of any affected fossils will be permanent and irreversible.	Local and limited to the construction phase	None identified.

Description of expected significance of impact There is a high possibility that fossil heritage will be recorded in the proposed study area. Probability of significant impacts on palaeontological heritage during the construction phase of the Power Block are high, but the intensity of the impact on fossil heritage is rated as medium. Should the project progress without due care to the possibility of fossils being present at the proposed development site within the Adelaide Subgroup the resultant damage, destruction or inadvertent relocation of any affected fossils will be permanent and irreversible. Fossils occurring within the study area are potentially scientifically and culturally significant and any negative impact on them without the opportunity to record such finds would be of high significance.
Gaps in knowledge & recommendations for further study Regardless of the sparse and sporadic occurrence of fossils in this biozone, a single fossil can be of scientific importance as many vertebrate fossil taxa are known from a single fossil. The value of fossil heritage at the site will be required to be considered through the EIA phase assessment. Should fossil material exist within the project area any negative impact upon it could be mitigated by surveying, recording, describing and sampling of well-preserved fossils within the study area by a professional palaeontologist. Excavation of this fossil heritage will require a permit from SAHRA and the material must be housed in a permitted institution. In the event that an excavation is impossible or inappropriate, the fossil or fossil locality should be protected.

6.4.7. Social Impacts

The potential positive impacts which could arise as a result of the construction activities include the following:

» Socio-economic benefits could accrue through job creation (primarily lower skilled levels) during the construction phase. The local community could therefore benefit in this regard;
» It is anticipated that more skilled positions could be filled by individuals from around South Africa;
» Should employment be linked to training and capacity building it would further the positives in this regard;
» At this stage it is not anticipated that local procurement would be achievable for the technology requirements associated with a project of this nature. Local procurement would be more focused on the procurement of general construction materials, goods and services.

The potential negative impacts which could arise as a result of the construction activities include the following:

» A large number of construction vehicles utilising the R389, local gravel roads and internal access roads for the duration of the construction phase for the proposed project could add to the negative impact on the roads. Construction vehicles utilising these roads over the construction period with heavy construction vehicles could increase the wear and tear on the roads utilised, regional roads and internal access roads; also crossing over the roads to access the site could increase the risk of accidents;
» An influx of workers and jobseekers to an area (whether locals are employed or outsiders are employed) could increase the safety risks in the local area and have an impact on the local social dynamics. Should locals be employed it could minimise the perceived and actual risk in this regard;
» An influx of an outside workforce could put pressure on municipal services, as indicated from the baseline description of the local area. Therefore introducing an external workforce to the local area will put pressure on local services and local community. This would, however, also depend on the exact size of the workforce.
» Adjacent landowners could be negatively affected by impacts from dust, noise or negative aesthetics created as a result of the construction activities.

Impact: Direct employment opportunities and skills development

The construction of the proposed project will require a workforce and therefore direct employment will be generated (approximately ~1210 employment opportunities for the duration of the construction phase of 36 months). The proposed project will create employment opportunities for the local community. This is therefore a positive social impact. The proponent has indicated that training will be provided to employees associated with the proposed project.

Desktop Sensitivity Analysis of the Site:
People from the ULM and nearby towns / settlements are most likely going to benefit the most from this positive impact due to the requirements stipulated in the REIPPP programme.

Issue	Nature	Extent of Impact	No-Go Areas
Direct employment opportunities and skills development	The creation of employment opportunities and skills development opportunities during the construction phase for the country and local economy	Local-regional	None

Description of expected significance of impact
The potential impact is expected to be positive, probable, short term, with a low intensity and have a medium significance. This will be confirmed

during the EIA phase following detailed investigations and assessment of impacts. In terms of reversibility of the impact and irreplaceable loss of resources, this is not applicable to this type of impact. The potential impact may be enhanced with possible enhancement measures which will be elaborated in the SIA EIA phase.

Gaps in knowledge & recommendations for further study

It is recommended that a detailed SIA is undertaken to determine actual impact of job creation and skills development.

Impact: Economic multiplier effects

There are likely to be opportunities for local businesses to provide services and materials for the construction phase of the project. The local service sector will also benefit. The economic multiplier effects from the use of local goods and services opportunities will include, but is not limited to, construction materials and equipment and workforce essentials such as services, safety equipment, ablution, accommodation, transportation and other goods. In terms of business opportunities for local companies, expenditure during the construction phase will create business opportunities for the regional and local economy. Also the injection of income into the area in the form of wages will represent an opportunity for the local economy and businesses in the area.

Desktop Sensitivity Analysis of the Site:

The ULM and nearby towns are most likely going to benefit the most from this positive impact due to the requirements stipulated in the REIPPP programme.

Issue	Nature	Extent of Impact	No-Go Areas
Economic multiplier effects	Significance of the impact from the economic multiplier effects from the use of local goods and services	Local-regional	None

Description of expected significance of impact

The potential impact is expected to be positive, probable, short term, with a minor intensity and have a low - medium significance. This will be confirmed during the EIA phase following detailed investigations and assessment of impacts. In terms of reversibility of the impact and irreplaceable loss of resources, this is not applicable to this type of impact. The potential impact may be enhanced with possible enhancement measures which will be elaborated in the SIA EIA phase.

Gaps in knowledge & recommendations for further study

It is recommended that this impact is further assessed in the EIA phase of the SIA.

Impact: Safety and security impacts

An increase in crime is often associated with construction activities. The perceived loss of security during the construction phase of the proposed project due to the influx of workers and/or outsiders to the area (as influxes of construction workers, newcomers or jobseekers are usually associated with an increase in crime), may have indirect effects, such as increased safety and security issues for neighbouring properties and damage to property, such as the risk of veld fire, stock theft, crime and so forth.

Desktop Sensitivity Analysis of the Site:
Areas of concern include the impacted farmland and adjacent farming areas where livestock and game farming occurs.

Issue	Nature	Extent of Impact	No-Go Areas
Safety and security impacts	Temporary increase in safety and security concerns associated with the influx of people in the study area during the construction phase	Local	None at this stage

Description of expected significance of impact
The potential impact is expected to be negative, improbable, short term, with a low intensity and have a low significance. This will be confirmed during the EIA phase following detailed investigations and assessment of impacts. The potential impact can be reversed and there is no irreplaceable loss of resources associated with the potential impact. The potential impact may be avoided with possible mitigation measures which will be elaborated in the SIA EIA phase.

Gaps in knowledge & recommendations for further study
Farmers/residents residing in the study area that currently utilize the R389, local gravel roads and the access road off the R389 to access their farms.

Impact: Impacts on daily living and movement patterns

An increase in traffic due to heavy vehicles could create short-term disruptions and safety hazards for current road users. Transportation of project components and equipment to the proposed study area will be transported using vehicular / trucking transport. The access road will be off the R389.

Desktop Sensitivity Analysis of the Site:
Farmers/residents residing in the study area that currently utilize the R389, local gravel roads and the access road off the R389 to access their farms.

Issue	Nature	Extent of Impact	No-Go Areas
Impacts on daily living and movement	Temporary increase in traffic disruptions impacting local communities movement patterns and increased safety risks for road users	Local	None

patterns			

Description of expected significance of impact

The potential impact is expected to be negative, probable, short term, with a moderate intensity and have a low significance. This will be confirmed during the EIA phase following detailed investigations and assessment of impacts. The potential impact can be reversed and there is no irreplaceable loss of resources associated with the potential impact. The potential impact may be mitigated with possible mitigation measures which will be elaborated in the SIA EIA phase.

Gaps in knowledge & recommendations for further study

Consultations with key stakeholders will need to take place in the EIA phase in order to determine the impact on daily living and movement patterns.

Impact: Pressure on economic and social infrastructure impacts from an in-migration of people

The in-migration of people to the area as either non-local workforce of construction workers and/or jobseekers could result in pressure on economic and social infrastructure (municipal services) due to in migration of construction workers and jobseekers and pressure on local population (rise in social conflicts and social dynamics). Influx of people into the area, especially by job seekers, could further lead to a temporary increase in the level of crime, cause social disruption and put pressure on municipal services.

Desktop Sensitivity Analysis of the Site:

Sensitive areas in the ULM include nearby towns such as Noupoort.

Issue	Nature	Extent of Impact	No-Go Areas
Pressure on economic and social infrastructure impacts from an in-migration of people	Added pressure on economic and social infrastructure during construction phase as a result of in-migration of people	Local-regional	None

Description of expected significance of impact

The potential impact is expected to be negative, improbable, short term, with a low intensity and have a low significance. This will be confirmed during the EIA phase following detailed investigations and assessment of impacts. The potential impact can be reversed and there is no irreplaceable loss of resources associated with the potential impact. The potential impact may be mitigated with possible mitigation measures which will be elaborated in the SIA EIA phase.

Gaps in knowledge & recommendations for further study

Consultations with key stakeholders (ward councillor and municipalities) will need to take place in the EIA phase.

Impact: Nuisance Impacts (noise and dust)

Impacts associated with construction related activities include noise, dust and disruption to adjacent properties is a potential issue.

Desktop Sensitivity Analysis of the Site:
Areas of concern include the impacted farmland and adjacent farming areas where farming communities may be living.

Issue	Nature	Extent of Impact	No-Go Areas
Nuisance Impacts (noise & dust)	Nuisance impacts in terms of temporary increase in noise and dust, on site and on farm roads for access to the site	Local	None

Description of expected significance of impact
The potential impact is expected to be negative, probable, short term, with a moderate intensity and have a low significance. This will be confirmed during the EIA phase following detailed investigations and assessment of impacts. The potential impact can be reversed and there is no irreplaceable loss of resources associated with the potential impact. The potential impact may be mitigated with possible mitigation measures which will be elaborated in the SIA EIA phase.

Gaps in knowledge & recommendations for further study
A site visit and consultations with key stakeholders (impacted and adjacent landowners) will need to take place in the EIA phase in order to determine the extent of this impact.

6.5 Evaluation of potential impacts associated with the Operation Phase of the Noupoort CSP Project

6.5.1. Impact on Ecology

Expected impacts during operation relate mainly to disturbance of plant and animal species in the surrounding areas as a result of maintenance activities. In addition, the presence of alien plant species could potentially result in impacts on vegetation structure and composition if not suitably controlled.

Impact: Impacts on Flora and fauna species and habitats

Operation related activities which could impact on the fauna, flora and overall ecology of the site includes:

» Maintenance (trimming / removal) of surrounding vegetation as part of management of the facility.
» Presence of ancillary infrastructure associated with the Noupoort CSP Project.
» Presence of impermeable surfaces associated with the built environment.

The following impacts are identified as the major potential impacts that are likely to be associated with the operation of the proposed Noupoort CSP Project and which will be assessed further during the EIA phase.

» Disturbance or loss of indigenous natural vegetation.
» Altered runoff patterns due to rainfall interception by trough infrastructure and compacted areas
» Disturbance to faunal migration routes and associated impacts to species populations.
» Impact on wetlands.
» Establishment and spread of declared weeds and alien invader plants.

Issue	Nature of Impact during the Operational Phase	Extent of Impact	No-Go Areas
Disturbance or loss of indigenous natural vegetation	The solar field will be installed a set of rails with no need for land levelling and minimal ground disturbance. No clearance of vegetation will be conducted underneath the trough mirrors, but will be trimmed to an acceptable height. The remaining infrastructure (i.e. access roads, buildings) will create areas of altered surface characteristics and rainfall interception patterns, and intensive shade that will not be tolerated by most of the species present on site, as these have evolved with a high daily irradiance. Consequently, it can be expected that within the development footprint, species composition topsoil characteristics will change significantly. No equivalent experiments have been undertaken in similar environments up to date, thus the nature and density of vegetation that may persist cannot be predicted at this stage. A sparser or less stable vegetation in the development footprint, together with the altered surface and runoff characteristics may lead to:	Local	» Valley-bottom wetland areas; and » Dolerite outcrops and ridge.

	» Increased vulnerability of remaining vegetation to future disturbance, including erosion; » General loss or significant alteration of habitats for sensitive species; » Loss in variation within sensitive habitats due to loss of portions of it; » General reduction in biodiversity; » Increased fragmentation (depending on location of impact); » Future extinction debt of a particular species; » Disturbance to processes maintaining biodiversity and ecosystem goods and services; and » Loss of ecosystem goods and services.		
Description of expected significance of impact The area seems to be generally homogenous and given the extensive amount of potentially intact vegetation in the area, there is likely to be little overall disruption to the broad-scale connectivity of the landscape, and that sufficient intact habitat would remain in the broader area to retain the overall ecological functioning of the landscape. Indigenous natural vegetation will be permitted underneath the trough. The extent (local), nature and subsequently the significance of this impact can be reduced with the implementation of mitigation measures such as avoidance of potential sensitive areas and listed species, by allowing a minimum clearance of vegetation (restricted to the absolute necessary areas). The duration of the impact will be restricted to the construction phase.			
Altered runoff patterns due to rainfall interception by trough infrastructure and compacted areas	The CSP mirrors create large surfaces of rainfall interception, where rainfall is collected and concentrated at the edges from where it then moves onto the ground in larger, concentrated quantities opposed to small drops being directly intercepted and raindrop impact dispersed by vegetation, then absorbed by the ground. This may lead to a localised increase in runoff during rainfall events, which may result in localised accelerated erosion. Likewise, access roads and areas where soils have been compacted during construction will have a low rainfall infiltration rate, hence creating more localised runoff from those surfaces. This runoff will thus have to be monitored and channelled where necessary to prevent erosion over larger areas.	Site and surroundings	» Valley-bottom wetland areas; and » Dolerite outcrops and ridge.

Description of expected significance of impact With effective mitigation measures in place, including implementation of an appropriate stormwater management plan, as well as regular monitoring of the occurrence, spread and potential cumulative effects of erosion may be limited to an absolute minimum. The extent of the impact will be limited to the site and surrounding area.			
Disturbance to faunal migration routes and associated impacts to species populations.	All components of the proposed development may interfere with current migration routes of especially fauna species. This may lead to: » Reduced ability of species to move between breeding and foraging grounds, reducing breeding success rates; » Increased mortality rates due to fatal collisions with infrastructure; and » Reduced genetic variation due to reduced ability of especially smaller organisms to have individual interaction.	Site and surroundings	Identified wetlands as well as their buffer areas.
Description of expected significance of impact Some habitat loss for faunal species is an inevitable consequence of the development but is not likely to be of broader significance (to be confirmed during EIA phase). From the desktop survey, no important faunal migratory routes (usually along extensive and well wooded valley floors and ephemeral streams) appear to be present within the development footprint areas.			
Impacts on wetlands	NFEPA Maps and available Google imagery show that a number of wetlands and drainage lines may be present within the broader study area. Beyond the study area is the Noupoortspruit River and other tributaries, which could be influenced by the proposed development if mitigation measures are not adequately implemented. » Accidental spills of harmful/toxic substances, if not contained and mitigated immediately, may result in these substances ending up in wetlands or polluting ground water resources. Spillage into larger drainage lines and wetlands may result in adverse effects along the Noupoortspruit and associated ecosystems; » The nature of the proposed developments, especially the CSP mirrors and new hard surfaces, will change surface characteristics, rainfall interception patterns and hence runoff characteristics of the project area; » This may affect the geohydrology, susceptibility to erosion and	Local to regional	Valley-bottom wetland system as well as the recommended buffer areas surrounding these wetlands.

	potential erosion rates of the landscape, which may lead to a significant alteration to or loss of habitat for fauna and flora species that depend on wetland habitats; » Altered runoff patterns may influence infrequent filling of possible wetlands on site, which may eliminate localised populations of water-dwelling organisms that depend on occasional small areas of standing water to breed out and regenerate; and » A decline in ecosystem functionality of wetlands will impact lower-lying larger wetland areas and river systems.		
Description of expected significance of impact The proposed development is unlikely to affect the catchment integrity and functionality of surrounding ecosystems or groundwater resources, or be detrimental to the functioning of habitats as these can be avoided by the development footprint. The extent of the impact will be local and regional. The extent, nature and subsequently the significance of this impact can be reduced by avoidance of valley-bottom wetland and associated buffer areas.			
Establishment and spread of declared weeds and alien invader plants.	The envisaged altered vegetation cover after construction and during the operation phase of the proposed development will create a window of opportunity for the establishment of alien invasive species. In addition, regenerative material of alien invasive species may be introduced to the site by machinery or persons traversing through areas with such plants or materials that may contain regenerative materials of such species. Consequences of the establishment and spread of invasive plants include: » Loss of indigenous vegetation or change in vegetation structure leading to an even more significant change in or loss of various habitat characteristics; » Loss of plant resources available to fauna; » Change in soil chemical properties; » Loss or fragmentation of sensitive or restricted habitats; » Loss or disturbance to individuals of rare, endangered, endemic and/or protected species; » Change in flammability of vegetation, depending on alien species; » Hydrological impacts due to increased transpiration and runoff;	Local to regional	None identified at this stage.

	» Increased production and associated dispersal potential of alien invasive plants, especially to lower-lying wetland areas, and » Impairment of wetland function.		

Description of expected significance of impact

A high number of alien invasive species has been recorded in the wider area according to the SANBI database. The extent to which the site contains alien plants will be determined in the EIA phase. The potential for alien invasive species present in or around the study area is regarded as high. With mitigation measures including regular monitoring and effective eradication and management methods in place, the significance of impacts associated with Invasive Alien Plants is expected to be low and local. With the absence of these mitigation measures the significance of invasion of invasive alien plants may potentially be high and may furthermore extend outside the boundary of the development footprint area affecting natural vegetation. Although this is a potential worst case scenario in the absence of mitigation measures as mentioned.

Gaps in knowledge & recommendations for further study

» The largest opportunity for mitigating any negative impacts exists during the design phase, if layouts adhere to the findings and recommendations of detailed field studies carried out during the EIA phase.
» Limited knowledge does, however exist on the potential and ease with which vegetation can be re-established after construction given the variable rainfall regime of the region; which species would be able to persist in the altered environment on and around the proposed development; and what effect will this altered species composition and –density will have on ecosystem intactness and –functionality.
» Regular monitoring of a minimum set of environmental parameters throughout the operational phase, coupled with an adaptive environmental management program, will thus be essential to prevent any environmental degradation and any cumulative effects of the development beyond its periphery.

6.5.2. Impact on Avifauna

Impact on Avifauna

The following impacts are identified as potential major impacts associated with the operation of the proposed Noupoort CSP Project and which will be assessed further during the EIA phase.

» Permanent alteration of habitat within the CSP trough footprint
» Collision with the CSP troughs and or perimeter fence.
» Collision with the power line and/or electrocution

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Collision with CSP troughs	Birds colliding with project infrastructure.	Confined to the solar field footprint area.	Drainage lines and wetlands associated with the eastern and western Valley-Bottom Wetlands

			of the Noupoortspruit.
Electrocution	Power lines have a range of bird related impacts one of which is electrocution events whereby a bird perches on an electrical structure and causes an electrical short circuit by bridging the gap between live components and or live and earthed components.	Local	Drainage lines and wetlands associated with the eastern and western Valley-Bottom Wetlands of the Noupoortspruit.
Collision with power lines	Fatal interactions involving birds and power line infrastructure include cases where birds collide with the power lines and/or when they cause a short circuit on electricity infrastructure."	Local	Drainage lines and wetlands associated with the eastern and western Valley-Bottom Wetlands of the Noupoortspruit.
Habitat destruction within the CSP trough footprint	In order for solar energy facilities to be commercially viable, they require large tracts of land (~900ha). It can therefore be assumed that some habitat will be lost during the establishment of the facility and its associated infrastructure (including clearing for access roads and power lines). Habitat loss reduces the carrying capacity of the local area.	Confined to footprint of the CSP trough solar field	Drainage lines and wetlands associated with the eastern and western Valley-Bottom Wetlands of the Noupoortspruit.
Description of expected significance of impact The potential impacts are expected to be negative and probable. Impacts during the operation phase will be long term. Reversibility of impacts is low, but there is no irreplaceable loss of resources associated with the potential impact. Any power line crossing wetland systems is highly likely to present a significant collision risk to birds such as the Blue Crane *Anthropoides paradiseus*. Possible mitigation measures will be investigated during the EIA phase.			
Gaps in knowledge & recommendations for further study The alignment of the new power line is not yet known. The following activities will be included as part of the Avifauna Study during the EIA Phase: » Second field survey in the wet season. » A detailed sensitivity map will be produced and will include mapping and incorporation of any sensitive features that may occur on site. » The presence of species of concern will be evaluated.			

6.5.3. Visual Impacts

Impacts could include general landscape change or change due to the proposed development that could detract from the existing character as well as change of view for affected people and / or activities:

» Generally landscape change or degradation. This is particularly important for protected areas where the landscape character might be deemed to be exceptional or rare. However, it can also be important in non-protected areas particularly where landscape character is critical to a specific broad-scale use such as tourism, or simply for the general enjoyment of an area. This is generally assessed by the breaking down of a landscape into components that make up the overall character and understanding how proposed elements may change the balance of the various elements. The height, mass, form and colour of new elements all help to make new elements more or less obvious as does the structure of an existing landscape which can provide screening ability or texture that helps to assimilate new elements. This effect is known as visual absorption capacity (VAC).
» Change in specific views within the affected area from which the character of a view may be important for a specific use or enjoyment of the area.
  * Visual intrusion is a change in a view of a landscape that reduces the quality of the view. This can be a highly subjective judgement. Subjectivity has however been removed as far as is possible by classifying the landscape character of each area and providing a description of the change in the landscape that will occur due to the proposed development. The subjective part of the assessment is to define whether the impact is negative or positive. Again to make the assessment as objective as possible, the judgement is based on the level of dependency of the use in question on existing landscape characteristics.
  * Visual obstruction is the blocking of views or foreshortening of views. This can generally be measured in terms of extent.
  * Due to the nature of the proposed development, visual impacts are expected to relate largely to intrusion.

Impact: Potential visual impact on general landscape character			
Issue	**Nature of Impact**	**Extent of Impact**	**No-Go Areas**
Industrialisation of general landscape character	The assessment indicates that the proposed development could be visible from and therefore affect the character of the rural landscape surrounding the site over an area of approximately 20 km measured east to west and 12 km measured north to south. Given that the rural landscape character is likely to be changed to a similar extent by existing (town centre) and currently authorised development (wind farm to the east) and given that there do not appear to be any affected protected areas or sensitive uses, this character change is unlikely to be significant and is assessed as low to medium.	This is likely to be a local impact	From the desk top scoping assessment, it does not appear that there are no-go areas. However, in order to protect the more natural landscape areas outside the influence of the urban area, it appears that the ridgeline and areas of the site to the west of the site should be avoided.

	The ZTV assessment also indicates that development of the eastern section of the site is only likely to impact the landscape that is already affected by urban development and infrastructure. Development of other sections of the site are also likely to impact on areas of more natural landscape to the west of the proposed site.		
Description of expected significance of impact Landscape degradation is expected to of low to medium significance. Given this project will be seen in the context the wider urban town area and wind farm project, the significance of this impact is likely to be low. Several mitigation measures might include the minimizing clearance of vegetation, maintaining natural vegetation within and below troughs, protection of boundary vegetation and arranging the development on the lower, north easterly quadrant of the site which will reduce visibility. There will be no irreplaceable loss and the impact will reverse on decommissioning of the CSP facility.			
Gaps in knowledge & recommendations for further study Confirmation of the nature of the surrounding landscape, possible sensitive uses. From review of existing GIS data sets there are no protected areas of national importance that are likely to be impacted. It is possible however that there could be sensitive and local conservation/recreational uses. The likely sensitivity of the western section of the urban area to views of the proposed development needs to be assessed on site. These issues need to be confirmed through a site visit.			

Impact: Potential visual impact on users of the N9			
Issue	**Nature of Impact**	**Extent of Impact**	**No-Go Areas**
Industrialisation of a natural landscape as seen from the N9	The assessment indicates that the development could be visible for approximately 11 km within the approximate limit of visibility for all visibility zones. The section of the N9 south of Noupoort would be the most affected (some 4 km), due to the higher elevation and also due to potential glint and glare in the mornings and late afternoons that will likely be experienced. The local elevation of the road relative to the site and the nature of vegetation is likely to be critical in either hiding the development area	This is likely to be a local impact.	From the desk top scoping assessment it does not appear that there are any no-go areas.

	or opening up views over it.		
Description of expected significance of impact Landscape degradation is expected to be of low significance. The N9 is a well-used tourist and connector route, the significance of the possible impact is anticipated to be low along the northern section and medium along the southern section, due to potential glint and glare and the road's elevation. VAC and distance may significantly reduce visibility, glint and glare, however this will require confirmation via ground-truthing. Mitigation may be required along sections of the road in the form of appropriate screen fencing/ planting to minimize glint/ glare for road users. There will be no irreplaceable loss. The impact will reverse on decommissioning of the facility.			
Gaps in knowledge & recommendations for further study Minor undulations in landform and density of vegetation could have significant influence on the visibility and nature of views of the development. A site visit is required to assess this in detail.			

Impact : Potential visual impact on users of the R389			
Issue	**Nature of Impact**	**Extent of Impact**	**No-Go Areas**
Industrialisation of a natural landscape as seen from the R389	The assessment indicates that the development could be visible for approximately 20 km within the approximate limit of visibility, within all zones of visibility. The section of the R389 in close proximity to the site and close to Noupoort would likely be the most affected. The local elevation of the road relative to the site and the nature of vegetation is likely to be critical in either hiding the development area or opening up views over it.	This is likely to be a local impact.	From the desk top scoping assessment it does not appear that there are any no-go areas. However, an undeveloped buffer area may be advisable between the proposed development and the R389.
Description of expected significance of impact Landscape degradation is expected to be of low to medium significance. Given that the R389 is a well-used tourist and connector route, the significance of the possible impact is anticipated to be medium along the majority of the R389 and medium to high along the section of road in close proximity to the proposed site (some 4.5 km) and in sections nearer to town. VAC and distance may reduce these respectively to low and to medium. The project site is also large, being 3460 ha in extent, with a proposed development area of 900 ha, i.e. only 26% of the site will be developed. This will provide opportunity to construct the visible structures away from sensitive receptors (toward the north-east quadrant of the site). Developing the lower north easterly quadrant of the site could reduce impacts on the R389. The section of the road closest to the site could also be affected by glint and glare. Mitigation may be required in the form of appropriate screen fencing/ planting, particularly in areas that may experience glint/ glare. There will be no irreplaceable loss. The impact will reverse on decommissioning of the facility.			
Gaps in knowledge & recommendations for further study			

Minor undulations in landform and density of vegetation could have significant influence on the visibility and nature of views of the development. A site visit is required to assess this in detail. A more detailed assessment of glint and glare particularly for the R389 in close proximity to the site.

Impact: Potential visual impact on users of the three minor roads			
Issue	**Nature of Impact**	**Extent of Impact**	**No-Go Areas**
Industrialisation of a natural landscape as seen from three minor roads	The ZTV indicates that views will be possible over approximately 8 km (northerly road), 8 km (southerly road) and 4 km (easterly road) within the approximate limit of visibility (10.1 km). The northerly road would be the most affected as it borders onto the site's northern border and from this road 33-66% of the site would be visible. The local elevation of the road relative to the site and the nature of vegetation is likely to be critical in either hiding the development area or opening up views over it.	This is likely to be a local impact.	From the desk top scoping assessment it does not appear that there are any no-go areas.
Description of expected significance of impact Landscape degradation is expected to be of very low significance. Given however that these minor roads are used mostly by farmers/ local people and that the interest is focused on productivity and not aesthetics the significance of the possible impact is anticipated to be low. However, along the section of the northerly road, which borders the northern boundary of the project site, the impact is anticipated to be medium to high**.** It should be noted though that a railway line also borders this section of the site, hence landscape character has already been altered. In addition, as mentioned above, the site is also fairly large, being 3460 ha in extent, with a proposed development footprint of 900 ha, i.e. only 26% of the site will be developed. This will provide opportunity to construct the visible structures away from sensitive receptors (toward the north-east quadrant of the site). Developing the lower north easterly quadrant of the site could reduce impacts on the surrounding landscape including local roads. Mitigation may be required in the form of appropriate fencing/ planting. There will be no irreplaceable loss. The impact will reverse on decommissioning of the facility.			
Gaps in knowledge & recommendations for further study Minor undulations in landform and density of vegetation could have significant influence on the visibility and nature of views of the development. A site visit is required to assess this in detail.			

Impact: Potential impacts on users of the railway line/s			
Issue	**Nature of Impact**	**Extent of Impact**	**No-Go Areas**
Industrialisation of a natural landscape as seen from the railway line/s	The ZTV indicates that views will be possible over approximately 3 km of the north-western branch of the railway line and 7 km over the northern branch of the line within the approximate limit of visibility (10.1 km). The north-western railway branch would be the most affected as it borders onto the site's northern border and from this line 33-66% of the site would be visible. No glint/ glare is expected to be visible from the railway lines. The local elevation of the line relative to the site and the nature of vegetation is likely to be critical in either hiding the development area or opening up views over it.	This is likely to be a local impact.	A site visit is required to confirm the nature of the surrounding landscape and the existence or otherwise of sensitive uses.
Description of expected significance of impact Landscape degradation is expected to be of very low significance. Given however that these railway lines are used for commercial purposes and that the interest is focused on business/ industrial activities and not aesthetics the significance of the possible impact is anticipated to be negligible. Mitigation will likely not be required. There will be no irreplaceable loss and the impact can be reverse on decommissioning of the facility.			
Gaps in knowledge & recommendations for further study This issue appears to be largely irrelevant due to the nature of the line which is used for goods. It will be reviewed during the EIA stage and if found irrelevant will not be reported on further.			

Impact: Potential impacts on residents of settlements and homesteads in close proximity (3 homesteads)			
Issue	**Nature of Impact**	**Extent of Impact**	**No-Go Areas**
Industrialisation of a natural landscape as seen from local homesteads	The scoping assessment has identified approximately 20 possible receivers within the approximate limit of visibility (10.1 km), in all directions of the site. Eleven of these fall within the zone of visibility, with three within or in close proximity to the site (approximately 1 km).	This is likely to be a local impact.	From the desk-top scoping assessment it does not appear that there is any no-go area although a buffer area may be required around homesteads

	Homesteads are generally associated with agriculture and largely have ornamental and woody vegetation planted around and within them. This vegetation is likely to have some influence in screening or pat screening views of external areas.		within and close to the site boundary.

Description of expected significance of impact

Landscape degradation is expected to be low to medium. Given the likely nature of the homesteads with a focus on agriculture and the distance between the homesteads and the development, the significance of the possible impact is anticipated to be generally low. The three homestead within or in close proximity to the site may however experience a high impact. Mitigation is unlikely to be necessary, apart from the homestead in close proximity, to the east, which may require screen planting/ fencing.

The project site is also large, being 3460 ha in extent, with a proposed development area of 900 ha, i.e. only 26% of the site will be developed. This will provide opportunity to construct the visible structures away from sensitive receptors (toward the north-east quadrant of the site). Developing the lower north easterly quadrant of the site could reduce impacts on the surrounding landscape including local homesteads. There is unlikely to be an irreplaceable loss. The impact will reverse on decommissioning of the facility.

Gaps in knowledge & recommendations for further study

Minor undulations in landform and density of vegetation could have a significant influence on the visibility and nature of views of the development. A site visit is required to assess this in detail.

Impact: Potential impacts on residents of Noupoort

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Industrialisation of a townscape	The assessment indicates that the small town of Noupoort could change in character to an industrialised town.	This is likely to be a local impact.	From the desk top scoping assessment it does not appear that there is any no-go area.

Description of expected significance of impact

Landscape degradation is expected to be negligible to medium. This is subject to the relative location of the proposed development as well as the sensitivity of the western section of the urban area. The change in character is generally expected to be minimal, given that the area is already urbanised and that a windfarm is to be constructed to the east of the town. Houses on the north-western edge of the urban area generally overlook a rural landscape, though with a railway line running close by. It is possible that the development may industrialise this view. This could be significant as this area appears to be comprised of relatively large properties that may be dependent on outlook for maintenance of property value. The significance could be negligible to high subject to the location of the proposed development within the site, the nature of the affected area and the degree of VAC provided by the existing landscape including existing railway infrastructure.

Gaps in knowledge & recommendations for further study
Buildings and infrastructure within the town could have significant influence on the visibility and nature of views of the development. Confirmation of the nature of affected properties particularly on the western edge of the urban area. A site visit is required to assess this in detail.

Impact: Potential impacts of night lighting			
Issue	**Nature of Impact**	**Extent of Impact**	**No-Go Areas**
Industrialisation of a natural landscape as seen at night	It is likely that operational lighting will be required at buildings and security lighting may be required within and around the facility.	This is likely to be a local impact.	From the desk top scoping assessment it does not appear that there are any no-go areas.
Description of expected significance of impact			
Landscape degradation is expected to be low. Subject to the location of the proposed development the significance of this impact could be medium to low. If seen in the context of existing lighting of the urban area then the impact is likely to be low. There will be no irreplaceable loss and the impact will reverse on decommissioning of the CSP facility.			
Gaps in knowledge & recommendations for further study			
Minor undulations in landform and density of vegetation could have significant influence on the visibility and nature of views of the development. A site visit is required to assess this in detail.			

Impact: Ocular impacts associated with glint and glare.			
Issue	**Nature of Impact**	**Extent of Impact**	**No-Go Areas**
Impacts can vary from permanent eye injury, persistence of vision that could make driving on local roads dangerous to low	All large scale solar facilities are capable of causing offsite glare that may cause annoyance and visual discomfort. Typically, the main risk of glint and glare associated with linear collectors such as parabolic troughs occur from; » Specular reflections from the mirrors when they are moving from stowed to tracking. » Specular reflections off the ends of the trough or mirrors when the	This is likely to be a local impact.	From the assessment it appears that the development could create a glint and glare problem. It seems likely however that this might be mitigated through screening. This impact is therefore unlikely to require a no-go area.

level nuisance.	sun has a low elevation angle (e.g., reflections from the north end of a north-south field when the sun is low in the southern horizon). » Diffuse and specular reflections from receiver tubes The main mitigation measures include: » Screening with opaque fencing / earth berms » Careful siting and operation of solar collectors (e.g., siting the facility away from roads and trails where possible) or turning mirrors away from the sun during time periods when glare impacts are significantly adverse may substantially reduce or avoid visual impacts from offsite glare. In the southern hemisphere typically these impacts are most likely to occur to the east, west and south of a facility. In order for there to be an issue it is necessary for the facility to be visible to receivers.		

Description of expected significance of impact

Landscape degradation is expected to be low. Possible glint and glare issues have been highlighted throughout the assessment. From the review of visibility undertaken in assessment of other impacts, it is obvious that the identified receivers that have the potential to be impacted are:

» Users of the R389, particularly immediately south of the proposed site;
» Three homesteads to the east of the site, one being in close proximity to the south eastern boundary of the proposed site.
» The north-western edge of the urban area.

Given the possible screening effect of vegetation and minor land form and the potential to set back visible components of the facility towards the north-eastern sectors of the site, it is possible that glint and glare will not be a major concern. Preliminary information indicates that the site slopes away from possible affected parties which if this is the case will help to minimise risk. Screening will also help to reduce any potential impact, particularly during early morning and late afternoon. The impact could therefore be negligible to high**,** should screening not be possible. As the project site is 3460ha, it provides opportunity to construct the visible structures away from sensitive receptors (toward the north-east quadrant of the site). Developing the lower north easterly quadrant of the site could reduce impacts on the surrounding receptors and will take the problem further from sensitive areas such as residents and roads. Distance is likely to help mitigate impacts. It is unlikely that there will be an irreplaceable loss. The impact will reverse on decommissioning of the facility.

Gaps in knowledge & recommendations for further study

A brief assessment may be undertaken using the analytical glare estimation tool on the Sandia Laboratories web site (https://share.sandia.gov/phlux). The following is required to be confirmed in order to assess the impact of the site:

- The proposed layout of site in relation to authorised projects.
- Mirror reflectivity.
- Root Mean Square (RMS) error.
- Mirror focal length.
- Reflective area.
- Direct Normal Irradiance levels (DNI)
- A site visit is required to check the screening ability of vegetation and minor landform changes.

The Sandia Laboratories web site has been unavailable recently so it may not be possible to utilize this facility. In which case, the assessment will provide comment based on the likely direction and angle of reflections during early morning and late afternoon will be prepared.

6.5.4. Impact on Land Use, Soil and Agricultural Potential

The overall impacts of the proposed Noupoort CSP Project on agriculture and soil conditions will be low, principally because of the climatic conditions and the low agricultural and grazing potential of the site. There are small cultivated lands situated only north-east in the project site. The soil and rock type properties tend to be very homogenous in the area and the whole site can be better utilised for power generation in comparison to any other practise. However, due to the predominance of duplex soils, the hazard of water erosion when topsoil is disturbed may be significant, as these areas are considered to be highly susceptible to erosion.

Impact: Loss of agricultural land

Loss of agricultural land due to the direct impact by the infrastructure's footprint during all phases of the project. The agricultural potential for the project site are considered to be low and there are small cultivated lands situated only north east in the project site, situated within the valley-bottom wetland system demarcated as a no-go area.

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Loss of agricultural land due to the direct	Although likely to occur at the extent of the development footprint, this impact is expected to be of low significance as a result of the limited agricultural potential of the site and limited usage for livestock grazing.	Site (confined to areas within the site where infrastructure	Small cultivated lands north east in the project site, located within the valley-bottom wetland

impact by the infrastructure's footprint during all phases of the project.		will be located).	system demarcated as a no—go area.

Description of expected significance of impact

Impacts of the proposed projects on agricultural potential are expected to be of low significance. The area for avoidance are the cultivated areas along the Noupoortspruit. At the end of the project life, it is anticipated that removal of the structures would enable the land to be returned to more or less a natural state following rehabilitation, with little impact, especially given the low prevailing agricultural potential. At the end of the project life, it is anticipated that removal of the structures would enable the land to be returned to more or less a natural state following rehabilitation, with little impact, especially given the low prevailing agricultural potential.

Gaps in knowledge & recommendations for further study

Considering that the broad soil types occurring on and surrounding the site are homogeneous, coupled with the fact that there is limited potential for agricultural activity within the project site, no further detailed soil investigation will be required in order to further assess the impact. It can confidentially be stated that the impact on agricultural potential will be low. The study undertaken by the Agricultural Research Council (ARC-IWR) confirmed that the overall impacts of the proposed facility on agriculture and soil conditions will be of low significance, predominantly because of the climatic conditions and the low agricultural and grazing potential of the site. The possibility to house substantial commercial farming practices (agriculture or grazing) on the property is not realistic, because of the dominant climatic conditions and prevailing soil conditions. Irregular rainfall, along with other soil-related factors, lead to low agricultural potential.

As a result of the low significance of impacts, no further studies are required to be undertaken. Mitigation measures recommended within the project site are to be included within the project Environmental Management Programme (EMPr), which is to be compiled in the EIA Phase of the process.

Impact: Loss of soil resources

Loss of soil resources as a result of erosion during all phases of the project. Most of the project site comprises of duplex soils. These soils are very susceptible to erosion, especially water erosion when the topsoil is disturbed.

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Loss of soil resources as a result of erosion	Soil erosion is a natural process whereby the ground level is lowered by wind or water action and may occur as a result of inter alia chemical processes and/or physical transport on the land surface. Accelerated	Site (confined to areas within the site where surface	None identified.

during all phases of the project (especially water erosion).	erosion is a common occurrence on construction sites where soil is loosened and vegetation cover is stripped. This impact can be largely minimised through the implementation of appropriate mitigation measures.	vegetation is removed).	

Description of expected significance of impact

The significance of increased susceptibility to water erosion are low if mitigated. Mitigation measures would be to ensure that little surface disturbance as possible occurs. Where vegetation is removed for construction, specific measures would need to be put in place during both the construction and operational phases, which would include: absolute minimum removal of vegetation; soil conservation measures; re-vegetation as soon as possible; regular monitoring of erosion situation. There is the potential for the loss of soil resources through erosion during the operation phase. This impact can be effectively minimised through the implementation of appropriate mitigation measures including implementation of an appropriate stormwater management plan and regular monitoring of the occurrence, spread and potential cumulative effects of erosion. Impacts post-mitigation are expected to be of low significance.

Gaps in knowledge & recommendations for further study

Erosion is a common occurrence on construction sites where soil is loosened and vegetation cover is stripped. The nature of the development will only include the partial clearance of vegetation within the development footprint. Vegetation will be permitted to remain underneath the trough system, and will be maintained throughout the operation phase.

As a result of the low significance of impacts, no further studies are required to be undertaken. Mitigation measures recommended within the project site are to be included within the project Environmental Management Programme (EMPr), which is to be compiled in the EIA Phase of the process.

6.5.5 Social Impacts

The potential positive impacts which could arise as a result of the operation phase include the following:

- Employment opportunities would be created resulting in benefits to unemployed individuals within the local communities.
- Capacity building and skills development throughout the life of the development could be to the benefit of the employees and could assist them in obtaining transferable skills.
- Local procurement for general materials, goods and services (e.g. transport, catering and security) and other spin-off benefits could materialise.
- The presence of permanent security personnel at the site could be beneficial to the overall security measures implemented in the area.

» The proposed project could assist in the generation of "green energy" which would lessen South Africa's dependency on coal-generated energy and the impact of such energy sources on the bio-physical environment. The project thereby providing clean, renewable energy supply.

The potential negative impacts which could arise as a result of the operation phase include the following:

» The permanent visual impact associated the proposed project (solar energy facility, power line, access roads, firebreaks, etc.) would alter the landscape. Perceptions with regards to the intensity of such an impact are expected to differ among landowners, stakeholders and other individuals. It is anticipated that each person would experience such an impact in a different way depending on their perception of the proposed project itself, the activities undertaken on the surrounding area, their interest in the project and their exposure to the project on a daily basis. The proposed project is located in a rural area so the visual implications could have a further negative impact on the area's sense of place.
» Direct occupation of land by the proposed project has the effect of taking the impacted land out of agricultural production (livestock grazing), through the occupation of the site by the footprint of the project.

Impact: Direct employment opportunities and skills development

The operation phase (20-25 years) of the proposed project will require a workforce and therefore direct employment will be generated. Primarily skilled and high skilled personal will be required during the operation phase. The proponent has also indicated that training will be provided for employees during the operation phase.

Desktop Sensitivity Analysis of the Site:
A limited number of local community members are likely going to benefit from this positive impact.

Issue	Nature	Extent of Impact	No-Go Areas
Direct employment opportunities and skills development	The creation of long term employment opportunities and skills development opportunities during the operation phase for the country and local economy	Local-regional	None

Description of expected significance of impact
The potential impact is expected to be positive, probable, long term, with a minor intensity and have a low - medium significance. This will be

confirmed during the EIA phase following detailed investigations and assessment of impacts. In terms of reversibility of the impact and irreplaceable loss of resources, this is not applicable to this type of impact. The potential impact may be enhanced with possible enhancement measures which will be elaborated in the SIA EIA phase.

Gaps in knowledge & recommendations for further study

It is recommended that a detailed SIA is undertaken to determine actual impact of job creation and skills development opportunities during the operation phase.

Impact: Economic multiplier effects

There are likely to be opportunities for local businesses to provide services and materials for the operation phase of the development. The local service sector will also benefit from the proposed project. In terms of business opportunities for local companies, expenditure during the operation phase will create business opportunities for the regional and local economy. Also the injection of income into the area in the form of wages will represent an opportunity for the local economy and businesses in the area.

Desktop Sensitivity Analysis of the Site:

The ULM, nearby towns and local community members are most likely going to benefit from this positive impact.

Issue	Nature	Extent of Impact	No-Go Areas
Economic multiplier effects	Significance of the impact from the economic multiplier effects from the use of local goods and services	Local-regional	None

Description of expected significance of impact

The potential impact is expected to be positive, probable, long term, with a minor intensity and have a low significance. This will be confirmed during the EIA phase following detailed investigations and assessment of impacts. In terms of reversibility of the impact and irreplaceable loss of resources, this is not applicable to this type of impact. The potential impact may be enhanced with possible enhancement measures which will be elaborated in the SIA EIA phase.

Gaps in knowledge & recommendations for further study

It is recommended that this impact is further assessed in the EIA phase of the SIA.

Impact: Socio-Economic Development (SED), Enterprise Development (ED) and share ownership in the project company with local communities:

Renewable energy projects under the Renewable Energy Independent Power Producer Procurement (REIPPP) programme are obliged to make a real contribution to local economic development in the area. Awarded projects are required to spend a certain amount of their generated revenue on SED and ED and share ownership in the project company with local communities. These criteria, as well as the creation of a specific number of jobs, are incentivised through awarding higher scoring to projects that realise such criteria within a 50km radius to the project site during the evaluation process. Additionally, projects add value to the local economy through targeted procurement from local businesses. Job creation requirements target national and local citizens. Between 12% and 20% of the people employed on the project have to be residents of local communities.

Desktop Sensitivity Analysis of the Site:

The ULM and local people from the nearby towns are most likely going to benefit from job opportunities and SED/ ED.

Issue	Nature	Extent of Impact	No-Go Areas
SED, ED and share ownership in the project company with local communities	Positive long-term impact from SED, ED and local share ownership in the project company	Local	None

Description of expected significance of impact

The potential impact is expected to be positive, probable, long term, with a moderate intensity and have a medium significance. This will be confirmed during the EIA phase following detailed investigations and assessment of impacts. The potential impact can be reversed and there is no irreplaceable loss of resources associated with the potential impact. The potential impact may be enhanced with possible enhancement measures which will be elaborated on in the SIA EIA phase.

Gaps in knowledge & recommendations for further study

An additional in-depth community needs assessment (CNA) will need to be carried out at a later stage to make sure that the real needs of communities are addressed (in line with the local government) by development programmes in order to significantly contribute towards local economic growth, SED and ED. A detailed SIA is also recommended to determine the actual impact of these benefits.

Impact: Development of clean, renewable energy infrastructure:

The use of solar radiation for power generation is considered a non-consumptive use of a natural resource which produces zero greenhouse gas emissions. The generation of renewable energy will contribute to South Africa's electricity market. The advancement of renewable energy is a priority for South Africa. Bringing in the renewable energy sector to the local economy may contribute to the diversification of the local economy and provide

greater economic stability.

Desktop Sensitivity Analysis of the Site:
N/A

Issue	Nature	Extent of Impact	No-Go Areas
Development of clean, renewable energy infrastructure	Positive long-term impacts from the generation of renewable energy	Local-regional-national	None

Description of expected significance of impact
The potential impact is expected to be positive, probable, long term, with a moderate intensity and have a medium significance. This will be confirmed during the EIA phase following detailed investigations and assessment of impacts. The potential impact can be reversed and there is no irreplaceable loss of resources associated with the potential impact.

Gaps in knowledge & recommendations for further study
None at this stage in the process.

Impact: Visual impact and impacts on sense of place

The sense of place is developed over time as the community embraces the surrounding environment, becomes familiar with its physical properties, and creates its own history. The sense of place is created through the interaction of various characteristics of the environment, including atmosphere, visual resources, aesthetics, climate, lifestyle, culture and heritage. Importantly though it is a subjective matter and is dependent on the demographics of the population that resides in the area and their perceptions regarding trade-offs. An impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light. The social impacts associated with the impact on sense of place relate to the change in the landscape character and visual impact from the proposed project.

Desktop Sensitivity Analysis of the Site:
Sensitive receptors include the immediate area of influence; landowners in the study area and commuters utilising the R389.

Issue	Nature	Extent of Impact	No-Go Areas
Visual impact and impacts on sense	Visual impacts and sense of place impacts associated with the operation phase of the project	Local	None

of place			

Description of expected significance of impact

The potential impact is expected to be negative, probable, long term, with a moderate intensity and have a low-medium significance. This will be confirmed during the EIA phase following detailed investigations and assessment of impacts. The potential impact can be reversed and there is no irreplaceable loss of resources associated with the potential impact. The potential impact may be mitigated with possible mitigation measures which will be elaborated in the SIA EIA phase.

Gaps in knowledge & recommendations for further study

A visual impact assessment will need to be undertaken to determine the exact visual impacts associated with the proposed project.

Impact: Impacts associated with the loss of agricultural land

The activities associated with the operation phase of the proposed project will result in a loss of farmland available for grazing and potential loss of agricultural production for the operation period of 20-25 years.

Desktop Sensitivity Analysis of the Site:

Sensitive areas include the proposed sites and development footprint area.

Issue	Nature	Extent of Impact	No-Go Areas
Impacts associated with the loss of agricultural land	Impacts associated with loss of farmland available for agricultural use due to occupation of land by the proposed project for 20-25 years.	Local (Site)	None

Description of expected significance of impact

The potential impact is expected to be negative, probable, long term, with a low intensity and have a low-medium significance. This will be confirmed during the EIA phase following detailed investigations and assessment of impacts. The potential impact can be reversed and there is no irreplaceable loss of resources associated with the potential impact. The potential impact may be mitigated with possible mitigation measures which will be elaborated on in the SIA EIA phase.

Gaps in knowledge & recommendations for further study

An agricultural impact assessment has been undertaken to determine the impacts on agricultural activities associated with the proposed project.

6.6 Evaluation of potential Cumulative impacts associated with the Noupoort CSP Project and other Renewable Projects in the Area

Cumulative impacts, in relation to an activity, refer to the impact of an activity that in-itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area. For cumulative effects analysis to help the decision-maker and inform interested parties, it must be limited to effects that can be evaluated meaningfully (DEAT, 2004). Therefore, the cumulative impacts associated with the proposed Noupoort CSP Project has been viewed with other relevant approved or operational developments within a 30 km radius of the proposed site.

Cumulative effects are commonly understood as the impacts which combine from different projects and which result in significant change, which is larger than the sum of all the impacts (DEAT, 2004). The complicating factor is that the projects that need to be considered are from past, present and reasonably foreseeable future development. Cumulative effects can be characterised according to the pathway they follow. One pathway could be the persistent additions from one process. Another pathway could be the compounding effect from one or more processes. Cumulative effects can therefore occur when impacts are:

» additive (incremental);
» interactive;
» sequential; or
» synergistic.

Canter and Sadler (1997) describe a three step process for addressing cumulative effects in an EIA:

» delineating potential sources of cumulative change (i.e. using GIS to map the relevant renewable energy facilities in close proximity to one another).
» identifying the pathways of possible change (direct impacts)
» indirect, non-linear or synergistic processes; and
» classification of resultant cumulative changes

Table 6.1 and **Figure 6.3** provide details of the known renewable energy projects within 30km from the project site (at least 17 other facilities, 2 of which are preferred bidder projects). It is clear from Table 6.1 that there is a concentration of solar facilities in the broader area around Noupoort, and that this area can be considered to be a solar hub.

Table 6.1: Other facilities within 30km from the Noupoort CSP Project site

Project Name	Location	Approximate distance from the proposed Noupoort CSP Project site	Project Status
Allemans Fontein Solar Energy Facility	Remainder of Farm Allemans Fontein 83	Located 9.6km north west of the proposed study area	Received Authorisation
Amandla Welanga Solar Energy Facility	Remaining extent of Farm Rietfontein 140	Located 25.2km north east of the proposed study area	Received Authorisation
Carolus Poort Solar Energy Facility*	Remainder of the Farm Carolus Poort No. 207	Located within the proposed farm portions	Received Authorisation
Damfontein Solar Energy Facility	Portion 8 of the Farm Damfontein 114	Located 7km north west of the proposed study area	Received Authorisation
Dida Solar Energy Facility	Portion 3 of the Farm Rietfontein	Located 27km north east of the proposed study area	Received Authorisation
Gillmer Solar Energy Facility	Farm Noupoort No. 306	Located 2.5km south east of the proposed study area	Received Authorisation
Inkululeko Solar Energy Facility	Portion 2 of the Farm Carolus Poort 167	Located adjacent (less than 500m) east of the proposed study area	Received Authorisation
Kleinfontein Solar Energy Facility*	Portion 4 of the Farm Caroluspoort 167	Located within the proposed farm portions	Received Authorisation
Klip Gat Solar Energy Facility	Portion 2 of the Farm Klip Gat 80	Located 17.8km west of the proposed study area	Received Authorisation
Linde Project (Solar Energy Facility)	Remaining extent and portion 1 of the Farm Van der Linderskraal No 79	Located 28.3km north west of the proposed study area	Received Authorisation and Preferred Bidder Round 2 (project constructed and operational)
Middleburg Solar Park 1	Remaining extent of Portion 4 of Farm Twee Fontein 11	Located 17.6km south east of the proposed study area	Received Authorisation

Middleburg Solar Park 2	Remainder of Farm Twee Fontein 11	Located 19.4km south east of the proposed study area	Received Authorisation
Naauw Poort Solar Energy Facility	Remaining extent of Portion 1 of the Farm Naauw Poort	Located 12.9km south of the proposed study area	Received Authorisation
Noupoort Mainstream Wind Energy Facility	Remainder of the Farm 168, Portion 1 of the Farm Holbrook 181, Portion 21 of the Farm Hartebeest Hoek 182	Located 10.3km east of the proposed study area	Received Authorisation and Preferred Bidder Round 3
Toitdale Solar Energy Facility*	Portion 1 of the Farm Caroluspoort 167	Located within the proposed farm portions	Received Authorisation
Tollie Solar Energy Facility	Remaining extent of Portion 1 of the Farm Naauw Poort 1	Located 12.9km south of the proposed study area	Received Authorisation
Wonderheuwel Solar Energy Facility	Portion 7 of the Farm Damfontein No. 114.	Located 10.2km west of the proposed study area	Received Authorisation

* Projects located within the proposed farm portions.

There is a growing number of solar energy facility applications in South Africa and in the Northern Cape. This could result in positive permanent impacts on the economy, business development, employment and education in the area and the Province. It may also result in negative impacts such as influx jobseekers and a change the landscape and areas sense of place. Cumulative impacts are expected to be associated with the following (refer to Sections 6.4 and 6.5 as well as specialist reports contained within **Appendices D-J** for more details):

» Impacts on ecology (fauna, flora and avifauna) - The study area is located in the Nama-Karoo biome and Upper Karoo Bioregion. The vegetation in and surrounding the study area is Eastern Upper Karoo vegetation type (NKu 4), classified as Least Threatened. Only 2% of the vegetation type has been transformed. Transformation of intact habitat could potentially compromise ecological processes as well as ecological functioning of important habitats and would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations. This is especially of relevance for larger drainage lines and wetlands serving as important groundwater recharge and floodwater attenuation zones, important microhabitats for various organisms and important corridor zones for faunal

movement. Due to the extent of the impacted vegetation type and the amount of intact habitat still present the cumulative impact is regarded as low.

» Impacts on avifauna - Avifaunal species likely to be observed within the project site are diverse, with 23 Red Data species recorded. This includes eight Endangered species, six Vulnerable species, and nine Near-Threatened species. Cumulative habitat loss and fragmentation in the area can be expected for the extent of the areas required for infrastructure development. The potential for cumulative impact on birds as a result of the development of the CSP facility is required to be investigated further.

» Loss of heritage and archaeological resources - Potential sites of heritage and archaeological significance will be determined during the EIA phase. Cumulative impacts including the permanent destruction of heritage resources throughout the wider region due to renewable energy and associated developments in the area.

» Loss of palaeontological resources - Fossils occurring within the study area are potentially scientifically and culturally significant. Potential sites of palaeontological significance will be determined during the EIA phase. Cumulative impacts including the permanent destruction of palaeontological resources throughout the wider region due to renewable energy and associated developments in the area. The cumulative effect of the proposed Noupoort CSP Project is considered to be low.

» Visual impacts - Cumulative visual impacts would occur when the Noupoort CSP Project is seen in conjunction with existing and other proposed energy projects in the area. The cumulative impacts associated with CSP and PV facilities are largely linked to the visual impact on the areas sense of place and landscape character. The construction of the Noupoort CSP Project and the other solar facilities in close proximity to one other will increase the cumulative visual impact of industrial type infrastructure within the region.

» Impacts on the social environment (both positive and negative) - The positive cumulative impacts include creation of employment, skills development and training opportunities, and downstream business opportunities. The significance of this impact is rated as a high positive with enhancement. Benefits to the local, regional and national economy through employment and procurement of services could be substantial should many renewable energy facilities proceed. Negative impacts and change to the local economy with an in-migration of labourers, businesses and jobseekers to the area.

Potential cumulative impacts associated with numerous solar energy developments within the study area are also positive and these too need to be considered, for instance:

» The development of renewable energy facilities will have a positive impact at a national and international level through the generation of "green energy" which would lessen South Africa's dependency on coal generated energy and the impact of such energy sources on the bio-physical environment.
» The proposed project would be in line with the government's aim to implement renewable energy projects as part of the country's energy generation mix over the next 20 years as committed to by government and as detailed in the Integrated Resource Plan (IRP).
» The development of renewable energy facilities will have a positive impact at a regional and local level through increased work and skills development opportunities and the associated reduced poverty levels.
» More projects within a single area will enhance the shareholding benefits that flow to the local community and will create cumulative positive impacts via the increased socio-economic and enterprise obligations that benefit the local community.
» Renewable energy, specifically solar energy, is the cheapest form of energy available to the country and hence the exploitation of high solar resource areas so as to reduce electricity tariffs is of direct benefit to the national economy and all South Africa's citizens.

Cumulative impacts will be fully assessed in the EIA phase. Each specialist study will consider and assess the cumulative impacts of proposed, approved and authorised renewable projects in the area.

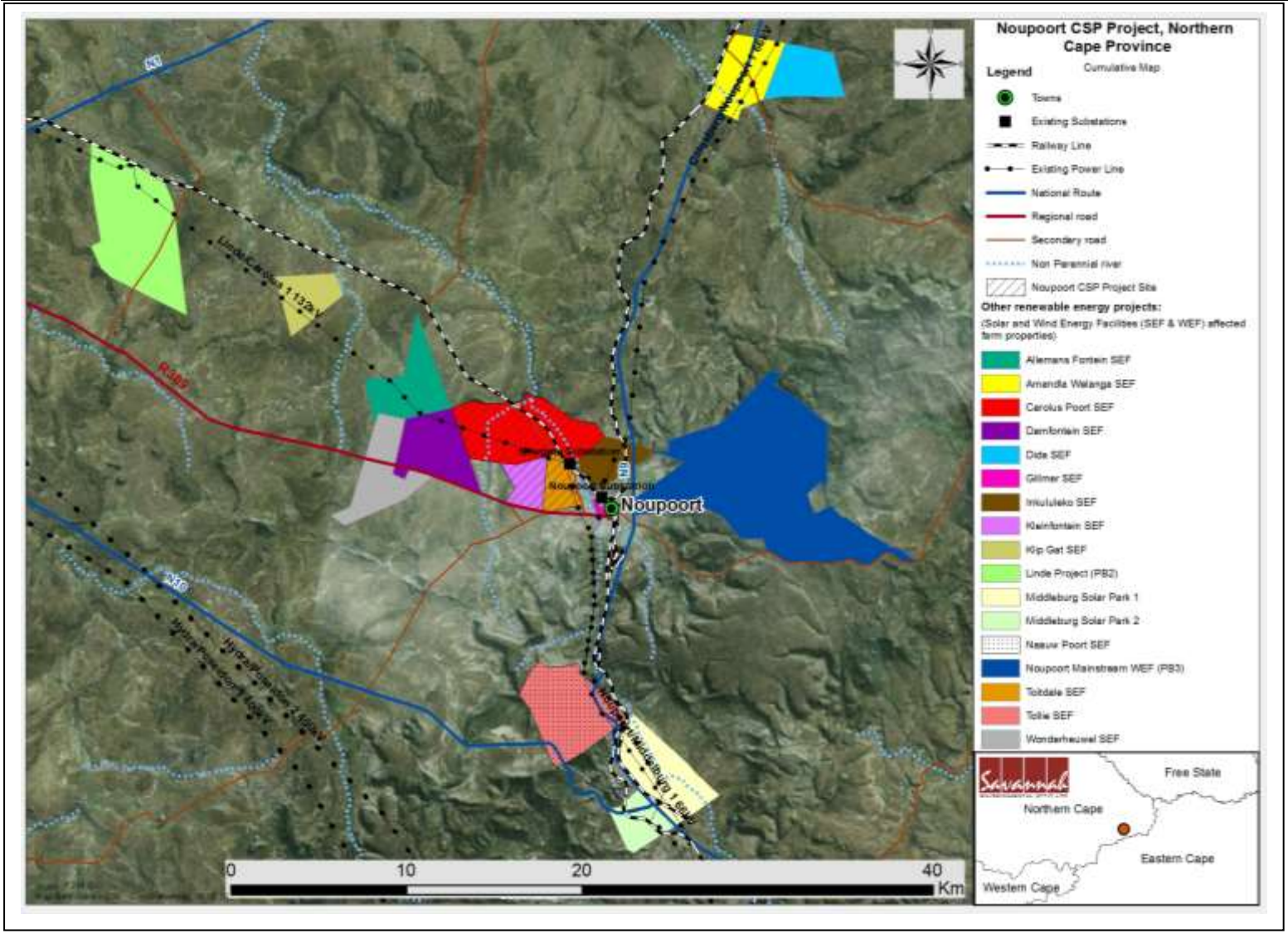

Figure 6.3: Map illustrating the affected farm portions of known renewable energy projects within 30km radius of the Noupoort CSP Project. These projects were identified using the Department of Environmental Affairs Geographic Information System digital data (http://egis.environment.gov.za/frontpage.aspx?m=27).

CONCLUSIONS CHAPTER 7

CRESCO Energy (Pty) Ltd is proposing the development of a Concentrated Solar Power (CSP) Project and associated infrastructure on the Remaining Extent of the Farm 207, Portion 1 and Portion 4 of the Farm Carolus Poort 167, situated approximately 4 km north west of Noupoort. The proposed site falls under the jurisdiction of the Umsobomvu Local Municipality and within the greater Pixley ka Seme District Municipality in the Northern Cape Province. The Noupoort CSP Project is proposed to generate up to 150MW in capacity and will be constructed over an area of approximately 900 ha in extent.

The Scoping Report for the proposed Noupoort CSP Project has been undertaken in accordance with the EIA Regulations published in Government Notice 38282 of 4 December 2014, in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998).

This Scoping Report is aimed at detailing the nature and extent of this facility, identifying potential issues associated with the proposed project, and defining the extent of studies required within the EIA phase. This was achieved through an evaluation of the proposed project, involving the project proponent, specialist consultants, and a parallel consultation process with key stakeholders (including relevant government authorities) and interested and affected parties (I&APs). The public consultation process has been extensive and every effort made to include representatives of all relevant stakeholder groupings with an interest in the type of development, the site, and the Province. This chapter concludes the Scoping Report and provides an evaluation of the identified potential environmental risks and impacts associated with the construction and operation phases of the Noupoort CSP Project. Recommendations regarding investigations required to be undertaken within the EIA are provided within the Plan of Study for EIA, contained within Chapter 8 of this scoping report.

The conclusions and recommendations of this Scoping Report are the result of the review of existing information, desk-top evaluations, on-site inspections of impacts identified by specialists and limited field work, with the aim of identifying the potential for risks and sensitivities on the proposed development site and thereby flagging any areas which are not considered acceptable for a development of this nature.

7.1 Legal Requirements as per the EIA Regulations, 2014

This chapter of the scoping report includes the following information required in terms of Appendix 2: Content of the Scoping Report of the EIA Regulations, 2014:

Requirement	Relevant Section
(h)(xi) a concluding statement indicating the preferred alternatives, including the preferred location of the activity.	A concluding statement regarding the Noupoort CSP Project is included within this chapter as a whole.

7.2. Conclusions drawn from the Evaluation of the Proposed Noupoort CSP Project

The Noupoort CSP Project is proposed to generate up to 150MW in capacity and will be constructed over an area of approximately 900 ha within the project site which is approximately 3460ha.

Infrastructure associated with the facility includes:

» Solar collector field comprising of all systems and infrastructure related to the control and operation of the parabolic troughs;
» Energy Centre, comprising of the storage media and heat exchanger;
» Power Block, consisting of the steam turbine and generator, as well as the air-cooled condenser and associated feedwater system;
» On-site project substation;
» A new 132kV power line to connect the on-site substation to the Eskom's electricity grid;
» Access roads and fencing around the development area;
» Lined evaporation ponds;
» Gas boiler for the start-up process of the facility;
» Water supply pipeline;
» On-site water storage tanks/reservoirs;
» Water treatment facility;
» Plant assembly facility;
» Offices and workshop areas for maintenance and storage; and
» Temporary laydown areas.

The key issues and potential impacts identified through this scoping study associated with the Noupoort CSP Project are summarised in **Table 7.1**. As illustrated in **Table 7.1**, the majority of potential impacts identified to be associated with the construction of the Noupoort CSP Project are anticipated to be localised in extent (i.e. limited to the site boundaries or the area immediately surrounding the site). This excludes social impacts – job creation which could have more of a regional positive impact. Operational phase impacts range from local to regional and national (being the positive impact of contribution of clean energy as part of the energy mix in South Africa).

Table 7.1: Summary of the extent of the potential impacts associated with the Noupoort CSP Project, as identified at the scoping phase

Construction / Decommissioning Impacts	Extent
Disturbance to and loss of indigenous natural vegetation	L
Disturbance or loss of threatened / protected plants	L
Loss of habitat for fauna species of conservation concern	L
Disturbance to migration routes and associated impacts to species populations	S
Impacts on wetlands	L-R
Establishment and spread of declared weeds and alien invader plants	L-R
Disturbance and displacement of birds and destruction of nests	L
Loss of soil resources as a result of erosion (especially water erosion)	S
Loss of agricultural land	S
Visual impact on surrounding areas as a result of construction activities	L
Direct employment opportunities and skills development	L-R (positive)
Economic multiplier effects	L-R (positive)
Safety and security impacts	L
Impacts on daily living and movement patterns	L
Pressure on economic and social infrastructure impacts from an in-migration of people	L-R
Nuisance Impacts (noise & dust)	L
Disturbance and destruction of archaeological sites and graves	L
Loss of unique fossil heritage	S-L

Operational Impacts	Extent
Disturbance or loss of indigenous natural vegetation	L
Altered runoff patterns due to rainfall interception by CSP mirrors and compacted areas	S-L
Disturbance to faunal migration routes and associated impacts to species populations	S-L
Impacts on wetlands	L-R
Establishment and spread of declared weeds and alien invader plants	L-R
Collision with parabolic troughs and infrastructure	S
Habitat destruction within the CSP trough footprint	S
Potential visual impact on general landscape character	L
Potential visual impact on users of the N9	L

Potential visual impact on users of the R389	L
Potential visual impact on users of the three minor roads	L
Potential impacts on users of the railway line/s	L
Potential visual impact on residents of settlements and homesteads in close proximity to the proposed Noupoort CSP Project	L
Potential impacts on residents of Noupoort	L
Potential visual impact of night lighting	L
Ocular impacts associated with glint and glare.	L
Loss of agricultural land	S
Loss of soil resources as a result of erosion (especially water erosion)	S
Direct employment opportunities and skills development	L-R (positive)
Economic multiplier effects	L-R (positive)
Socio-Economic Development (SED), Enterprise Development (ED) and share ownership in the project company with local communities	L (positive)
Development of clean, renewable energy infrastructure	L-R-N (positive)
Visual impact and impacts on sense of place	L
Impacts associated with the loss of agricultural land	S-L

S	**Site**	L	**Local**	R	**Regional**	N	**National**	I	**International**

At a local level, the area has become a node for renewable energy projects due to the viability of the solar resource for the area and the availability of the Newgate and Noupoort Substations. There are already a number of CSP projects (and solar PV facilities) constructed and planned in the region. Key cumulative impacts associated with solar energy developments within the immediate vicinity of the Noupoort CSP Project are expected to be associated with the construction impacts and resulting disturbance of the physical footprints of the facilities in one node/area, and the potential for a change in visual quality of the area.

No environmental fatal flaws associated with the Noupoort CSP Project within the Remaining Extent of the Farm 207, Portion 1 and Portion 4 of the farm Carolus Poort 167 were identified at this stage in the process. This conclusion must however be confirmed through a detailed investigation of the development footprint within the EIA Phase of the process.

7.3 Sensitivity Analysis and Risks Associated with the Proposed Project

The potentially sensitive areas which have been identified through the scoping study are listed below and summarised in **Figure 7.1** and **Figure 7.2**. The scoping phase sensitivity maps provide an informed illustration of sensitivity within and around the larger site and are intended to inform the location and layout of the CSP facility within the project site. **Figure 7.1** illustrates potential areas within the project site that are considered to be no-go areas, very high- and highly sensitive areas as identified in the scoping evaluation. The areas shown as no-go areas are considered to be exclusion areas for development, and must be avoided by the development footprint. **Figure 7.2** illustrates potential areas of medium sensitivity. These areas are predominantly artificial anthropogenic features (such as furrows associated with historic agricultural activities) and are not considered to present a risk to the intended use of the site. The demarcated sensitive areas must be used as a tool by the developer to avoid those areas flagged to be no-go areas (considered exclusion areas) and areas of very high sensitivity (where impacts would be of high significance). High and medium sensitivity ratings are considered acceptable loss areas. The mapped detail is based on the desktop review of the available baseline information for the project site as well as field surveys already undertaken. Specific sensitivities identified within the scoping study are summarised below.

Those portions of the site which are proposed for the project development footprint will be subject to survey and ground-truthing during the EIA phase of the project. The potentially sensitive areas identified to date will therefore be further investigated and assessed through detailed specialist studies (including field surveys) during the EIA phase of the process (refer to Chapter 8 for further

details) and the sensitivity map will be further refined on the basis of these specialist studies, in order to provide an assessment of environmental acceptability and suitability of the facility layout of the Noupoort CSP Project.

7.4.1. Ecological sensitive features

The project site is located within Eastern Upper Karoo vegetation type, which is classified as Least Threatened and is the most widespread vegetation type in the country. Given the extensive amount of potentially intact vegetation in the area, there is likely to be little overall disruption to the broad-scale connectivity of the landscape, and that sufficient intact habitat would remain in the broader area to retain the overall ecological functioning of the landscape. On a local/site level, areas of high ecological function include the ephemeral valley-bottom wetland system, depression wetland and the more inaccessible areas such as the dolerite ridge and outcrops that are considered to be highly sensitive and should be regarded as no-go areas. Drainage lines located in the eastern and western portions of the project site are susceptible to erosion and regarded as areas of high sensitivity. Several artificial wetlands (small to medium size earthen dams) identified within the project site provide valuable functions corresponding with those of natural wetlands and are regarded as areas of high sensitivity and include a 35m buffer.

Buffer areas are essential for wetland protection. Presently there are no prescribed aquatic buffers other than those proposed in the Eastern Cape, therefore a modified version of the Eastern Cape Biodiversity Plan (ECBCP) (Desmet and Berliner, 2007) buffer recommendation are to be applied, as these recommendations are becoming more widely accepted.

The impacts for the construction and operational phase range from local to regional level. The most significant potential impacts expected are:

* Reduction of a stable vegetation cover and associated below-ground biomass that currently increases soil surface porosity, water infiltration rates and therefore improves the soil moisture availability. Without this vegetation, the soil will be prone to extensive surface capping, leading to accelerated erosion and further loss of organic material and soil seed reserves from the local environment.
* A loss of habitats, or the presence of protected plant species.
* Disturbed vegetation in the project site carries a high risk of invasion by alien invasive plants.
* Possible impacts on the wetlands and drainage lines that are present on the site, as well as larger wetland and drainage systems beyond the project site due to altered surface hydrology of the surrounding plains.

7.4.2. Avifaunal Sensitivities

Several areas that are considered to be of avifaunal significance have been identified within the project site and includes areas that are linked to landform and habitat. The areas of high ecological function including the valley-bottom wetlands and the dolerite ridge located in the northern portion of the project site and should be regarded as no-go areas. The south-western portion of the project site is considered to be a habitat for sensitive avifaunal species (including the Secretary bird) and should be regarded as a no-go area. Man-made structures such as the furrow and water/feeding troughs are likely to attract birds such as Blue Cranes to the area and are regarded as areas of medium sensitivity, only should they remain in situ.

The impacts for the construction and operation phases are restricted to the site with only one impact that range from the site to a local level. The most significant potential impacts expected are:

* Disturbance and displacement of birds due to construction.
* Habitat destruction within the CSP trough footprint.
* Collision with CSP trough and associated infrastructure.
* Collision with the power line and/or electrocution.

7.4.3. Soil and agricultural potential

The Noupoort CSP Project will have a low significance impact on the agricultural potential of the area. The overall impacts of the proposed Noupoort CSP Project on agriculture potential and soil conditions will be low, principally because of the climatic conditions and the low agricultural and grazing potential of the site. There are small cultivated lands situated north east in the project site within the identified valley-bottom wetland system which is already demarcated as a no-go area. There are no identified highly sensitive areas with regards to agricultural potential and soil. The impacts for the construction and operation phase will be confined to the site. There is the potential for the loss of soil resources through erosion, particularly during the construction phase.

7.4.4. Visual sensitive receptors

The impacts for the construction and operation phase will be at a local level. The project site is located 4km north west of Noupoort. As the project site is adjacent to a town centre and 10.3km from a wind farm already under construction, the effect of industrialising the character of the surrounding landscape will be minimal. The development is expected to not add significantly to the visual

impact associated with the wind farm project under construction and the existing urban setting, including a major railway line. The project site is also located 3km west of the N9 National Road, and adjacent to the R389 Regional road. Both of these roads are within the approximate limit of visibility (10.1km). The Noupoort CSP Project could have a significant impact on views from these roads, particularly the R389.

A number of farmsteads (including the landowner of the Remaining Extent of the Farm 207) occur of which three within close proximity to the project site (~1km). The natural vegetation that covers the majority of the affected area could provide a degree of screening, particularly if trees and shrubland extend above eye-level. The distance between possible sensitive receivers and the CSP facility also means that intervening vegetation is likely to combine to provide a cumulative screening effect.

Possible visual receptors that have been identified include:

* The N9 south of Noupoort;
* The R389, particularly immediately south of the proposed project site;
* The minor road immediately north of the proposed development site;
* A small number homesteads in close proximity to the proposed project site, particularly to the south-east; and
* The town of Noupoort, particularly a residential area on the north-western edge.

7.4.5. Archaeological resources

Areas which may yield heritage resources or finds of some significance include an old water furrow and a dam. Other areas that are could potentially be associated with Stone Age artefact scatters include the ridges, hills, pans, drainage lines or dongas. The construction of the project could have a low to medium impact on heritage resources on a local scale. The most significant potential impact expected is:

* Disturbance and destruction of archaeological finds.

7.4.6. Palaeontological resources

The development area is underlain by the Adelaide and Tarkastad Supergroup of the Beaufort Group, Karoo Supergroup. Due to the nature of the underlying sediments, it is considered highly likely that fossil material may be present in the sediments underlying the project site and therefore the significance of fossil heritage is considered to be high. Although fossil heritage could be present, the destruction or inadvertent relocation of any affected fossils will be permanent and

irreversible. The impacts for the construction phase have an impact on a local level (restricted to the development footprint). The most significant potential impact expected is:

* Loss of potential palaeontological heritage - mainly due to disturbance, damage or destruction or sealing-in of fossils.

7.4.7. Social

The impacts for the construction and operation phase range from local to regional level. The most important potential social benefits associated with the construction and operation of the proposed project include:

* employment opportunities
* possible socio-economic spin-offs created.

The most significant potential negative impacts expected are:

* Safety and security impacts - temporary increase in safety and security concerns associated with the influx of people in the project site during the construction phase.
* Impacts on daily living and movement patterns – the temporary increase in traffic disruptions impacting local communities movement patterns and increased safety risks for road users.
* Farmers/residents residing in the study area that currently utilize the access road to access their farms
* Pressure on economic and social infrastructure impacts from an in-migration of people.
* Nuisance due to an increase in noise and dust.
* Visual impact and impacts on sense of place.

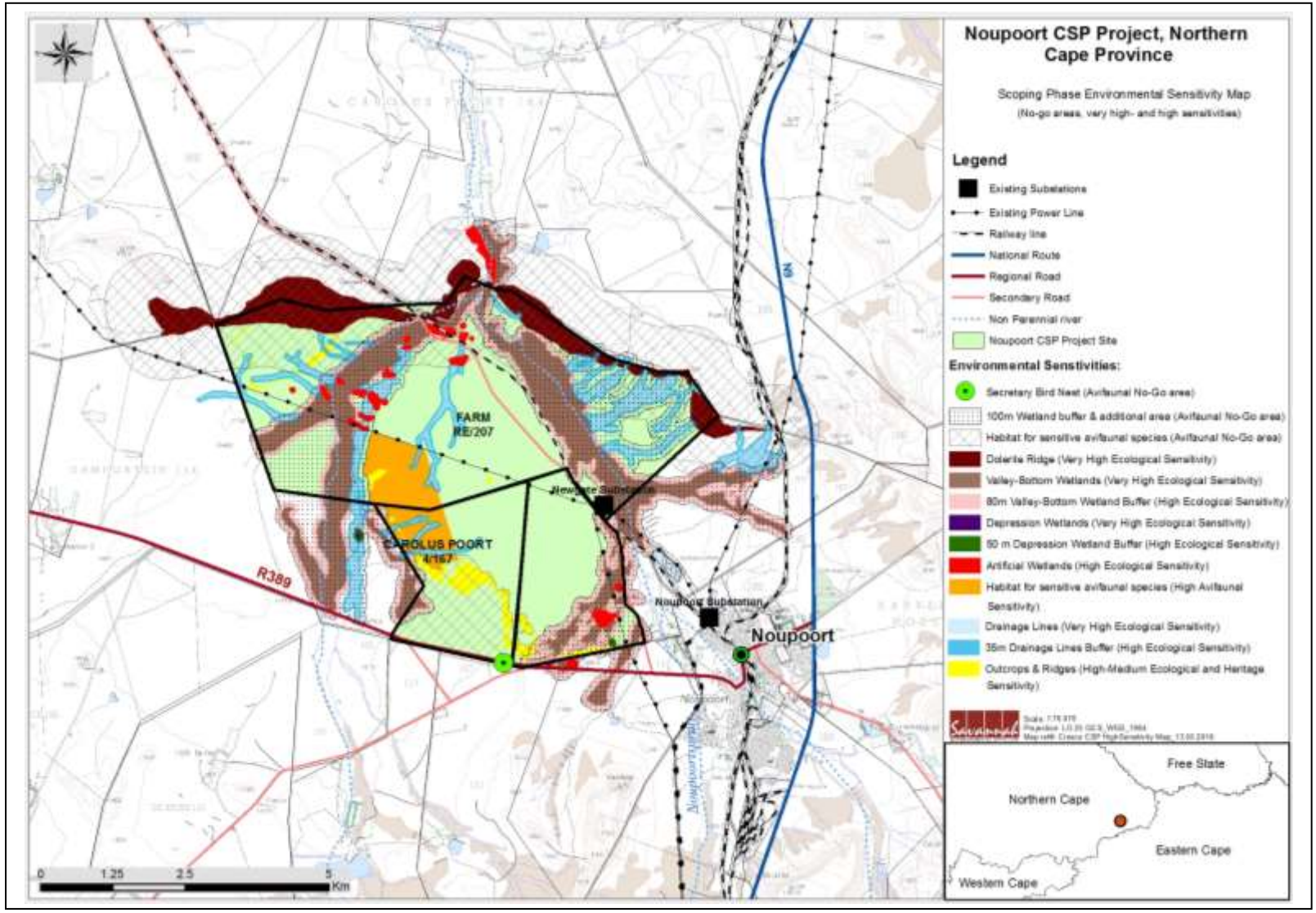

Figure 7.1: Environmental Sensitivity Map illustrating no-go areas, very high- and high sensitivities identified in the scoping evaluation for the Proposed Noupoort CSP Project (refer to **Appendix M** for A3 map).

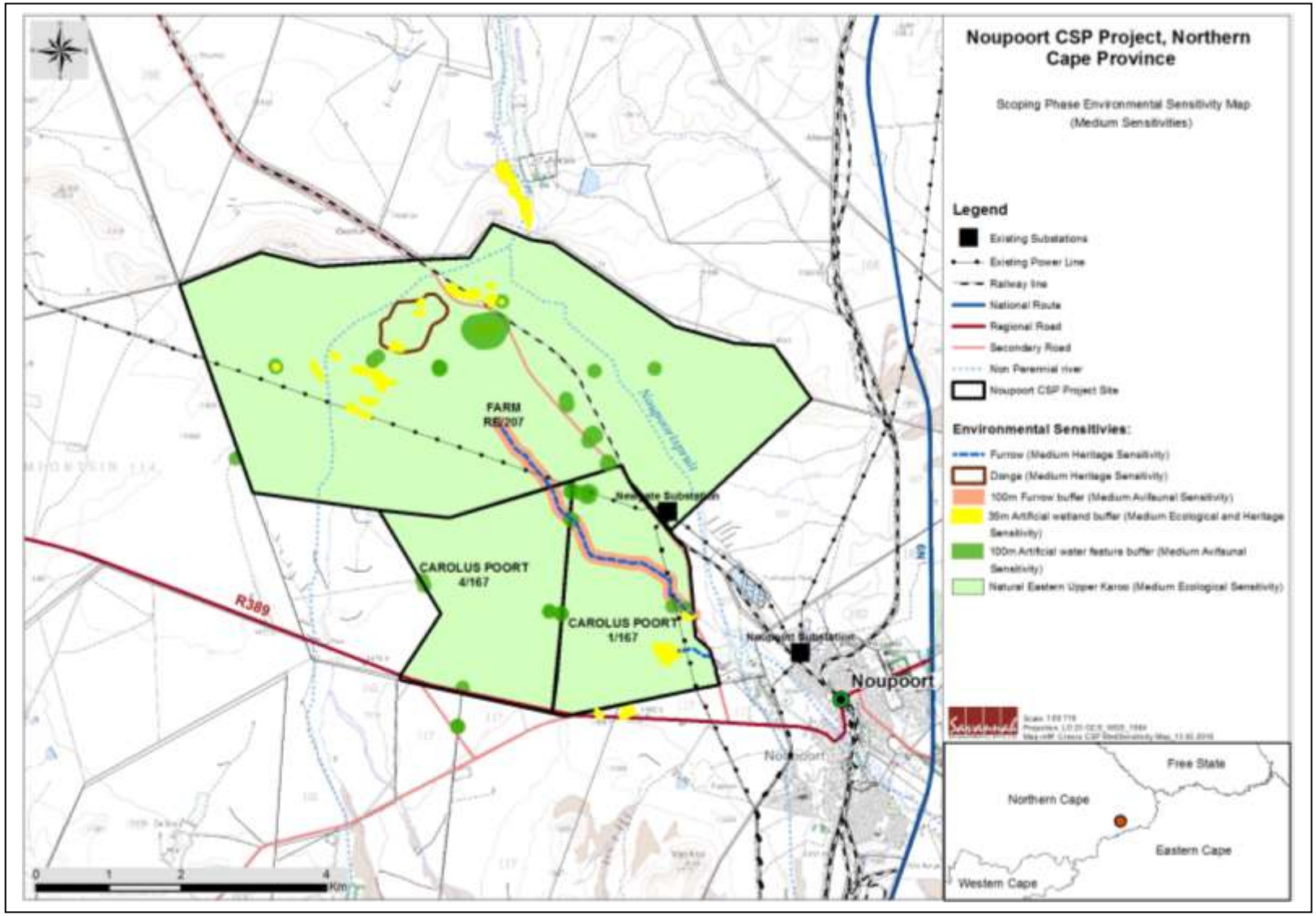

Figure 7.2: Environmental Sensitivity Map illustrating medium sensitivities identified in the scoping evaluation for the Proposed Noupoort CSP Project (refer to **Appendix M** for A3 map).

7.5 Recommendations

At this stage in the process, there are no environmental fatal flaws associated with the Noupoort CSP Project within the Remaining Extent of the Farm 207, Portion 1 and Portion 4 of the farm Carolus Poort 167, and there is no reason for the Noupoort CSP Project to not be evaluated further through an EIA-level assessment. It is, however, recommended that potential areas within the broader project site that are considered to be no-go areas and very high sensitive areas must be avoided by the development footprint. Potential areas of medium sensitivity which are predominantly artificial anthropogenic features (such as furrows and watering points associated with historic agricultural activities) are not considered to present a risk to the intended use of the site.

With an understanding of which areas within the project site are considered sensitive to the development of the proposed CSP facility, CRESCO Energy (Pty) Ltd can prepare the detailed infrastructure layout for consideration and assessment within the EIA Phase. During the EIA phase more detailed environmental studies will be conducted in line with the Plan of Study contained in Chapter 8 of this report. These studies will consider the feasible facility layout provided by the developer and make recommendations for the implementation of avoidance strategies (if required), mitigation and management measures to ensure that the final assessed layout retains an acceptable environmental impact.

PLAN OF STUDY FOR THE ENVIRONMENTAL IMPACT ASSESSMENT CHAPTER 8

This Scoping Report includes a description of the nature, extent, expected significance of impacts associated with the development of the proposed Noupoort CSP Project. This chapter provides the Plan of Study for the Environmental Impact Assessment (EIA) which is relevant to the development phase for the CSP facility, based on the outcomes of the Scoping Study and associated specialist investigations.

The key findings of the Scoping Phase includes inputs from authorities, the public, the proponent and the EIA specialist team, and are used to inform the Plan of Study for EIA together with the requirements of the NEMA EIA Regulations of 2014 and applicable guidelines. The Plan of Study describes how the EIA Phase will proceed and includes details of the detailed specialist studies required to be undertaken for those potential impacts recorded to be of potential significance.

8.1 Legal Requirements as per the EIA Regulations, 2014

This chapter of the scoping report includes the following information required in terms of Appendix 2: Content of the Scoping Report of the EIA Regulations, 2014:

Requirement	Relevant Section
(i) a plan of study for undertaking the environmental impact assessment process to be undertaken	A plan of study for the undertaking of the EIA phase for the Noupoort CSP Facility is included within this chapter.

8.2 Aims of the EIA Phase

The EIA Phase to be undertaken for the CSP facility will aim to achieve the following:

» Provide an overall description and assessment of the social and biophysical environment affected by the development of the proposed CSP facility.
» Assess potentially significant impacts (direct, indirect and cumulative, where required) associated with the proposed CSP facility.
» Identify and recommend appropriate mitigation measures for potentially significant environmental impacts.
» Undertake a fully inclusive public involvement process to ensure that I&APs are afforded the opportunity to participate, and that their issues and concerns are recorded.

The EIA will address potential environmental impacts and benefits (direct, indirect and cumulative impacts) associated with each phase of the development including design, construction, operation and decommissioning; and will aim to provide the environmental authorities with sufficient information to make an informed decision regarding the proposed project. The detailed CSP facility layout will be assessed through detailed specialist studies. As required in terms of the EIA Regulations the assessment will include consideration of the 'do nothing' alternative.

8.3 Authority Consultation

Consultation with the regulating authorities (i.e. Department of Environmental Affairs (DEA) and the Department of Environment and Nature Conservation (DENC)) will be undertaken and will continue throughout the EIA process. On-going consultation will include the following:

» Submission of a Final Scoping Report following the 30-day review period (and consideration of comments received).
» Submission of an EIA Report for review and comment.
» Submission of a Final EIA Report following a 30-day review period (and consideration of comments received).
» Consultation and a site visit with DEA and DENC (if required) in order to discuss the findings and conclusions of the EIA Report.

8.4 Consideration of Alternatives

The following project alternatives will be investigated and assessed in the EIA Phase:

» **The 'do nothing' alternative:** CRESCO Energy (Pty) Ltd does not establish the proposed Noupoort CSP Project on the Remaining Extent of the Farm 207, Portion 1 and Portion 4 of the Farm Carolus Poort 167.
» **Site-specific layout/design alternatives:** No site alternatives are to be assessed for the location of the Noupoort CSP Project, as a suitable site was determined using a 'funnel-down approach'.
» **Grid connection alternatives:** the grid connection solution will either be a power line to connect to the 132kV Newgate Substation situated directly across the development site, or to connect to the 66kV Noupoort Substation located 3 km south east of the development site, as well as the Newgate Substation. The power line routes for the facility will be assessed in detail in the EIA report.

8.5 Assessment of Potential Impacts and Recommendations regarding Mitigation Measures

A summary of those issues identified at Scoping which require further investigation within the EIA phase, as well as the proposed activities to be undertaken in order to assess and ground-truth the significance of these potential impacts is provided within **Table 8.1**. The specialists to provide specialist assessments in the EIA Phase are also reflected within this table. These specialist studies will consider the development footprint proposed for the facility and all associated infrastructure, as well as feasible and reasonable alternatives identified for the project.

No further studies regarding soils and agricultural potential are required in the EIA phase. The study undertaken by the Agricultural Research Council (ARC-IWR) confirmed that the overall impacts of the proposed facility on agriculture and soil conditions will be of low significance, predominantly because of the climatic conditions and the low agricultural and grazing potential of the site. The possibility to house substantial commercial farming practices (agriculture or grazing) on the property is not realistic, because of the dominant climatic conditions and prevailing soil conditions. Irregular rainfall, along with other soil-related factors, lead to low agricultural potential. The soil and rock type properties tend to be relatively homogenous in the area, with limited signs of agricultural activity in the area.
As a result of the low significance of impacts, no further studies are required to be undertaken. Mitigation measures recommended within the study are however to be included within the project Environmental Management Programme (EMPr), which is to be compiled in the EIA Phase of the process.

Table 8.1: Issues requiring further investigation during the EIA Phase and activities to be undertaken in order to assess the significance of these potential impacts relevant to the Noupoort CSP Project.

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
Ecology (Flora and Fauna)	***Sensitivity Analysis and EIA assessment*** The scoping study was based on a desktop assessment and a preliminary site inspection. The current knowledge is sufficient to proceed to the EIA stage and additional fieldwork is required to provide accurate insight into the area and to ground-truth the impacts and sensitivities identified. The ecological specialist study to be undertaken in the EIA phase will include: » A field survey to ground-truth and confirm the potential for sensitive habitats and the overall sensitivity of the site, and to gain a better and in-depth understanding of the area in terms of all ecological features present within the site (including fauna and flora). The optimum timing for the field survey is in the growing season, but is dependent on temperatures and rainfall experienced within the season. » A detailed ecological survey and sensitivity assessment will be undertaken during the EIA phase according to the following methodology outlined below: * A phytosociological classification of the vegetation found in the study area according to vegetation survey data and its TWINSPAN / PC ORD analysis * A corresponding description of all defined plant communities and their typical habitats, including a full species list for each plant community and a representative photographic record taken on site of each community * A map of all plant communities within the boundaries of the study area * A detailed sensitivity map will be produced and will delineate identified sensitive features that may occur on site. ***Assessment of Impacts for the EIA*** This methodology described above assists in the evaluation of the overall effect of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive).	Gerhard Botha of Eco-Care Consultancy

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	The nature of the impact will be defined and described, and refers to the causes of the effect, what will be affected and how it will be affected. For each anticipated impact, recommendations will be made for desirable mitigation measures. ***Environmental Management Programme*** For each overarching anticipated impact, management recommendations for the design, construction, and operational phase will be drafted for inclusion in the project EMPr.	
Avifauna	***Sensitivity Analysis and EIA assessment*** The site visit during December 2015 coincided with a widespread drought and all the major wetlands were dry (dry season survey). Subsequent rainfall inundated these wetlands and incidental observation during the February 2016 site visit indicated that they attract many birds. From an impact assessment perspective a survey when the wetland areas are inundated will be an important time of the annual cycle to monitor. It will also be important to do observation on the birds of the area when grass is prominent. Therefore, assuming a normal rainfall pattern for the rest of the year, another data collection trip/survey will be undertaken in the second quarter of 2016 while the wetlands are still inundated and when grasses will be more prominent (wet season survey). This will be the final survey required for the pre-construction monitoring programme. » The methodology and effort of the wet season survey will match that undertaken as part of the dry season survey, and is to include: * Vantage point surveys; * Transects during bird-active hours; and * All species will be identified where possible using binoculars, and the number of individual birds and the perpendicular distance to them recorded. * Calculate the density (birds per unit area and km) and the species richness in each area using the survey data recorded. * Record the position of all active nests found through the project site. * Survey each habitat type independently for bird species richness and bird abundance. » A detailed sensitivity map will be produced and will delineate identified sensitive features that	Dr. Johan van Niekerk (Independent Ornithologist)

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	may occur on site. » The presence of species of concern will be evaluated. » Based on the information gathered, several impacts have been identified and will be quantified in sections below: * Impact on local bird communities due to habitat loss * Impact on local bird community due to disturbance created by the construction of the facility » Consider the nature of impacts specific to the CSP technology and associated infrastructure including proposed power lines, substation, evaporation ponds, access roads, pipelines etc. » Confirm the identified habitats supporting birdlife on the project site. » Where possible, describe the seasonal variation in the presence of threatened and endemic species. » Identify and map areas of impacts or risk areas for birds resulting from construction and operation phase activities » Consider whether identified risk areas could affect the siting of the facility. » Provide recommendations for the mitigation of impacts associated with the construction and operational phases of the proposed development. During each field survey, information will be collected on the following aspects: » Movement patterns of birds: Information is to be collected from fixed vantage points. As a minimum the same four vantage points used during the first two site visits should be used (see VPS1, VPS2, VPS3 & VPS4).Additional vantage points should be established in the Remaining Extent of Farm 207 during the wet season survey. » Bird community composition: Will be determined primarily by walking random transects on foot throughout the proposed development site and recoding birds using the methodology above. A record should also be kept of bird recorded on the site at other times. » The northern and eastern borders of the south-western high sensitive area should be refined through observations focusing on the use of the area by Red Data species. » Avifaunal power lines casualties: Several sections of Linde/Carolus 132kV power line was patrolled for avifaunal casualties. The same sections of power line should be covered in the	

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	wet season survey using the appropriate methodology. » The Noupoort water treatment works should be surveyed during different times of the day. » Transects by vehicle along all major tar and gravel roads up to 10 km from the proposed CSP site can provide valuable insights into the occurrence and movements of Blue Cranes and other large species in the area. ***Assessment of Impacts for the EIA*** This methodology described above assists in the evaluation of the overall effect of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive). The nature of the impact will be defined and described, and refers to the causes of the effect, what will be affected and how it will be affected. For each anticipated impact, recommendations will be made for desirable mitigation measures. ***Environmental Management Programme*** For each overarching anticipated impact, management recommendations for the design, construction, and operational phase will be drafted for inclusion in the project EMPr.	
Heritage: Archaeology and Palaeontology	***Sensitivity Analysis and EIA assessment*** The specialist study to be undertaken in the EIA phase will include: Archaeology: » In order to comply with the National Heritage Resources Act (Act 25 of 1999), a Phase 1 Archaeological Impact Assessment must be undertaken. » During this study sites of archaeological, historical significance or places of cultural interest must be located, identified, recorded, photographed and described. » The levels of significance of the recorded heritage resources must be determined and mitigation proposed should any significant sites be impacted upon, ensuring that all the requirements of SAHRA are met.	Jaco Van der Walt of Heritage Contracts and Archaeological Consulting (Archaeology) Elize Butler of the Bloemfontein National Museum (Palaeontology)

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	» Description and assessment of all potential impacts (direct, indirect and cumulative) identified in this scoping phase report; and » Recommendations will be made for the management of identified impacts. Palaeontology: » A phase 2 Palaeontological assessment including a site visit and a detailed assessment of the impacts must be conducted to assess the value and prominence of fossil heritage in the development area. ***Assessment of Impacts for the EIA*** This methodology described above assists in the evaluation of the overall effect of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive). The nature of the impact will be defined and described, and refers to the causes of the effect, what will be affected and how it will be affected. For each anticipated impact, recommendations will be made for desirable mitigation measures. ***Environmental Management Programme*** For each overarching anticipated impact, management recommendations for the design, construction, and operational phase will be drafted for inclusion in the project EMPr.	
Visual	***Sensitivity Analysis and EIA assessment*** The specialist study to be undertaken in the EIA phase will be a Level 3 Visual Impact Assessment which includes: » Verification of issues raised in scoping phase through a site visit » Description of the receiving environment and the proposed project » Establishment of viewshed catchment area and receptors » Indication of potential visual impacts using established criteria » Consideration of potential lighting impacts at night	Jon Marshall of Afzelia Environmental Consultants

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	» Description of alternatives, mitigation measures and monitoring programmes. » Review by independent, experienced visual specialist (confirmation needed if required) ***Assessment of Impacts for the EIA*** This methodology described above assists in the evaluation of the overall effect of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive). The nature of the impact will be defined and described, and refers to the causes of the effect, what will be affected and how it will be affected. For each anticipated impact, recommendations will be made for desirable mitigation measures. ***Environmental Management Programme*** For each overarching anticipated impact, management recommendations for the design, construction, and operational phase will be drafted for inclusion in the project EMPr.	
Social	***Sensitivity Analysis and EIA assessment*** The main aim for the Social Impact Assessment (SIA) to be conducted during the EIA phase, will be to determine the social impacts that may arise from the proposed development. The key objectives in the SIA process will include: » Describing and obtaining an understanding of the proposed development (type, scale, location), the communities likely to be affected and determining the need and scope of the SIA; » Collecting baseline data on the current social environment and historical social trends; » Identifying and collecting data on the Social Impact Assessment variables and social change processes related to the proposed intervention. This requires consultation with affected individuals and communities; » Assessing and documenting the significance of social impacts associated with the proposed project;	Candice Hunter of Savannah Environmental (with external peer review by Neville Bews)

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	» Assessing the project (including any feasible alternatives) and identifying potential mitigation and enhancement measures; » Developing an Environmental Management Programme. ***The collection of data*** Primary and secondary data sources will be utilised to inform the study in aid of the objectives of the study. Primary data sources for the SIA will include the following: » A site visit will be undertaken. Observations will also be made while on site and within the study area. » Meetings will be undertaken to collect information from representatives of key stakeholder groups. These included individuals both directly and indirectly associated with the proposed development. The meetings will mostly be undertaken face-to-face and where not possible telephonically. A project specific questionnaire will be developed and utilized for the semi-structured interviews. These meetings will form the basis of the primary data collection and assisted with the gathering of baseline information as well as establishing the stakeholder's perceptions, interests and concerns on the proposed development. Secondary data collection methods mostly centred on desktop study will be gathered and analysed for the purpose of the study, in which the following documents will be examined: » Project maps. » A desktop aerial study of the affected area through the use of the latest version of Google Earth Pro 2015. » The background information document (BID). » The 2011 South African Census Survey and the Local Government Handbook. » Planning documentation such as District Municipality (DM) Integrated Development Plans (IDPs), Spatial Development Framework (SDF) and Environmental Management Framework (EMF) as well as the Local Municipality (LM) IDPs and policies. » Relevant guidelines, policies and plan frameworks. » Other similar specialist studies and relevant information where there have been cross-cutting issues, such as the EIAs undertaken for previous solar energy facilities in the Northern Cape	

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	Province and other parts of South Africa. » Literature reviews of social issues associated with solar energy facilities. ***Assessment of Impacts for the EIA*** This methodology described above assists in the evaluation of the overall effect of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive). The nature of the impact will be defined and described, and refers to the causes of the effect, what will be affected and how it will be affected. For each anticipated impact, recommendations will be made for desirable mitigation measures. ***Environmental Management Programme*** For each overarching anticipated impact, management recommendations for the design, construction, and operational phase will be drafted for inclusion in the project EMPr.	

8.5 Methodology for the Assessment of Potential Impacts

Direct, indirect and cumulative impacts of the above issues, as well as all other issues identified will be assessed in terms of the following criteria:

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional:
  - local extending only as far as the development site area – assigned a score of 1;
  - limited to the site and its immediate surroundings (up to 10 km) – assigned a score of 2;
  - will have an impact on the region – assigned a score of 3;
  - will have an impact on a national scale – assigned a score of 4; or
  - will have an impact across international borders – assigned a score of 5.
- The **duration**, wherein it will be indicated whether:
  - the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
  - the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
  - medium-term (5–15 years) – assigned a score of 3;
  - long term (> 15 years) - assigned a score of 4; or
  - permanent - assigned a score of 5.
- The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
  - 0 is small and will have no effect on the environment;
  - 2 is minor and will not result in an impact on processes;
  - 4 is low and will cause a slight impact on processes;
  - 6 is moderate and will result in processes continuing but in a modified way;
  - 8 is high (processes are altered to the extent that they temporarily cease); and
  - 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **probability** *of occurrence*, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale, and a score assigned:
  - Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
  - Assigned a score of 2 is improbable (some possibility, but low likelihood);
  - Assigned a score of 3 is probable (distinct possibility);
  - Assigned a score of 4 is highly probable (most likely); and
  - Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).

» the **significance**, which shall be determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high.
» the **status**, which will be described as either *positive, negative or neutral*.
» the degree to which the impact can be reversed.
» the degree to which the impact may cause *irreplaceable loss of resources.*
» the *degree* to which the impact can be *mitigated.*

The **significance** is determined by combining the criteria in the following formula:

S= (E+D+M) P; where

S = Significance weighting
E = Extent
D = Duration
M = Magnitude
P = Probability

The **significance weightings** for each potential impact are as follows:

» < 30 points: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
» 30-60 points: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
» > 60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

As CRESCO Energy (Pty) Ltd has the responsibility to avoid and/or minimise impacts as well as plan for their management (in terms of the EIA Regulations), the mitigation of significant impacts will be discussed. Assessment of mitigated impacts will demonstrate the effectiveness of the proposed mitigation measures.

The results of the impact assessment studies and other available information will be integrated by the Savannah Environmental project team. The EIA Report will be compiled in terms of the requirements of the EIA Regulations and will include:

» The details and expertise of the **EAP** who prepared the report.
» The **location** of the activity and a locality map illustrating the location of the proposed activity.
» A **description** of the scope of the proposed activity including all listed activities triggered and a description of associated structures and infrastructure.

- The **policy and legislative** context within which the development is located and an explanation of how the development complies and responds to the legislation and policy context.
- The **need and desirability** of the proposed development of the activity in the context of the preferred location.
- A motivation for the **preferred development footprint** within the approved site.
- A description of the **process** followed to reach the proposed development footprint within the approved site, including:
  - details of the development footprint considered;
  - details of the public participation process undertaken in terms of Regulation 41 of the 2014 EIA Regulations, including copies of supporting documents;
  - a summary of issues raised by interested and affected parties and the manner in which the issues were incorporated;
  - the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;
  - the impacts and risks identified including the nature, significance, consequence extent, duration and probability of the impacts, including the degree to which these impacts can be reversed, may cause irreplaceable loss of resources and can be avoided, managed or mitigated;
  - the methodology used for determining and ranking the nature, significance, consequence, extent, duration and probability of potential environmental impacts and risks;
  - positive and negative impacts that the activity and alternatives will have on the environment and the community;
  - possible mitigation measures to be applied and the level of residual risk;
  - a motivation for not considering alternative development locations;
  - a concluding statement indicating the preferred alternative development location; and
  - a full description of the process followed to identify, assess and rank impacts of the activity and associated infrastructure on the preferred location including all environmental issues and risks that have been identified and an assessment of the significance of each issue and risk and the extent to which the issue/risk can be avoided or mitigated.
- An **assessment** of the identified potentially significant impacts and risks.
- A summary of the **findings and recommendations** of any specialist report and an indication as to how these findings and recommendations have been included.
- An **environmental impact assessment** containing a summary of key findings, an environmental sensitivity map and a summary of the positive and negative impacts and risks of the proposed activity.

- **Recommendations** from specialist, the recording of proposed impact management **objectives** and the impact management **outcomes** for inclusion in the **EMPr** as well as inclusion as conditions of authorisation.
- The final **alternatives** which respond to the impact management measures, avoidance and mitigation measures identified.
- Any aspects which were **conditional** to the findings of the assessment.
- A description of the assumptions, uncertainties and gaps in knowledge relating to the assessment and mitigation measures proposed.
- An **opinion** as to whether the proposed activity should or should not be authorised and the conditions thereof.
- An undertaking under **affirmation** by the EAP in relation to the correctness of the information, the inclusion of comments and inputs from stakeholders and Interested and affected parties, the inclusion of inputs and recommendations from the specialists and any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties.

The EIA Report will be released to the public and relevant stakeholders, Organs of State and Authorities for a 30-day review period. The comments received from I&APs will be captured within a Comments and Response Report, which will be included within the Final EIA Report, for submission to the Competent Authority for decision-making.

8.6 Public Participation Process

A public participation process will be undertaken by Savannah Environmental during the EIA phase. Consultation with key stakeholders and I&APs will be on-going throughout the EIA Phase. Through this consultation process, stakeholders and I&APs will be encouraged to verify that their issues were recorded in the Scoping Phase and to identify additional issues of concern or highlight positive aspects of the CSP facility, and to comment on the findings of the EIA Phase. In order to accommodate the varying needs of stakeholders and I&APs within the study area, as well as capture their inputs, various opportunities will be provided for stakeholders and I&APs to be involved in the EIA Phase of the process, as follows:

- Focus group or public meetings (pre-arranged and I&APs invited to attend).
- One-on-one consultation meetings (for example with directly affected and surrounding landowners).
- Telephonic consultation sessions (consultation with various parties from the EIA project team, including the public participation consultant, lead EIA consultant as well as specialist consultants).
- Written, faxed or e-mail correspondence.

The EIA Report will be made available for a 30-day review period prior to finalisation and submission to the Department of Environmental Affairs for decision-making. In order to provide an overview of the findings of the EIA process and facilitate comments, a public meeting may be held during this public review period, depending on the specific needs of the stakeholders in the area.

8.7 Key Milestones of the Programme for the EIA

The envisaged key milestones of the programme for the EIA Phase are outlined in the following table (and include indicative dates):

Key Milestone Activities	Proposed timeframe
Make Scoping Report available to the public, stakeholders and authorities	30 June 2016 – 1 August 2016
Finalisation of Scoping Report, and submission of the Final Scoping Report to DEA	August 2016
Authority acceptance of the Final Scoping Report and Plan of Study to undertake the EIA	September 2016
Make EIA Report and EMPr available to the public, stakeholders and authorities	Within 60 days from receipt of acceptance of the Final Scoping Report.
Finalisation of EIA Report, and submission of the Final EIA Report to DEA	Within 40 days from the release of the EIA Report to the public, stakeholders and authorities.
Authority review period and decision-making (107 calendar days)	Within 107 days from receipt of the Final EIAr.

REFERENCES CHAPTER 9

Ecology Report

Apps, P. (ed.). 2012. *Smither's Mammals of Southern Africa*. A field guide. Random House Struik, Cape Town, RSA

Alexander, G. & Marais, J. 2007. *A Guide to the Reptiles of Southern Africa*. Struik Nature, Cape Town.

Anhaeusser, C.R., Johnson, M.R., Thomas, R.J. (2008). The Geology of South Africa. Council for Geosciences.

Bates, M.F., Branch, W.R., Bauer, A.M., Burger, M., Marais, J., Alexander, G.J. & de Villiers, M. S. 2014. A*tlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland*. Strelitzia 32. SANBI, Pretoria.

Branch W.R. 1998. *Field guide to snakes and other reptiles of southern Africa*. Struik, Cape Town.

CRITICAL BIODIVERSITY AREAS MAPS (PER MUNICIPALITY) AND GIS DATA AVAILABLE FROM: Biodiversity GIS (BGIS), South African National Biodiversity Institute, Tel. +27 21 799 8739 or CapeNature, Tel. +27 21 866 8000. Or on the web at: http://bgis.sanbi.org/fsp/project.asp

Department of Environmental Affairs and Tourism, 2007. National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004): Publication of lists of Critically Endangered, Endangered, Vulnerable and Protected Species. Government Gazette, Republic of South Africa

Du Preez, L. & Carruthers, V. 2009. *A Complete Guide to the Frogs of Southern Africa*. Struik Nature., Cape Town.

Friedmann, Y. & Daly, B. 2004. Red data book of the mammals of South Africa, a conservation assessment. Johannesburg, Endangered Wildlife Trust.

Hoare, D. 2012. David Hoare Consulting cc (2012). Impact Assessment Report: Specialist ecological study on the potential impacts of the proposed Hidden Valley Wind Energy Facility Project near Matjiesfontein, Northern Cape.

Marais, J. 2004. *Complete Guide to the Snakes of Southern Africa.* Struik Nature, Cape Town.

Mucina L. & Rutherford M.C. (eds) 2006. *The Vegetation of South Africa, Lesotho and Swaziland*. Strelitzia 19. South African National Biodiversity Institute, Pretoria

Minter LR, Burger M, Harrison JA, Braack HH, Bishop PJ & Kloepfer D (eds). 2004. *Atlas and Red Data book of the frogs of South Africa, Lesotho and Swaziland.* SI/MAB Series no. 9. Smithsonian Institution, Washington, D.C.

Raimondo, D., Von Staden, L., Foden, W., Victor, J.E., Helme, N.A., Turner, R.C. Kamundi, D.A. & Manyama, P.A. (Eds.). 2009. *Red list of South African plants* 2009. Strelitzia 25:1-668

Skinner, J.D. & Chimimba, C.T. 2005. The mammals of the Southern African Subregion. Cambridge University Press, Cambridge.

Strohbach, M. 2013. Mitigation of ecological impacts of renewable energy facilities in South Africa. The Sustainable Energy Resource Handbook (Renewable Energy) South Africa 4: 41 – 47.

Strohbach, M. 2013. Savannah Environmental. 2013. Ecological Scoping Report: Proposed Gihon Solar Energy Facility South of Bela-Bela, Limpopo Province.

Tessema, A & Nzotta, U. 2014. Multi-Data Integration Approach in Groundwater Resource Potential Mapping: A Case Study from the North West Province, South Africa. WRC Report No. 2055/1/13. Water Research Commision.

Todd, S. 2015. Simon Todd Consulting. 2015. Terrestrial Fauna & Flora Specialist Impact Assessment: Proposed Wolmaransstad 75 MW Solar Energy Facility in the North West Province.

Websites:

AGIS, 2007. Agricultural Geo-Referenced Information System, accessed from www.agis.agric.za

ADU, 2012. Animal Demography Unit, Department of Zoology, University of Cape Town. http://www.adu.org.za

BGIS: http://bgis.sanbi.org/website.asp

SANBI databases:

http://posa.sanbi.org/searchspp.php
http://SIBIS.sanbi.org

Climate:
http://en.climate-data.org/location/10658/

Avifauna

ABB 2006. Cost efficient design open doors in Botswana. Available at http://www05.abb.com/global/scot/scot245.nsf/veritydisplay/8361fa737aa882e8c1256e3600486c76/$file/Project%20Botswana%20132%20kV%20XLPE%20land-.pdf [accessed on 12 November 2013].

Anderson, M. D. 2000. Raptor conservation in the Northern Cape Province, South Africa. Ostrich 71(1&2):25–32.

Anderson, M. D. 2013. Guidelines for communication companies: raptor and crow nests on manmade structures.

Anonymous 2008. Annual report April 2007 to March 2008, The Eskom – Endangered Wildlife Trust Strategic Partnership.

Anonymous 2014. Bird deaths at toxic heap leach ponds. Available at http://www.basinandrangewatch.org/Genesis-Updates.html [accessed on 13 January 2016].

Avian Power Line Interaction Committee (APLIC) 2012. Reducing avian collisions with power lines: the state of the art in 2012. Edison Electric Institute & APLIC, Washington, D.C.

Barrientos, R., Alonso, J. C., Ponce, C. & Palacín, C. 2011. Meta-analysis of the effectiveness of marked wire in reducing avian collisions with power lines. Conservation Biology 25(5):893–903.

Barrientos, R., Ponce, C., Palacín, C., Martín, C. A., Martín, B. & Alonso, J. C. 2012. Wire marking results in a small but significant reduction in avian mortality at power lines: a BACI designed study. PLoS ONE 7(3):e32569.

Bevanger, K. 1994. Bird interactions with utility structures: collision and electrocution, causes and mitigating measures. Ibis 136(4):412–425.

Bevanger, K. 1998. Biological and conservation aspects of bird mortality caused by electricity power lines: a review. Biological Conservation 86(1):67–76.

Bevanger, K. & Brøseth, H. 2001. Bird collisions with power lines - an experiment with ptarmigan (Lagopus spp.). Biological Conservation 99:341–346.

Birdlife South Africa 2015. BirdLife South Africa checklist of birds in South Africa 2015 (2 November 2015 update). Available at http://www.birdlife.org.za/component/docman/doc_download/327-blsa-checklist-2015?Itemid=533 [accessed on 4 November 2015].

Brown, W. M., Drewien, R. C. & Bizeau, E. G. 1987. Mortality of cranes and waterfowl from powerline collisions in the San Luis Valley, Colorado. Pages 128–136 in: Avery, M. L. (ed.) Procedings 1985 Crane Workshop, Platte River Whooping Crane Maintenance Trust, Grand Island, NE.

Bruce-White, C. & Shardlow, M. 2011. A review of the impact of artificial light on invertebrates. Buglife, Peterborough.

Cody, M. L. 1985. An introduction of habitat selection in birds. Pages 3–56 in: Cody, M. L. (ed.) Habitat selection in birds, Academic Press, Inc. Orlando, Florida.

Danelski, D. 2014. Blythe: Toxic ponds uncovered at solar plant where birds died. Available at http://www.pe.com/articles/birds-753040-plant-ponds.html [accessed on 13 January 2016].

Department of Energy, RSA 2003. Independent Power Producers. Available at http://www.energy.gov.za/files/electricity_frame.html [accessed on 6 May 2013].

Department of Energy, RSA 2011a. Electricity Regulation Act No. 4 of 2006: Electricity Regulations on the Integrated Resource Plan 2010 - 2030. Government Gazette 6 May 2011:3–71.

Department of Energy, RSA 2011b. Renewable Energy Independent Power Producer Programme. Available at http://www.energy.gov.za/files/media/pr/2011/Renewable%20Energy%20Independent%20Power%20Producer%20Programme.pdf [accessed on 6 May 2013].

Department of Minerals & Energy, RSA 1998. White paper on the energy policy of the Republic of South Africa. Available at http://www.info.gov.za/whitepapers/1998/energywp98.htm [accessed on 6 May 2013].

Devault, T. L., Seamans, T. W., Schmidt, J. A., Belant, J. L., Blackwell, B. F., Mooers, N., Tyson, L. A. & Van Pelt, L. 2014. Bird use of solar photovoltaic installations at US airports: Implications for aviation safety. Landscape and Urban Planning 112:122–128.

Diamond, M. 2008. The Distribution Desk. Available at http://www.ewt.org.za/programmes/WEP/Newsletters/Wildlife%20WATTch%20Dec%202008.pdf [accessed on 2 November 2013].

Diamond, M., Smallie, J., Strugnell, L. & Golding, M. 2010. Annual report April 2009 - March 2010, The Eskom – Endangered Wildlife Trust Strategic Partnership.

Drewitt, A. L. & Langston, R. H. W. 2006. Assessing the impacts of wind farms on birds. Ibis 148:29–42.

Drewitt, A. L. & Langston, R. H. W. 2008. Collision effects of wind-power generators and other obstacles on birds. Annals of the New York Academy of Sciences 1134(1):233– 266.

Earlé, R. A. 1997a. South African Cliff Swallow Hirundo spilodera. Pages 62–63 in: Harrison et al. (eds.). The atlas of southern African birds, Vol. 2. BirdLife South Africa, Johannesburg.

Earlé, R. A. 1997b. Greater Striped Swallow Hirundo cucullata. Pages 64–65 in: Harrison et al. (eds.). The atlas of southern African birds, Vol. 2. BirdLife South Africa, Johannesburg.

Elinfrastrukturudvalget (DENMARK) 2008. Technical report on the future expansion and undergrounding of the electricity transmission grid – Summary. Available at https://www.atvinnuvegaraduneyti.is/media/fylgigogn-raflinur-i-jord/5-Elinfrastrukturudvalget.pdf [accessed on 12 November 2013].

Energinet Dk 2009. Cable action plan 132 - 150 kV grids – March 2009. Available at http://energinet.dk/SiteCollectionDocuments/Engelske%20dokumenter/Om%20os/Cable%20Action%20Plan%20-%202008-2009.pdf [accessed on 12 November 2013].

Faanes, C. A. 1987. Bird behavior and mortality in relation to power lines in prairie habitats. Fish and Wildlife Technical Report 7. Fish and Wildlife Service, United States Department of the Interior, Washington, DC.

Ferrer, M. 2012. Birds and power lines: from conflict to solution. Endesa & Migres Foundation, Spain.

First Solar 2011. PV technology comparison. Available at http://dev.firstsolar.com//~/media/Files/Products%20and%20Services%20-%20Product%20Documentation/Technology/PV%20Technology%20Comparison%20-%20English.ashx [accessed on 29 May 2013].

Flint, P. L., Lance, E. W., Sowl, K. M. & Donnelly, T. F. 2010. Estimating carcass persistence and scavenging bias in a human-influenced landscape in western Alaska. Journal of Field Ornithology 81(2):206–214.

Forman, R. T. T. & Alexander, L. E. 1998. Roads and their major ecological effects. Annual Review of Ecology and Systematics 29:207–231+C2.

Frank, K. D. 1988. Impact of outdoor lighting on moths: an assessment. Journal of the Lepidopterists' Society 42(2):63–93.

Gaston, K. J., Davies, T. W., Bennie, J. & Hopkins, J. 2012. Reducing the ecological consequences of night-time light pollution: options and developments. Journal of Applied Ecology 49(6):1256–1266.

Gijben, M. 2012. The lightning climatology of South Africa. South African Journal of Science 108:44–53.

Haas, D., Nipkow, M., Fiedler, G., Schneider, R., Haas, W. & Schürenberg, B. 2005. Protecting birds from powerlines. Nature and Environment 140:1–44.

Hall, K. L. 2012. Out of sight, out of mind: an updated study on the undergrounding of overhead power lines. Edison Electric Institute, Washington, D.C., USA.

Harrison, J. A., Allan, D. G. & Van Hensbergen, H. J. 1994. Automated habitat annotation of bird species lists - an aid in environmental consultancy. Ostrich 65(3&4):316–328.

Harrison, J. A., Allan, D. G., Underhill, L. G., Herremans, M., Tree, A. J., Parker, V. & Brown, C. J. (eds.) 1997a. The atlas of southern African birds, Vol. 1: Non-passerines. BirdLife South Africa, Johannesburg.

Harrison, J. A., Allan, D. G., Underhill, L. G., Herremans, M., Tree, A. J., Parker, V. & Brown, C. J. (eds.) 1997b. The atlas of southern African birds, Vol. 2: Passerines. BirdLife South Africa, Johannesburg.

Hernandez, R. R., Easter, S. B., Murphy-Mariscal, M. L., Maestre, F. T., Tavassoli, M., Allen, E. B., Barrows, C. W., Belnap, J., Ochoa-Hueso, R., Ravi, S. & Allen, M. F. 2014. Environmental impacts of utility-scale solar energy. Renewable and Sustainable Energy Reviews 29:766–779.

Hockey, P. A. R., Dean, W. R. J. & Ryan, P. G. (eds.) 2005. Roberts' birds of southern Africa, 7th edn. The Trustees of the John Voelcker Bird Book Fund, Cape Town.

Hunting, K. 2002. A roadmap for PIER research on avian collisions with power lines in California. Prepared for the California Energy Commission, Public Interest Energy Research Program. Report No. P500-02-071F.

Janss, G. F. E. 2000. Avian mortality from power lines: a morphologic approach of a species-specific mortality. Biological Conservation 95(3):353–359.

Janss, G. F. E. & Ferrer, M. 1998. Rate of bird collision with power lines: effects of conductor-marking and static wire-marking. Journal of Field Ornithology 69(1):8–17.

Jenkins, A. 2008. WEIG visits the roof of Africa surveying power lines for vulture casualties in the Lesotho Highlands. Available at http://www.ewt.org.za/programmes/WEP/Newsletters/Wildlife%20WATTch%20Dec%202008.pdf [accessed on 2 November 2013].

Jenkins, A. & Smallie, J. 2009. Terminal velocity. End of the line for Ludwig's Bustard? Africa Birds and Birding 14(2):34–39.

Jenkins, A. R., Smallie, J. J. & Diamond, M. 2010. Avian collisions with power lines: a global review of causes and mitigation with a South African perspective. Bird Conservation International 20:263–278.

Kagan, R. A., Viner, T. C., Trail, P. W. & Espinoza, E. O. 2014. Avian mortality at solar energy facilities in southern California: a preliminary analysis, National Fish and Wildlife Forensics Laboratory.

Kuvlesky, W. P. J., Brennan, L. A., Morrison, M. L., Boydston, K. K., Ballard, B. M. & Bryant, F. C. 2007. Wind energy development and wildlife conservation: challenges and opportunities. Journal of Wildlife Management 71(8):2487–2498.
Longcore, T. & Rich, C. 2004. Ecological light pollution. Frontiers in Ecology and the Environment 2(4):191–198.

Lovich, J. E. & Ennen, J. R. 2011. Wildlife conservation and solar energy development in the desert southwest, United States. BioScience 61(12):982–992.
Maclean, G. L. 1985. Roberts' birds of southern Africa, 5th edn. The Trustees of the John Voelcker Bird Book Fund, Cape Town.

Marnewich, M. D., Retief, E. F., Theron, N. T., Wright, D. R. & Anderson, T. A. 2015. Important Bird and Biodiversity Areas of South Africa. BirdLife South Africa, Johannesburg.

Martin, G. R. & Shaw, J. M. 2010. Bird collisions with power lines: Failing to see the way ahead? Biological Conservation 143(11):2695–2702.

Mccrary, M. D., Mckernan, R. L., Schreiber, R. W., Wagner, W. D. & Sciarrotta, T. C. 1986. Avian mortality at a solar energy power plant. Journal of Field Ornithology 57(2):135–141.

Mucina, L. & Rutherford, M. C. (eds.) 2006. The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

Navara, K. J. & Nelson, R. J. 2007. The dark side of light at night: physiological, epidemiological, and ecological consequences. Journal of Pineal Research 43(3):215–224.

Ogden, L. J. E. 1996. Collision course: The hazards of lighted structures and windows to migrating birds. World Wildlife Fund Canada.

Perry, G., Buchanan, B. W., Fisher, R. N., Salmon, M. & Wise, S. E. 2008. Effects of artificial night lighting on reptiles and amphibians in urban environments. Pages 239–256 in: Mitchell et al. (eds.). Urban Herpetology, Society for the Study of Amphibians and Reptiles, Salt Lake City, UT. Herpetological Conservation Number Three.

Peters, D. 2012. Address by the Minister of Energy, Ms Dipuo Peters, MP. Sod-turning for the Solar Capital De Aar project, 10th December 2012. Available at http://www.energy.gov.za/files/media/speeches/2012/Solar%20Capital%20Speech%2010%20December%202012.pdf [accessed on 7 May 2013].

Piechota, T., Van Ee, J., Batista, J., Stave, K. & James, D. (eds.) 2002. Potential environmental impacts of dust suppressants: "Avoiding another Times Beach". US Environmental Protection Agency. Panel Summary no. EPA/600/R-04/031.

Prinsen, H. A. M., Boere, G. C., Píres, N. & Smallie, J. J. 2011. Review of the conflict between migratory birds and electricity power grids in the African-Eurasian region.

Rosa, B. D. S. 2010. Underground viability of alternating current with isolated XLPE cable of a 400 kV double circuit very high voltage line in the regions of Girona. Summary document outlining main issues. Available at http://www.cilma.cat/wp-content/uploads/2010/12/Sintesi_refos_C_en.pdf [accessed on 11 November 2013].

RSPB 2011. Solar power. RSPB briefing, March 2011. Available at http://www.rspb.org.uk/Images/Solar_power_briefing_tcm9-273329.pdf [accessed on 10 April 2012].

Savereno, A. J., Savereno, L. A., Boettcher, R. & Haig, S. M. 1996. Avian behavior and mortality at power lines in coastal South Carolina. Wildlife Society Bulletin 24(4):636–648.
Scott, R. E., Roberts, L. J. & Cadbury, C. J. 1972. Bird deaths from power lines at Dungeness. British Birds 65(7):273–286.

Shaw, J. M., Jenkins, A. R., Ryan, P. G. & Smallie, J. J. 2010. A preliminary survey of avian mortality on power lines in the Overberg, South Africa. Ostrich 81(2):109–113.

Shobrak, M. 2012. Electrocution and collision of birds with power lines in Saudi Arabia. Zoology in the Middle East 57:45–52.

Smallwood, K. S. 2007. Estimating wind turbine-caused bird mortality. The Journal of Wildlife Management 71(8):2781–2791.

Tarboton, W. R., Kemp, M. I. & Kemp, A. C. 1987. Birds of the Transvaal. Transvaal Museum, Pretoria.

The Campaign to Protect Rural England (CPRE), Campaign for National Parks (CNP), & National Association for Aonbs (NAAONB). 2010. An independent evaluation report of the costs for underground high voltage cables in Great Britain.

The Royal Commission on Environmental Pollution. 2009. Artificial light in the environment. The Stationery Office Limited, London.

Thompson, L. S. 1978. Transmission line wire strikes: mitigation through engineering design and habitat modification. Pages 27–52 in: Avery, M. L. (ed.) Proceedings of a workshop on impacts of transmission lines on birds in flight. U.S. Fish and Wildlife Service, Washington, D.C., USA.

Trombulak, S. C. & Frissell, C. A. 2000. Review of ecological effects of roads on terrestrial and aquatic communities. Conservation Biology 14(1):18–30.

Umeda, S., Ishii, N., Horiguchi, N., Maeda, M., Yamaguchi, T., Tanaka, H., Niinobe, H., Mizuno, T., Maruyama, S., Iwasaki, K., Majima, H., Amanuma, S., Kamiyama, H., Tokita, M., Oya, S., Shigeta, H. & Akasaka, H. 2007. Underground power cable, distribution cable, overhead transmission line, industrial cable and their accessories. Furukawa Review 32:2–20.

University Of Queensland, Australia 2013. UQ solar photovoltaic data. Available at http://www.uq.edu.au/solarenergy/pv-array/rainfall-other-factors [accessed on 29 May 2013].

Van Niekerk, D. J. 2012. Avicta treated Zea mays seed: Is South African wildlife at risk? A study commissioned by Syngenta.
Van Niekerk, D. J. 2013. Avifaunal impact assessment for proposed Cecilia substation and power line. A report to EnviroWorks.

Van Rooyen, C. 2003. The management of wildlife interactions with overhead lines training manual. Eskom African Centre for Energy and Environment, Johannesburg.

Van Rooyen, C. S. & Ledger, J. A. 1999. Birds and utility structures: developments in southern Africa. Pages 205–229 in: Ferrer, M. & Janss, G. F. E. (eds.) Birds and Powerlines: collision, electrocution, and breeding. Quercus, Madrid, Spain.

Vosloo, H. F. & Van Rooyen, C. 2008. Transmission bird collision prevention guideline. Available at http://migratorysoaringbirds.undp.birdlife.org/sites/default/files/APPENDIX%205%20Eskom%20Collision%20Guideline.pdf [accessed on 8 November 2009].

Vosloo, H. F. & Van Rooyen, C. 2009. Transmission bird collision prevention guideline. Available at http://www.zitholele.co.za/projects/12619%20-%20Camden/3%20Environmental%20Impact%20Assessment%20Phase/Final%20Environmental%20Impact%20Report/Appendix%20Q%20-%20Eskom%20Bird%20Collision%20Prevention%20Guideline.pdf [accessed on 8 November 2009].

Walston, L. J., Rollins, K. E., Smith, K. P., Lagory, K. E., Sinclair, K., Turchi, C., Wendelin, T. & Souder, H. 2015. A review of avian monitoring and mitigation information at existing utility-scale solar facilities.

Western Ecosystems Technology, Inc 2015. Bird and Bat Conservation Strategy (BBCS) for Genesis Solar Energy Project.

Williams, P. 2013. Installation of underground cables - LV to 132kV. UK Power Networks. 35

Soil, Land Type and Agricultural Potential

ARC-ISCW. 2004. Overview of the status of the agricultural natural resources of South Africa (First Edition). ARC-Institute for Soil, Climate and Water, Pretoria.

Geers, B.C., & Eloff, J.F. 1992. Land types of the map 3124 Middelburg. Field information. Mem. Nat. Agric. Res. S. Afr. No. 18. ARC-Institute for Soil, Climate and Water, Pretoria.

Geological Survey. 1988. 1:250 000 scale geological map 2820 Upington. Department of Mineral and Energy Affairs, Pretoria.
Koch, F.G.L. 1986. Climate data. In: Land types of the maps 3024 Colesberg, 3122 Victoria West and 3124 Middelburg. Mem. Agric. nat. Res. S. Afr. No. 18. Department of Agriculture and Water Supply, Pretoria.

MacVicar, C.N., de Villiers, J.M., Loxton, R.F, Verster, E., Lambrechts, J.J.N., Merryweather, F.R., le Roux, J., van Rooyen, T.H. & Harmse, H.J. von M. 1977. Soil classification. A binomial system for South Africa. ARC-Institute for Soil, Climate & Water, Pretoria.

Soil Classification Working Group. 1991. Soil classification. A taxonomic system for South Africa. ARC-Institute for Soil, Climate and Water, Pretoria.

Visual

Clifford, K.H., Ghanbari, C.M. & Diver, R.B. 2011. Methodology to assess potential glint and glare hazards from concentrating solar power plants: analytical models and experimental validation. Journal of Solar Energy Engineering. 133(031021):1-9.

Clifford, K.H., Ghanbari, C.M. & Diver, R.B. 2009. Hazard analysis of glint and glare from concentrating solar power plants. Proceedings of the SolarPACES Conference. 15-18 September 2009. Berlin, Germany.

Landscape Institute and Institute of Environmental Management Assessment. 2013. Guidelines for landscape and visual impact assessment. Oxon, UK:Routledge
Low, A.B. & Rebelo, A.G. (eds), 1996, Vegetation of South Africa, Lesotho and Swaziland. Department of Environmental Affairs & Tourism, Pretoria.

Mucina, L. & Rutherford, M.C. (eds.). 2006. The vegetation of South Africa, Lesotho and Swaziland, South African National Biodiversity Institute, Pretoria (Strelitzia series; no. 19).

Oberholzer, B., 2005. Guidelines for involving visual and aesthetic specialists in EIA processes: Edition 1. (CSIR Report No. ENV-S-C 2005 053 F). Cape Town, South Africa: Provincial Department of the Western Cape, Department of Environmental Affairs & Development Planning.

United States Department of Interior. 2013. Best management practices for reducing visual impacts of renewable energy facilities on BLM-administered lands. Wyoming, United Stated of America: Bureau of Land Management.

Heritage

Archaeological Database Wits University 2009.

Booth, C. 2011a. A Phase 1 archaeological impact assessment (AIA) for the proposed Kleinfontein Solar Energy Facility on the farm Kleinfontein, portion 4 of 167, situated near Noupoort, Northern Cape Province. Unpublished report prepared for Savannah Environmental (Pty) Ltd. Grahamstown: Albany Museum.

Booth, C. 2011b. A Phase 1 archaeological impact assessment (AIA) for the proposed Solar Facility on the farm Toitdale, portion 1 of 167, situated near Noupoort, Northern Cape Province. Unpublished report prepared for Savannah Environmental (Pty) Ltd. Grahamstown: Albany Museum.

Booth, C. & Sanker, S. 2012a. A Phase 1 archaeological impact assessment for the proposed establishment of the Allemans Fontein Solar Energy Facility on the remainder of farm Allemans RE/83, near Noupoort, Umsombomvu Local Municipality, Northern Cape Province. Unpublished report prepared for Savannah Environmental (Pty) Ltd. Grahamstown: Albany Museum.

Booth, C. & Sanker, S. 2012b. A Phase 1 archaeological impact assessment for the proposed establishment of the Amandla Welanga Solar Energy Facility on the remaining extent of the farm Rietfontein, near Noupoort, Northern Cape Province. Unpublished report prepared for Savannah Environmental (Pty) Ltd. Grahamstown: Albany Museum.

Booth, C. & Sanker, S. 2012c. A Phase 1 archaeological impact assessment for the proposed establishment of the Carolus Poort Solar Energy Facility on the remainder of farm Carolus Poort RE/207, near Noupoort, Umsombomvu Local Municipality, Northern Cape Province. Unpublished report prepared for Savannah Environmental (Pty) Ltd. Grahamstown: Albany Museum.

Booth, C. & Sanker, S. 2012d. A Phase 1 archaeological impact assessment for the proposed establishment of the Dida Solar Energy Facility on Portion 3 of the farm Rietfontein, near Noupoort, Northern Cape Province. Unpublished report prepared for Savannah Environmental (Pty) Ltd. Grahamstown: Albany Museum.

Booth, C. & Sanker, S. 2012e. A Phase 1 archaeological impact assessment for the proposed establishment of the Inkululeko Solar Energy Facility on Portion 2 of the farm Carolus poort 167, near Noupoort, Northern Cape Province. Unpublished

report prepared for Savannah Environmental (Pty) Ltd. Grahamstown: Albany Museum.

Hart, T.J.G. 1989. Haaskraal and Volstruisfontein: Later Stone Age events at two rockshelters in the Zeekoe Valley, Great Karoo, South Africa. Unpublished M.A. dissertation, University of Cape Town.

Hart, T. 2005. Heritage impact assessment of a proposed Sutherland golf estate, Sutherland, Northern Cape Province. Unpublished report prepared for DJ Environmental. Archaeology Contracts Office, University of Cape Town.

Hutten, M. 2014. SiVest Environmental Division Noupoort Wind Energy Facility Heritage Management Plan for construction. Unpublished report prepared for SiVest Environmental Division. Totiusdal: PGS Heritage.

Mucina, L. & Rutherford, M.C. 2006. The Vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute. Pretoria.
National Heritage Resources Act NHRA of 1999 (Act 25 of 1999).

Orton, J.D. J. 2012. Late Holocene archaeology in Namaqualand, South Africa: hunter-gatherers and herders in a semi-arid environment. Unpublished D. Phil. thesis. Oxford: University of Oxford.

Orton, J.D. 2013. Geometric rock art in western South Africa and its implications for the spread of early herding. South African Archaeological Bulletin 68: 27-40.

Orton, J.D. 2014. Specialist Input For The Archaeological Walk Down Survey Of The Proposed Noupoort Wind Energy Facility, Noupoort Magisterial District, Northern Cape.

Orton, J.D. & Halkett, D. 2011. Heritage impact assessment for the proposed photovoltaic solar energy facility on the remainder of farm Jakhalsvalley 99, Sutherland Magisterial District, Northern Cape. Unpublished report prepared for The Environmental Evaluation Unit. University of Cape Town: Archaeology Contracts Office.

SAHRA Report Mapping Project Version 1.0, 2009

SAHRIS (referenced 2016)

Sampson, C.G. 1968. The Middle Stone Age Industries of the Orange River Scheme area. National Museum, Bloemfontein. Memoir 4: 1-111.

Sampson, C.G. 1985. Atlas of Stone Age Settlements in the Central and Upper Seacow Valley.National Museum, Bloemfontein, Memoir: 20: 1-116.

Sampson, C.G. 2010. Chronology and dynamics of Later Stone Age herders in the upper Seacow River valley, South Africa. Journal of Arid Environments 74: 842–848.

Sampson, C.G., Hart, T.J.G., Wallsmith, D.L. & Blagg, J.D. 1989. The Ceramic Sequence in the Upper Seacow Valley: Problems and Implications. South African Archaeological Bulletin 44: 3-16.

Sampson, C.G., Vogel, J.C. 1995. Radiocarbon chronology of Later Stone Age pottery decorations in the upper Seacow valley. Southern African Field Archaeology 4: 84–94.

Schoeman, C. 2013. The Historical Karoo. Traces of the past in South Africa's Arid Interior. Zebra House Press. Cape Town.

Smith, A.B. 1998. Keeping People on the Periphery: The Ideology of Social Hierarchies between Hunters and Herders. Journal of Anthropological Archaeology 17: 201–215.

Palaeontology

Abdala, F., Cisneros, J.C. & Smith, R.M.H. 2006. Faunal aggregation in the Early Triassic Karoo Basin: earliest evidence of shelter-sharing behavior among tetrapods. Palaios 21, 507- 512.

Bamford, M.K. 2004. Diversity of woody vegetation of Gondwanan southern Africa. Gondwana Research 7, 153-164.

Botha, J. & Smith, R.M.H. 2007. Lystrosaurus species composition across the Permo-Triassic boundary in the Karoo Basin of South Africa. Lethaia 40, 125-137.

Damiani, R., Modesto, S., Yates, A. & Neveling, J. 2003. Earliest evidence for cynodont burrowing. Proceedings of the Royal Society of London B. 270, 1747-1751.

Gradstein, F.M., J.G.Ogg, M.D. Schmitz & G.M.Ogg. (Coordinators). 2012. The Geologic Time Scale 2012. Boston, USA: Elsevier, 2 volumes plus chart, 1176 pp.

Groenewald, G.H. 1991. Burrow casts from the Lystrosaurus-Procolophon Assemblage-zone, Karoo Sequence, South Africa. Koedoe 34, 13-22.

Groenewald, G.H. & Kitching, J.W. 1995. Biostratigraphy of the Lystrosaurus Assemblage Zone. Pp. 35-39 in RUBIDGE, B.S. (ed.) Biostratigraphy of the Beaufort Group (Karoo Supergroup). South African Committee for Stratigraphy, Biostratigraphic Series No. 1, 46 pp. Council for Geoscience, Pretoria.

Groenewald, G.H. 1996. Stratigraphy of the Tarkastad Subgroup, Karoo Supergroup, South Africa. Unpublished PhD thesis, University of Port Elizabeth, South Africa.

Kent, L.E. 1980. Part 1: Lithostratigraphy of the Republic of South Africa, South West Africa/Namibia and the Republics of Bophuthatswana, Transkei and Venda. SACS, Council for Geosciences, pp. 535-574.

Kitching, J.W. 1977. The distribution of the Karroo vertebrate fauna, with special reference to certain genera and the bearing of this distribution on the zoning of the Beaufort beds. Memoirs of the Bernard Price Institute for Palaeontological Research, University of the Witwatersrand, No. 1, 133 pp (incl. 15 pls).

Mccarthy, T. & Rubidge, B. 2005. The story of Earth and life: a southern African perspective on a 4.6-billion-year journey. 334pp. Struik, Cape Town.

Modesto, S.P. & Botha-Brink, J. 2010. A burrow cast with Lystrosaurus skeletal remains from the Lower Triassic of South Africa. Palaios 25, 274-281.
Partridge, T.C., G.A. of Mammals. Indiana Uuniversity Press.

Rubidge, B.S. (Ed.) 1995. Biostratigraphy of the Beaufort Group (Karoo Supergroup). South African Committee for Biostratigraphy, Biostratigraphic Series No. 1., 46 pp. Council for Geoscience, Pretoria.

Smith, R. & Botha, J. 2005. The recovery of terrestrial vertebrate diversity in the South African Karoo Basin after the end-Permian extinction. ComptesRendusPalevol 4, 555-568.

Smith, R. & Botha, J. 2005. The recovery of terrestrial vertebrate diversity in the South African Karoo Basin after the end-Permian extinction. ComptesRendusPalevol 4, 555-568.

Smith, R. & Botha, J. 2005. The recovery of terrestrial vertebrate diversity in the South African Karoo Basin after the end-Permian extinction. ComptesRendusPalevol 4, 555-568.

Social:

Aucamp, I.C., Woodbourne, S., Perold, J.J., Bron, A. and Aucamp, S.-M. (2011). Looking beyond social impact assessment to social sustainability. In Vanclay, F.

and Esteves, A.-M. New Directions for Social Impact Assessments, Cheltenham, UK: Edward Elgar.

Census 2011 Community Profiles Database. Statistics South Africa.

CSIE, DME and Eskom. 2001. South African Renewable Energy Resource Database. Available from: www.csir.co.za/environmentek/sarerd/contact.html

Franke. V. & Guidero. A. (2012). Engaging local stakeholder: A Conceptual Model for Effective Donor- Community Collaboration. Institute for Homeland Security Solutions.

IFC. (2007). Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets. International Finance Corporation: Washington.

Interorganizational Committee on Principles and Guidelines for Social Impact Assessment. US Principles and Guidelines – Principals and guidelines for social impact assessment in the USA. Impact Assessment and Project Appraisal, 21(3): 231-250.

Local Government Handbook. 2012. Municipalities of South Africa. Available from: http://www.localgovernment.co.za/

National Development Agency (NDA). (2014). Beyond 10 years of unlocking potential. Available from: http://www.nda.org.za/?option=3&id=1&com_id=198&parent_id= 186&com_task=1

National Environmental Management Act 107 of 1998 (NEMA)

National Development Plan (2030)

Northern Cape Provincial Development and Resource Management Plan / Provincial Spatial Development Framework (PSDF) (2012)

Northern Cape Provincial Growth and Development Strategy (NCPGDS) (2011)

Northern Cape Provincial Local Economic Development Strategy (LED) (2009)

Pixley ka Seme District Municipality Integrated Development Plan (IDP) (2012-2016)

South Africa Info. (2012). Northern Cape Province, South Africa. Available from: http://www.southafrica.info/about/geography/north-west.htm#.U3HBjChTOio

South African Local Government Association (SALGA). (2011). Northern Cape. Available from: http://www.salga.org.za/pages/About-SALGA/Provinces/NorthernCape-Overview

State of the Environment Report (SOER). 2005. Northern Cape Province. Department of Tourism, Environment and Conservation. CSIR Environmental.

Statistics South Africa. (2014). Education: A Roadmap out of poverty? Available from: http://beta2.statssa.gov.za/?p=2566

The Constitution Act 108 of 1996

Umsobomvu Local Municipality Integrated Development Plan (2012-2017) (2015-2016 review)

UNEP, 2002. EIA Training Resource Manual. 2nd Ed. UNEP.

United Nations Economic and Social Commission for Asia and the Pacific (UN). (2001). Guidelines for Stakeholders: Participation in Strategic Environmental Management. New York, NY: United Nations.

Vanclay, F. 2003. Conceptual and methodological advances in Social Impact Assessment. In Vanclay, F. & Becker, H.A. 2003. The International Handbook for Social Impact Assessment. Cheltenham: Edward Elgar Publishing Limited.

WWF (World Wide Fund). (2015). Energy: A review of the local community development requirements in South Africa's renewable energy procurement programme. Available from: http://awsassets.wwf.org.za/downloads/local_community_development_report_20150618.pdf