

ENVIRONMENTAL IMPACT ASSESSMENT PROCESS
FINAL IMPACT ASSESSMENT REPORT

PROPOSED PROJECT BLUE SOLAR
ENERGY FACILITY, NORTH OF KLEINSEE,
NORTHERN CAPE PROVINCE

(DEA Ref No: 14/12/16/3/3/2/316)

FINAL REPORT
NOVEMBER 2014

Prepared for:

WWK Development (Pty) Ltd
P.O Box 15652,
Vlaeberg,
Cape Town



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)11 656 3237
FAX: +27 (0)86 684 0547
E-MAIL: INFO@SAVANNAHSA.COM



PROJECT DETAILS

DEA Reference No.	:	14/12/16/3/3/2/316
Title	:	Environmental Impact Assessment Process Final EIA Report: Proposed Project Blue Solar Energy Facility north of Kleinsee in the Northern Cape Province
Authors	:	Savannah Environmental (Pty) Ltd Tambudzani Mulaudzi Jo-Anne Thomas
Sub-consultants	:	Berg Wind Botanical Surveys Simon Todd Consulting Terrasoil Science Archaeology Contracts Office, Department of Archaeology: University of Cape Town M2 Environmental Connections cc MetroGIS Tony Barbour Environmental Consulting and Research Sustainable Futures ZA
Project Developer	:	WWK Development (Pty) Ltd
Report Status	:	<u>Final</u> EIA Report

When used as a reference this report should be cited as: Savannah Environmental (2014) Final EIA Report: Proposed Project Blue Solar Energy Facility north of Kleinsee in the Northern Cape Province

COPYRIGHT RESERVED

This technical report has been produced for WWK Development (Pty) Ltd. The intellectual property contained in this report remains vested in Savannah Environmental and WWK Development. No part of the report may be reproduced in any manner without written permission from Savannah Environmental (Pty) Ltd and WWK Development (Pty) Ltd.

PURPOSE OF THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT

WWK Development (Pty) Ltd is currently undertaking an Environmental Impact Assessment (EIA) process to determine the environmental feasibility of a proposed solar energy facility on the West Coast, on a site north of Kleinsee, in the Northern Cape Province. WWK Development has appointed Savannah Environmental, as independent environmental consultants, to undertake the EIA. The EIA process is being undertaken in accordance with the requirements of the National Environmental Management Act (NEMA; Act No. 107 of 1998).

The EIA Report consists of eight sections as follows:

- » **Chapter 1** provides background to the proposed Project Blue Solar Energy Facility and the environmental impact assessment.
- » **Chapter 2** describes the activities associated with the project (project scope).
- » **Chapter 3** outlines the process which was followed during the EIA Phase of the EIA process, including the consultation programme that was undertaken and input received from interested parties.
- » **Chapter 4** outlines the regulatory and legal context of the EIA study
- » **Chapter 5** describes the existing biophysical and socio-economic environment that may be affected by the proposed development.
- » **Chapter 6** describes the assessment of environmental impacts associated with the proposed Project Blue Solar Facility.
- » **Chapter 7** presents the conclusions of the impact assessment as well as impact statement of the development.
- » **Chapter 8** provides references used to compile the EIA Report.

The Scoping Phase of the EIA process identified potential issues associated with the proposed project, and defined the extent of the studies required within the EIA Phase. The EIA Phase addresses those identified potential environmental impacts and benefits associated with all phases of the project including design, construction and operation, and recommends appropriate mitigation measures for potentially significant environmental impacts. The EIA report aims to provide the environmental authorities with sufficient information to make an informed decision regarding the proposed project.

The release of a draft EIA Report provided stakeholders with an opportunity to verify that the issues they have raised to date have been captured and adequately considered within the study, and provides an opportunity for further issues to be noted. This Final EIA Report incorporates all issues noted and responses provided and is submitted to the National Department of Environmental Affairs (DEA), the decision-making authority for the project.

INVITATION TO COMMENT ON THE FINAL EIA REPORT

The release of a Final EIA Report provides stakeholders with an additional opportunity to verify that the issues they have raised to date have been captured and adequately considered within the study. The Final EIA Report has incorporated all issues and responses received during the process. As required in terms of Regulation 56(2) of the EIA Regulations, this report has been made available for public review prior to submission to the National Department of Environmental Affairs (DEA), the decision-making authority for the project. Any changes made from the Draft EIA Report to this Final EIA Report **have been underlined throughout** this Final EIA Report for ease of reference.

Comments on this FEIR should be submitted to the DEA with a copy to Savannah Environmental. Relevant contact details are as follows:

Please submit your comments to
<u>Muhammad Essop</u> <u>Department of Environmental Affairs</u> <u>Private Bag X 447, Pretoria, 0001</u> <u>Tel: 012 399 9406</u> <u>E-mail: messop@environment.gov.za</u>
The due date for comments on the final EIA Report is 24 November 2014

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

EXECUTIVE SUMMARY

Background and Project Overview

WWK Development (Pty) Ltd is proposing to establish a commercial photovoltaic solar energy facility on Portion 03 of the Farm Predikant Vlei 190, Portion 03 of the Farm Roode Vlei 189 and Portion 04 of the Farm Dikgat 195 north of Kleinsee, Northern Cape Province. The site is located within the Nama Khoi Local Municipality. The purpose of the proposed facility is to add new capacity for generation of power from renewable energy to the national electricity supply (which is short of generation capacity to meet current and expected demand), and to aid in achieving the goal of a 30% share of all new power generation being derived from independent power producers (IPPs), as targeted by the Department of Energy (DoE).

The proposed facility will require a development footprint area of approximately 130 ha (within a larger site of 360 ha in extent), and will be comprised of the following primary elements:

- » Arrays of photovoltaic (PV) panels.
- » Mounting structures for the solar panels to be rammed steel piles or piles with pre-manufactured concrete footings
- » Cabling between the structures, to be lain underground where practical.

- » Central inverter/transformer stations to collect all energy generated from the PV panels. The inverter's role is to convert direct current (DC) electricity to alternating current (AC) electricity at grid frequency.
- » An on-site substation (150m x 150m) and power line (up to 220kV) to evacuate the power from the facility into the Eskom Gromis Substation grid
- » Internal access roads (4-6 m wide roads).
- » Associated buildings including a workshop area for maintenance, storage, and control facility with basic services such as water and electricity

The proposed solar facility was originally proposed as a fourth phase of a renewable energy facility which also includes wind technology. These projects have subsequently been separated, with the wind energy facility having received authorisation in August 2014.

Overall Conclusion

The principles of NEMA have been considered in this assessment through the implementation of the principle of sustainable development where appropriate mitigation measures have been recommended for impacts which cannot be avoided. In addition, the successful implementation and appropriate management of this proposed project

will aid in achieving the principles of minimisation of pollution and environmental degradation at a national scale.

The EIA process has been undertaken in accordance with the requirements of the EIA Regulations and all effort has been made to involve interested and affected parties, stakeholders and relevant Organs of State such that an informed decision regarding the project can be made by the Regulating Authority. The general objectives of Integrated Environmental Management have been taken into account for this EIA report by means of identifying, predicting and evaluating the actual and potential impacts on the biophysical environment, socio-economic conditions and cultural heritage component. The risks, consequences, alternatives as well as options for mitigation of activities have also been considered with a view to minimise negative impacts, maximise benefits, and promote compliance with the principles of sustainable environmental management.

The technical viability of establishing a solar energy facility with a net generating capacity of 65 MW on a site located on Portion 03 of the Farm Predikant Vlei 190, Portion 03 of the Farm Roode Vlei 189 and Portion 04 of the Farm Dikgat 195 has been established by WWK Development (Pty) Ltd. The positive implications of establishing the

Project Blue Solar Energy facility on the identified site include the following:

- » The potential to harness and utilise solar energy resources within the Northern Cape Province.
- » The project will assist the South African government at a national, provincial and local level in reaching their set targets for renewable energy.
- » The project will assist the South African government in the implementation of its green growth strategy and job creation targets.
- » The project will assist the district and local municipalities in reducing levels of unemployment through the creation of jobs, skills development opportunities and support of local business.
- » The National electricity grid in the Northern Cape Province will benefit from the additional generated power.
- » The project will contribute towards the promotion of clean, renewable energy in South Africa.
- » Project blue Solar Energy site is appropriately located for easy access via:
 - * "Kleinsee pad": R355, via Springbok (~97 km). This constitutes the most direct route to Kleinsee from the N7, and the only proclaimed public road to Kleinsee. The segment from Springbok to Buffelsrivier is tarred and

provides sole access to the study area communities from Springbok. The segment from Buffelsrivier to Kleinsee is untarred and the road in a relatively bad state;

* "Rooipad": Buffelsrivier-Kommagas Road off the R355, linking up with the KDBC Koingnaas-Kleinsee road south of Kleinsee. The segment from Buffelsrivier to Kommagas is tarred; the portion from Kommagas to the De Beers Consolidated Koingnaas road is a De Beers Consolidated owned gravel road. This Kommagas Road ("rooipad" due to red soils) is preferred by Kleinsee residents and Kleinsee farmers for accessing Springbok;

* "Hondekliipbaai pad": Combination of (mainly gravel) roads from Garies (off the N7), via Hondekliipbaai and Koingnaas. This constitutes the most direct road link to the harbours of Cape Town and Saldanha via the N7. Garies is located approximately 176 km south-east of Kleinsee (by road). The De Beers Consolidated owned Kleinsee-Koingnaas segment is the only tarred segment at present. The remainder of the road is essentially only safely negotiable by 4x4 or truck. Tarring of the Garies-Hondekliipbaai segment is

envisaged by the Kamiesberg Local Municipality SDF in the medium to long term, but no funds appear to have been allocated.

» Gramis-Oranjemund 1 220kV power line runs parallel the proposed site, the project proximity to the national grid connection reduces some of the impacts related to building longer power line to connect to the grid.

The findings of the specialist studies undertaken within this EIA to assess both the benefits and potential negative impacts anticipated as a result of the proposed project conclude that there are **no environmental fatal flaws** that should prevent the proposed project from proceeding, provided that the recommended mitigation and management measures are implemented. The significance levels of the majority of identified negative impacts have been reduced to acceptable levels by implementing the mitigation measures recommended by the specialist team during the EIA process, and this specifically included the consideration of the facility layout in relation to site-specific sensitivities identified. The avoidance of areas of sensitivity is illustrated by the facility layout drawing overlain on the sensitivity map included as **Figure 1**. The project has all environmental constraints, and is considered to meet the requirements of sustainable development. Environmental specifications for the management of

potential impacts are detailed within the draft Environmental Management Programme (EMPr) for the Project Blue Solar Energy facility included within **Appendix K**.

With reference to the information available at this planning approval stage in the project cycle, the **confidence** in the environmental assessment undertaken is regarded as **acceptable** provided all measures are taken to protect and preserve surrounding environment.

Overall Recommendation

Based on the nature and extent of the proposed project, the local level of disturbance predicted as a result of the construction and operation of the facility and associated infrastructure, the findings of the EIA, and the understanding of the significance level of potential environmental impacts, it is the opinion of the EIA project team that the impacts associated with the development of the Project Blue Solar Energy project can be mitigated to an acceptable level. In terms of this conclusion, the EIA project team support the decision for environmental authorisation.

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

- » The draft Environmental Management Programme (EMPr) as contained within Appendix K of this report should form part of

the contract with the Contractors appointed to construct and maintain the proposed solar energy facility, and will be used to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for all life cycle phases of the proposed project is considered to be the main key in achieving the appropriate environmental management standards as detailed for this project.

- » Following the final design of the facility, a final layout indicating all relevant infrastructure and affected areas (permanent and temporary) must be submitted to DEA for review and approval prior to commencing with construction.
- » If any protected plant or tree species will be removed/destroyed by the developer, a collection/destruction permit to be obtained from Northern Cape Department of Environment and Nature Conservation and/or DAFF for the protected species found on site as well from the provincial permitting authority.
- » A detailed Invasive Plant Management Plan will have to be in place prior to commencement of activity and be diligently followed and updated throughout the project cycle up to the decommissioning phase.
- » Access roads to the development should follow existing tracks as far as possible. Where new access routes will be necessary,

- suitable erosion control measures must be implemented.
- » All infrastructures, including access roads and other on-site infrastructure must be planned so that the clearing of vegetation is minimised.
 - » Site rehabilitation of temporary laydown and construction areas to be undertaken immediately after construction.
 - » Once the facility has exhausted its life span, the main facility and all associated infrastructure not required for the post rehabilitation use of the site should be removed and all disturbed areas appropriately rehabilitated. An ecologist should be consulted to provide input into rehabilitation specifications.
 - » Develop an emergency maintenance plan to deal with any event of contamination, pollution, or spillages during construction and operation.
- » Compile a comprehensive storm-water management method statement, as part of the final design of the project and implement during construction and operation.
 - » All rehabilitated areas should be monitored for at least a year following decommissioning, and remedial actions implemented as and when required.
 - » An independent Environmental Control Officer (ECO) must be appointed by the project developer prior to the commencement of any authorised activities.
 - » Applications for all other relevant and required permits required to be obtained by the developer and must be submitted to the relevant regulating authorities.



Figure 1: Environmental Sensitivity Map for the proposed Project Blue Solar Farm, north of Kleinsee, in the Northern Cape

TABLE OF CONTENTS

	PAGE
PURPOSE OF THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT	ii
EXECUTIVE SUMMARY	iv
BACKGROUND AND PROJECT OVERVIEW	IV
OVERALL CONCLUSION	IV
OVERALL RECOMMENDATION	VII
TABLE OF CONTENTS	x
DEFINITIONS AND TERMINOLOGY	xiv
ABBREVIATIONS AND ACRONYMS	xviii
CHAPTER 1: INTRODUCTION	1
1.1. PROJECT OVERVIEW	2
1.2. DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER AND SPECIALIST TEAM	5
CHAPTER 2: SCOPE OF THE PROPOSED PROJECT	7
2.1. NEED AND DESIRABILITY OF THE PROJECT	7
2.1.1 <i>The Need for Renewable Energy Projects at a National Scale</i>	7
2.1.2 <i>Strategic Integrated Projects (SIPs)</i>	8
2.1.3 <i>Renewable Energy Development Zones (REDZ)</i>	8
2.1.4 <i>Northern Cape Province Spatial Development Framework (NCPSDF)</i>	10
2.1.5 <i>Namakwa District Municipality Integrated Development Plan (2012 - 2016)</i>	10
2.1.6 <i>Nama Khoi Local Municipality Integrated Development Plan (2012- 2016)</i>	11
2.1.7 <i>Rationale for the proposed Project Blue Solar Energy Facility</i>	12
2.1.8 <i>Desirability for Project Blue Solar Energy Facility on the proposed site</i>	12
2.2. DESCRIPTION OF THE PROPOSED SOLAR ENERGY FACILITY	13
2.2.1. <i>Water Requirements</i>	14
2.3. PROJECT ALTERNATIVES	15
2.3.1. <i>Site Alternatives</i>	15
2.3.2. <i>Activity Alternatives</i>	19
2.3.3. <i>Design or Layout Alternatives</i>	19
2.3.4. <i>Technology Alternatives</i>	20
2.3.5. <i>Operating Alternatives</i>	20
2.3.6. <i>No-go Alternative</i>	20
2.4. SOLAR ENERGY AS A POWER GENERATION TECHNOLOGY	22
2.4.1 <i>How do Grid Connected Photovoltaic Facilities Function?</i>	22
2.5. PROPOSED ACTIVITIES DURING THE PROJECT LIFE CYCLE PHASES	23
2.5.1. <i>Construction Phase</i>	23
2.5.2. <i>Operational Phase</i>	27
2.5.3. <i>Decommissioning Phase</i>	27

CHAPTER 3: REGULATORY AND LEGAL CONTEXT	28
3.1 POLICY AND PLANNING CONTEXT AT A NATIONAL LEVEL	28
3.1.1 <i>The National Energy Act (2008)</i>	28
3.1.2 <i>White Paper on the Energy Policy of South Africa, 1998</i>	29
3.1.3 <i>White Paper on the Renewable Energy Policy of the Republic of South Africa (2003)</i>	29
3.1.4 <i>Final Integrated Resource Plan, 2010 - 2030</i>	30
3.1.5 <i>Electricity Regulation Act, 2006</i>	32
3.2 PROVINCIAL POLICY AND PLANNING CONTEXT	33
3.2.1 <i>Northern Cape Provincial Spatial Development Framework (2012)</i> .	33
3.2.3 <i>Northern Cape Climate Change Response Strategy</i>	35
3.3 LOCAL POLICY AND PLANNING CONTEXT.....	36
3.3.1 <i>The Namakwa District Municipality Draft Integrated Development Plan 2012-2016</i>	36
3.3.2 <i>Nama Khoi Local Municipality 2011/2012 Revision</i>	38
3.4. ALIGNMENT OF PROJECT BLUE SOLAR ENERGY FACILITY WITH THE POLICIES AND PLANNING.....	39
3.5. REGULATORY HIERARCHY FOR ENERGY GENERATION PROJECTS.....	39
3.5.1 <i>Regulatory Hierarchy</i>	39
CHAPTER 4: APPROACH TO UNDERTAKING THE EIA PHASE	41
4.1. REQUIREMENT FOR AN ENVIRONMENTAL IMPACT ASSESSMENT PROCESS	41
4.2. OBJECTIVES OF THE EIA PROCESS	46
4.3. SCOPING PHASE	46
4.4. ENVIRONMENTAL IMPACT ASSESSMENT PHASE	47
4.5. OVERVIEW OF THE EIA PHASE	47
4.5.1 <i>Authority Consultation</i>	48
4.5.2 <i>Public Involvement and Consultation</i>	48
4.5.3 <i>Identification and Recording of Issues and Concerns</i>	50
4.5.4 <i>Assessment of Issues Identified through the Scoping Process</i>	51
4.5.5 <i>Assumptions and Limitations</i>	53
4.5.6 <i>Legislation and Guidelines that have informed the preparation of this EIA Report</i>	53
CHAPTER 5: DESCRIPTION OF THE AFFECTED ENVIRONMENT.....	67
5.1. REGIONAL SETTING.....	67
5.2. LOCATION OF THE STUDY AREA.....	69
5.3. SITE ACCESS	69
5.4. GEOLOGY AND TOPOGRAPHY	72
5.5. CLIMATIC CONDITIONS	72
5.6. HYDROLOGY	75
5.7. LAND USE AND SETTLEMENT PATTERNS	75
5.8. SOILS	76
5.9. AGRICULTURAL POTENTIAL	79
5.10. ECOLOGICAL PROFILE OF THE STUDY AREA	79

5.10.1	<i>Vegetation</i>	79
5.10.2	<i>Terrestrial Fauna</i>	81
5.10.3	<i>Bats</i>	82
5.10.4	<i>Avifauna</i>	83
5.11.	HERITAGE PROFILE	84
5.12	SOCIAL CHARACTERISTICS OF THE STUDY AREA AND SURROUNDS	85
5.12.1.	<i>Population</i>	85
5.12.2.	<i>In-migration trends</i>	85
5.12.3.	<i>Education</i>	86
5.12.4.	<i>Employment levels</i>	86
5.12.5.	<i>Income and economic development</i>	86
CHAPTER 6: ASSESSMENT OF IMPACTS		90
6.1.	CONCLUSIONS FROM THE SCOPING PHASE	91
6.2.	ASSESSMENT OF THE POTENTIAL IMPACTS ASSOCIATED WITH THE CONSTRUCTION AND OPERATION PHASES	93
6.2.1.	<i>Potential Impacts on Vegetation</i>	93
6.2.2.	<i>Potential Impacts on Terrestrial Fauna and Habitats</i>	97
6.2.3.	<i>Potential Impacts on Geology, Soils and Agricultural Potential</i>	103
6.2.4.	<i>Potential Visual Impacts</i>	107
6.2.5.	<i>Potential Heritage Impacts</i>	113
6.2.6.	<i>Potential Social Impacts</i>	114
6.3.	ASSESSMENT OF THE NO GO ALTERNATIVE	125
CHAPTER 7: ASSESSMENT OF CUMULATIVE IMPACTS.....		127
7.1	APPROACH TAKEN TO ASSESS CUMULATIVE IMPACTS.....	127
7.3.1	<i>Loss of vegetation and impacts on ecology</i>	130
7.3.2	<i>Cumulative impacts on soil and agricultural potential</i>	130
7.3.3	<i>Cumulative impacts on heritage and palaeontology</i>	130
7.3.4	<i>Cumulative Visual Impacts</i>	130
7.3.5	<i>Cumulative Impacts on the Social and Economic Environment</i>	132
7.4.	CONCLUSION REGARDING CUMULATIVE IMPACTS OF PROJECT BLUE SOLAR ENERGY FACILITY	132
CHAPTER 8: CONCLUSIONS AND RECOMMENDATIONS		134
8.1.	SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS RELEVANT TO THE PROJECT BLUE SOLAR ENERGY FACILITY AND ASSOCIATED INFRASTRUCTURE	137
8.1.1.	<i>Impacts on Ecology</i>	139
8.1.2.	<i>Impact on Soils, Land Capability and Agricultural Potential</i>	139
8.1.3.	<i>Visual Impacts</i>	140
8.1.4.	<i>Impacts on Heritage and Paleontological Resources</i>	140
8.1.5.	<i>Social and Economic Impacts</i>	140
8.2.	ASSESSMENT OF POTENTIAL CUMULATIVE IMPACTS.....	141
8.3.	ENVIRONMENTAL COSTS OF THE PROJECT VERSUS BENEFITS OF THE PROJECT...	142
8.4.	OVERALL CONCLUSION (IMPACT STATEMENT)	143
8.5.	OVERALL RECOMMENDATION	145

APPENDICES

Appendix A:	EIA Project Consulting Team CVs
Appendix B:	Correspondence with National and Provincial Authorities
Appendix C:	Stakeholder Database
Appendix D:	Public Participation Information
Appendix E:	Vegetation Specialist Study
Appendix F:	Fauna Specialist Study
Appendix G:	Soils, and Agricultural Potential Study
Appendix H:	Heritage/ Archaeology Study
Appendix I:	Visual Impact Assessment
Appendix J:	Social Assessment
Appendix K	EMPr - Project Blue Solar Energy Facility
Appendix L:	Maps

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.

Cumulative impacts: 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.

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

'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.

Drainage: A drainage line is a lower category or order of watercourse that does not have a clearly defined bed or bank. It carries water only during or immediately after periods of heavy rainfall i.e. non-perennial, and riparian vegetation may or may not be present

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.

Perennial and non-perennial: Perennial systems contain flow or standing water for all or a large proportion of any given year, while non-perennial systems are episodic or ephemeral and thus contains flows for short periods, such as a few hours or days in the case of drainage lines.

Riparian: the area of land adjacent to a stream or river that is influenced by stream-induced or related processes. Riparian areas which are saturated or flooded for prolonged periods would be considered wetlands and could be described as riparian wetlands. However, some riparian areas are not wetlands (e.g. an area where alluvium is periodically deposited by a stream during floods but which is well drained).

Photovoltaic effect: Electricity can be generated using photovoltaic solar panels which are comprised of individual photovoltaic cells that absorb solar energy to directly produce electricity. The absorbed solar radiation excites the electrons inside the cells and produces what is referred to as the Photovoltaic Effect.

Rare species: Taxa with small world populations that are not at present Endangered or Vulnerable, but are at risk as some unexpected threat could easily cause a critical decline. These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range. 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.

Watercourse: as per the National Water Act means -
(a) a river or spring;

- (b) a natural channel in which water flows regularly or intermittently;
- (c) a wetland, lake or dam into which, or from which, water flows; and
- (d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks

Wetlands: land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which under normal circumstances supports or would support vegetation typically adapted to life in saturated soil (Water Act 36 of 1998); land where an excess of water is the dominant factor determining the nature of the soil development and the types of plants and animals living at the soil surface (Cowardin et al., 1979).

ABBREVIATIONS AND ACRONYMS

BID	Background Information Document
CBOs	Community Based Organisations
CO ₂	Carbon dioxide
DAFF	Department of Forestry and Fishery
DENC	Northern Cape Department of Environmental Affairs and Nature Conservation
DEA	National Department of Environmental Affairs
DME	Department of Minerals and Energy
DOT	Department of Transport
DWA	Department of Water Affairs
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
ESA	Ecological Support Area
GIS	Geographical Information Systems
GG	Government Gazette
GN	Government Notice
GWh	Giga Watt Hour
Ha	Hectare
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IEP	Integrated Energy Planning
km ²	Square kilometres
km/hr	Kilometres per hour
kV	Kilovolt
LUPO	Rezoning and Subdivision in terms of Land Use Planning Ordinance, Ordinance 15 of 1985
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)
SAAO	South African Astronomical Observatory
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency Limited
SDF	Spatial Development Framework

INTRODUCTION

CHAPTER 1

WWK Development (Pty) Ltd has identified a site north of the town of Kleinsee within De Beers mining area in the Nama Khoi Local Municipality Northern Cape Province for the establishment of a photovoltaic (PV) solar energy facility. The solar energy facility is proposed on Portion 03 of the Farm Predikant Vlei 190, Portion 03 of the Farm Roode Vlei 189 and Portion 04 of the Farm Dikgat 195. The facility is proposed to comprise PV panels appropriately spaced over an extent of approximately 130 hectares for the purpose of electricity generation. The total generating capacity of the proposed facility will be up to 65 MW (to be developed in two phases of 20MW and 45MW respectively). This project will be referred to as the **Project Blue Solar Energy Facility**. The proposed solar facility was originally proposed as a fourth phase of a renewable energy facility which also includes wind technology. These projects have subsequently been separated, with the wind energy facility having received authorisation in August 2014.

The nature and extent of the solar energy facility, as well as potential environmental impacts associated with the construction of a facility of this nature is explored in more detail in this Final EIA Report. The purpose of this report is to assess potential environmental impacts associated with the proposed project and to recommend mitigation measures to minimise impacts on the environment. This EIA Report consists of the following sections:

- Chapter 1:** Provides background to the proposed facility and the environmental impact assessment
- Chapter 2:** Provides a description of the proposed project.
- Chapter 3:** Provides an overview of the regulatory and legal context for electricity generation projects.
- Chapter 4:** Outlines the process which was followed during the EIA Phase, including the consultation program that was undertaken and input received from interested parties, as well as an outline of the legal considerations which have informed the EIA process.
- Chapter 5:** Describes the existing biophysical and socio-economic environment.
- Chapter 6:** Presents the assessment of environmental impacts associated with of the project.
- Chapter 7:** Presents the conclusions of the EIA, as well as an impact statement of the project.
- Chapter 8:** Assesses the potential for cumulative impacts associated with the development of the proposed project
- Chapter 9:** Provides a list of references and information sources used in undertaking the studies for this EIA Report.

1.1. Project Overview

The site for development of the Project Blue Renewable Energy Facility was identified in early 2009 as an area of interest for renewable energy development by WWK Development. The site was selected as a result of, inter alia,

- » the potential solar resource (estimated from satellite derived mesocale data);
- » previous disturbance of local landscape from mining activities;
- » potential size of the site;
- » the proximity of high voltage electrical grid lines (at Gromis Substation).

The proposed project development site is considered suitable and favourable by the developer for the construction of a solar PV facility from a technical perspective due to the following technical considerations:

- » **Climatic conditions:** Climatic conditions determine the economic viability of a solar energy facility as it is directly dependent on the annual direct solar irradiation values for a particular area. Studies of solar irradiation worldwide indicate that the Northern Cape shows high potential for the generation of solar power.
- » **Topographic conditions:** The site topographic conditions are optimum for a development of this nature. For instance the site slope and aspect for the proposed site is predominantly flat. A level surface area (i.e. a gradient of 3% or less) is preferred for the installation of PV panels.
- » **Extent of the site:** Significant land area is required for the proposed development. The site (i.e. 360ha) is larger than the area required for development (i.e. 130ha) which would allow for the avoidance of any identified environmental or technical constraints.
- » **Grid connection and access:** This site is located adjacent to the Eskom Gromis Substation and 220kV power line which minimises the need for a long connection power line. Furthermore, the proposed facility lies in close proximity to the R355 provincial road. This is preferred from an environmental and technical perspective.

Initial site visits and early discussions were held with the majority landowner, i.e. De Beers, which subsequently engaged in a competitive process to award the land to independent power producers (IPPs) for renewable energy facility development. The project developer was selected to develop in this area through this process, and is proposing the development of a wind energy facility (the subject of a separate EIA process - DEA Ref No: 12/12/20/2331) and a solar energy facility in the area.

The proposed study site falls within the Nama Khoi Local Municipality on Portion 03 of the Farm Predikant Vlei 190, Portion 03 of the Farm Roode Vlei 189 and Portion 04 of the Farm Dikgat 195 (refer to Figure 1.1). The proposed facility is envisaged to have a maximum generating capacity of up to 65 MW (potentially to be developed in a phased approach) to be achieved through several arrays of PV panels and the following associated infrastructure:

- » Arrays of photovoltaic (PV) panels.
- » Mounting structures for the solar panels to be rammed steel piles or piles with pre-manufactured concrete footings.
- » Cabling between the structures, to be laid underground where practical.
- » Central inverter/transformer stations to collect all energy generated from the PV panels. The inverter's role is to convert direct current (DC) electricity to alternating current (AC) electricity at grid frequency.
- » An on-site substation (150m x 150m) and power line (2km) to evacuate the power from the facility into the Eskom Gromis Substation grid
- » Internal access roads (4-6 m wide roads).
- » Associated buildings including a workshop area for maintenance, storage, and control facility with basic services such as water and electricity

The proposed development requires an area of approximately 130 ha for all infrastructure, and is to be located within a broader site of approximately 360 ha. Therefore the facility can be appropriately placed within the broader site such that any identified environmental sensitivities can be avoided.

The scope of the proposed PV facility, including all elements of the project (i.e. the design/planning, construction, operation and decommissioning phases) is discussed in more detail in Chapter 2.

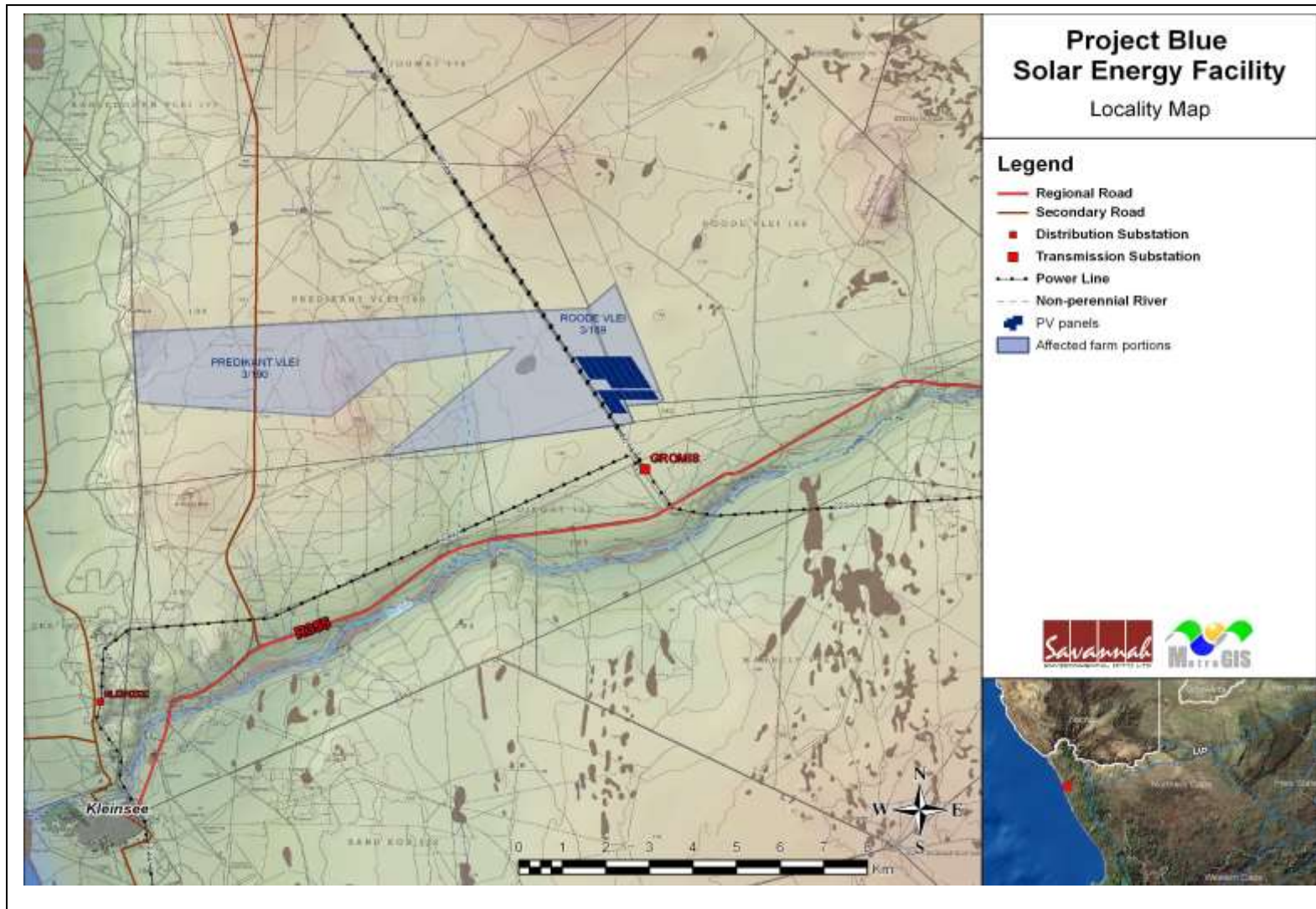


Figure 1.1: Locality map indicating location of the affected farm portions for the proposed Project Blue Solar Energy Facility

The overarching objective for the proposed PV facility is to maximise electricity production through exposure to solar irradiation, while minimising infrastructure, operational and maintenance costs, as well as social and environmental impacts. As the proposed project may have an impact on the environment (as detailed in the EIA Regulations of June 2010), an Environmental Impact Assessment (EIA) process is required to be undertaken. Local level environmental and planning issues will be assessed through this process in order to identify, and assess areas of sensitivity within the broader site. This will serve to inform the design/layout of the facility in order to meet these objectives.

1.2 Details of the Environmental Assessment Practitioner and Specialist Team

Savannah Environmental was appointed by WWK Development as the independent consultant to undertake the EIA process for the proposed project, as required by the NEMA EIA Regulations of June 2010. Neither Savannah Environmental nor any of its specialist sub-consultants are subsidiaries of or are affiliated to WWK Development. 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 which provides a holistic environmental management service, including environmental assessment and planning to ensure compliance with relevant environmental legislation. Savannah Environmental benefits from the pooled resources, diverse skills and experience in the environmental field held by its team that has been actively involved in undertaking environmental studies for a wide variety of projects throughout South Africa and neighbouring countries. Strong competencies have been developed in project management of environmental processes, as well as strategic environmental assessment and compliance advice, and the assessment of environmental impacts, the identification of environmental management solutions and mitigation/risk minimising measures.

The EAPs from Savannah Environmental who are responsible for this project are:

- » *Lusani Rathanya (principle author of this report)* – the environmental consultant for this project, holds a BSc Honours in Environmental Management and Analysis and has 2 years of experience consulting in the environmental field. Her key focus is on environmental impact assessments, environmental management programmes, public participation, waste and water applications. She is currently the responsible EAP for several renewable energy project EIAs across the country.

- » *Jo-Anne Thomas (registered EAP on this application)*, is a registered Professional Natural Scientist and holds a Master of Science degree. She has 16 years' 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 involved in undertaking siting processes as well as EIAs for several renewable energy projects across the country.

Savannah Environmental has developed a detailed understanding of impacts associated with the construction and operation of renewable energy facilities through their involvement in numerous EIA processes for these projects. In order to adequately identify and assess potential environmental impacts associated with the proposed project, Savannah Environmental has appointed the following specialists to conduct specialist impact assessments:

- » Flora study - Bergwind Botanical Surveys & Tours cc.
- » Terrestrial Fauna study – Simon Todd Consulting
- » Geology, Soils and Agricultural Potential study – Terra Soil Science cc
- » Heritage study – Archaeology Contracts Office (ACO)
- » Visual study– MetroGIS (Pty) Ltd
- » Social study– Tony Barbour Environmental Consulting and Research

Curricula vitae for the Savannah Environmental project team and its specialist sub-consultants are included in **Appendix A**.

SCOPE OF THE PROPOSED PROJECT

CHAPTER 2

This chapter provides an overview of Project Blue Solar Energy Facility near Kleinsee, Northern Cape Province. The project scope includes the planning and design, construction, operation and decommissioning phases during which potential impacts will vary in terms of their nature and significance. This chapter also describes the project alternatives (including the "Do-Nothing" alternative) proposed for the project.

2.1. Need and Desirability of the project

According to the DEA Draft Guideline on Need and Desirability in terms of the Environmental Impact Assessment (EIA) Regulations, 2010 (October 2012) the need and desirability of a development must be measured against the contents of the Integrated Development Plan (IDP), Spatial Development Framework (SDF) and Environmental Management Framework (EMF) for an area, and the sustainable development vision, goals and objectives formulated in, and the desired spatial form and pattern of land use reflected in, the area's IDP and SDF. This section of the report provides a summary of the findings from the review of relevant policies and guidelines at a national, provincial and local scale regarding the need for renewable energy and Project Blue Solar Energy Facility, in particular.

2.1.1 The Need for Renewable Energy Projects at a National Scale

The need for harnessing renewable energy resources (such as solar energy for electricity generation) is linked to increasing pressure on countries to increase their share of renewable energy generation due to concerns such as exploitation of non-renewable resources and the rising cost of fossil fuels. In order to meet the long-term goal of a sustainable renewable energy industry, a target of 17.8 GW of renewables by 2030 has been set by the Department of Energy (DoE) within the Integrated Resource Plan (IRP) 2010¹ and incorporated in the Renewable Energy Independent Power Producer Procurement (REIPPP) Programme initiated by the DoE. This programme has been designed so as to contribute towards a target of 3725 MW to be generated from renewable energy sources, required to ensure the continued uninterrupted supply of electricity, towards socio-economic and environmentally sustainable growth, and to start and stimulate the renewable industry in South Africa. The energy procured through this programme will be produced mainly from wind, solar, biomass, and small-

¹ Note that an update of the IRP has been drafted and is currently under review.

scale hydro (with wind and solar comprising the bulk of the power generation capacity). This 17,8GW of power from renewable energy amounts to ~42% of all new power generation being derived from renewable energy forms by 2030.

2.1.2 Strategic Integrated Projects (SIPs)

In 2010, a National Development Plan was drafted to address socio economic issues affecting development in South Africa. These issues were identified and 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. Amongst these is the green energy in support of South African Economy i.e. SIP 8. The SIP aims at supporting sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP, 2010).

In support of SIP 8, the Department of Energy has introduced the Renewable Energy Independent Power Producers (REIPPP) Programme, which is now in its fourth year. The proposed Project Blue Solar Energy Facility will contribute towards SIP 8 due to the addition of clean energy to the grid and the project will create significant socio-economic benefits at a local, regional and national scale.

2.1.3 Renewable Energy Development Zones (REDZ)

The DEA in discussion with the DoE has been mandated by MinMec to undertake a Strategic Environmental Assessment (SEA). The DEA has subsequently appointed CSIR to manage wind and solar PV SEA processes. The SEAs will be undertaken in order to identify geographical areas most suitable for the rollout of wind and solar PV energy projects and the supporting electricity grid network. The aim of the study is to designate renewable energy development zones (REDZs) within which such development will be incentivised and streamlined.

The CSIR has recently released a map (Figure 2.1) indicated the initial identification of geographical areas best suited for the roll-out of wind and solar photovoltaic (PV) energy projects in South Africa. The proposed Project Blue solar facility falls within one of the identified geographical areas most suitable for the rollout of the development of renewable energy projects within the Northern Cape Province. It must be noted that this process is currently within the development phase and no REDZ have as yet been gazetted. The mapped areas could therefore still be subject to change.

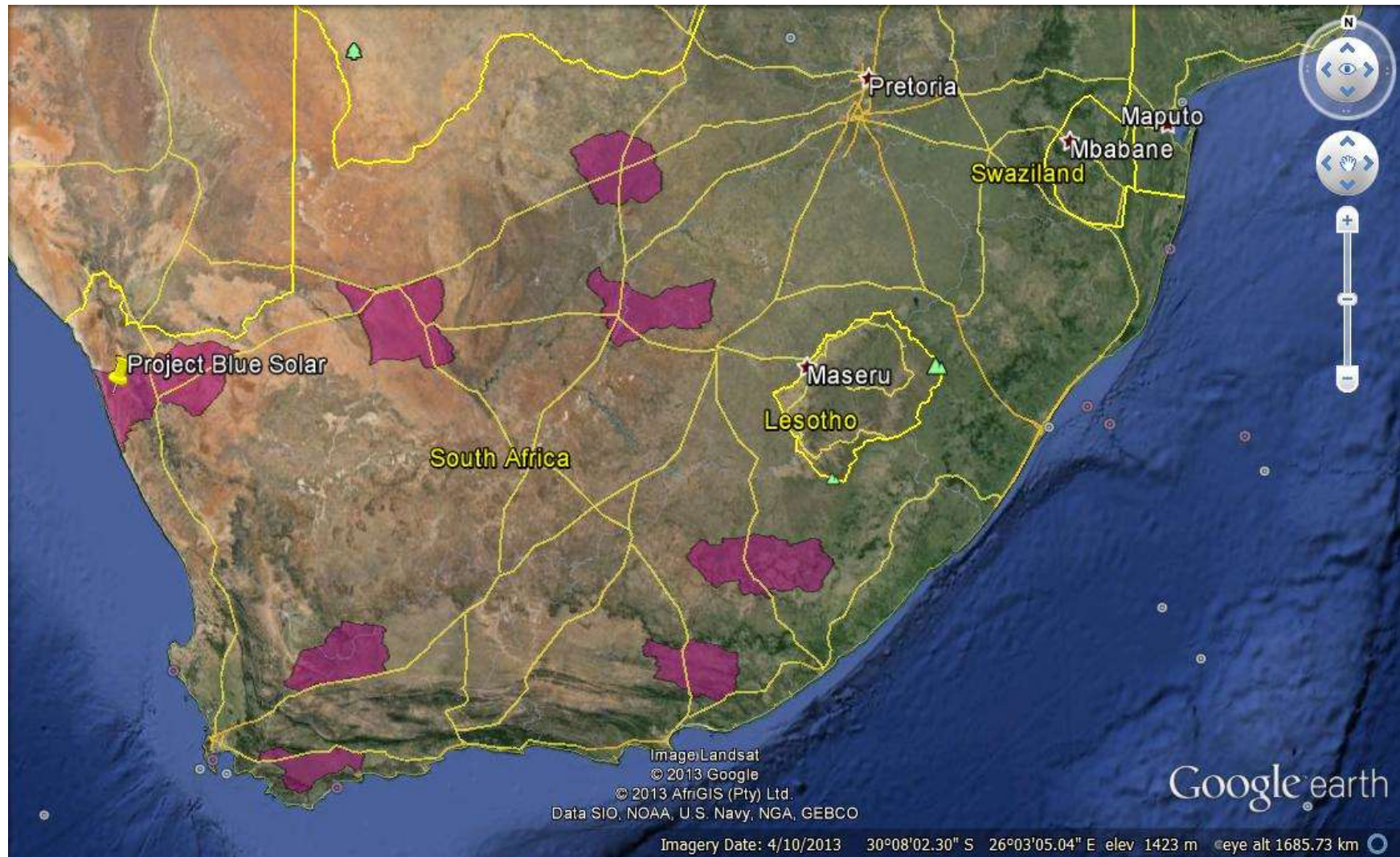


Figure 2.1: Google Earth image indicating proposed Renewable Energy Development Zones (REDZ) (CSIR, March 2014), showing the location of the proposed Project Blue Solar Facility

2.1.4 Northern Cape Province Spatial Development Framework (NCPSDF)

The Northern Cape Province Spatial Development Framework (NCPSDF) makes reference to the need to ensure the availability of inexpensive energy. The Framework notes that in order to promote economic growth in the Northern Cape Province, the availability of electricity to key industrial users at critical localities at rates that enhance the competitiveness of their industries must be ensured. At the same time, the development of new sources of energy through the promotion of the adoption of energy applications that display a synergy with the province's natural resource endowments must be encouraged.

Of specific relevance to the proposed Project Blue Solar Energy Facility, the NCPSDF notes that "Renewable energy sources such as wind, solar, biomass and domestic hydroelectricity are to constitute 25% of the province's energy generation capacity by 2020. Promote the development of renewable energy supply schemes. Large-scale renewable energy supply schemes are strategically important for increasing the diversity of domestic energy supplies and avoiding energy imports while minimizing detrimental environmental impacts."

Further detail on the need for renewable energy as included in the NCPSDF is provided in Chapter 3.

2.1.5 Namakwa District Municipality Integrated Development Plan (2012 - 2016)

The Namakwa District IDP is explicitly aligned with the applicable national and provincial policy and planning frameworks, including the 12 National Outcomes (2010) and National Development Plan (2011), as well as the PGDS. Focus in presentation below is on aspects of relevance to the assessment of the Project Blue Solar Energy Facility.

The IDP identifies a number of key socio-economic development constraints and challenges with regard to the NDM, including:

- » High unemployment, underemployment and economic non-participation levels, with only ~20% of the labour force permanently employed in 2010, and an increasingly larger part of the population becoming dependent on social grants;
- » The potential impacts of climate change on the NDM. Generally hotter, drier, more fire-prone conditions, resulting in less predictable rainfall patterns, more frequent droughts, and an overall greater scarcity of water, are anticipated for the NDM.

Key identified development priorities therefore include the following:

- » Employment creation, specifically including female-orientated employment opportunities, to address the current high rate of out-migration of women in the 20-34 age group;
- » Skills training and reskilling opportunities, also including provision for people with low education levels;
- » Economic diversification away from primary sector activities (agriculture and mining), and a greater focus on tourism as growth and employment sector;
- » Realising any opportunities resulting from appropriate developments in the historically transformed coastal zone to counteract the decline of employment and other opportunities associated with a decline in the diamond mining industry.

Section 2.5 of the IDP includes a summary of a recent NDM research report on the "Possible effects and impact of climate change on human settlements and population development in the Northern Cape". Key findings of the report indicated that the Namakwa District, including its Atlantic fisheries, is in the direct path of extreme anticipated climate change impacts. Key recommendations include the NDM's need to mainstream climate change into planning activities and implement institutional arrangements that support integration of climate change across sectors.

The proposed Project Blue Solar Energy Facility will be reducing the level at which climate change is affecting the province and country wide through the use of a renewable resource, i.e. sun to generate electricity.

2.1.6 Nama Khoi Local Municipality Integrated Development Plan (2012-2016)

The Nama Khoi Local Municipality's IDP is underpinned by the National Strategic Plan for Local Government 2006-2011, the PGDS, the national Accelerate and Shared Growth Initiative – South Africa (2006-2014) (ASGISA), and the 2009 national Local Government Turnaround Strategy (regarding service delivery challenges and financially sustainable local government).

Socio-economic developmental planning in the NKLM is further underpinned by the objectives of national Medium-term Strategic Framework in line with the proposed project (or 12 National Outcomes by 2014), namely:

- » Speeding up growth and transforming the economy to create decent work and sustainable livelihoods;
- » To strengthen the skills and human resource base;
- » To build cohesive, caring and sustainable communities;
- » Sustainable Resource Management and use;

Of specific relevance to the proposed Project Blue Solar Energy Facility, the IDP notes that mining used to form the backbone of the economy, but that tourism is currently seen as the “new frontier” for economic development in the municipal area (NKLM Draft 2011/12 IDP). The IDP makes no mention of renewable energy projects or policy pertaining thereto.

2.1.7 Rationale for the proposed Project Blue Solar Energy Facility

In responding to the growing electricity demand within South Africa, as well as the national and provincial targets for renewable energy as outlined above, WWK Development (Pty) Ltd proposes the establishment of Project Blue Solar Energy Facility to add new capacity to the national electricity grid. The purpose of the proposed project is to supply renewable energy to the national grid (as required by the IRP2010) and to aid in achieving the goal of a 30% share of all new power generation being derived from Independent Power Producers (IPPs), as targeted by the Department of Energy (DoE).

The development of the project would benefit the local, regional and national community by developing a renewable energy project with a generation capacity of up to 65MW. Surrounding communities would also benefit from the development through job creation and economic spin-offs. In addition, according to the Department of Energy (DoE) bidding requirements, the developer will be required to plan for a percentage of the profit per annum from the solar energy facility operation to go back into the local community through a social beneficiation scheme. This is particularly important in the Kleinsee area due to the declining job and economic opportunities in the area as a result of reductions in mining activities.

2.1.8 Desirability for Project Blue Solar Energy Facility on the proposed site

The use of solar irradiation for electricity generation is essentially a non-consumptive use of a natural resource. A solar energy facility also qualifies as a Clean Development Mechanism (CDM) project (i.e. a financial mechanism developed to encourage the development of renewable technologies and other low carbon technologies) as it meets all international requirements in this regard. The proposed site located on Portion 03 of the Farm Predikant Vlei 190, Portion 03 of the Farm Roode Vlei 189 and Portion 04 of the Farm Dikgat 195 was selected for the development of a solar energy facility based on its predicted solar resource, suitable proximity in relation to the existing and available electricity grid, minimum technical constraints from a construction and technical perspective, and relatively disturbed nature of the area (due to previous mining activities), which reduces the environmental sensitivity to some extent. WWK

Development (Pty) Ltd considers this area, and specifically the demarcated site on Portion 03 of the Farm Predikant Vlei 190, Portion 03 of the Farm Roode Vlei 189 and Portion 04 of the Farm Dikgat 195, to be highly preferred for the development of a solar energy facility. The reasons include:

- » There are no arable lands in the study area or directly adjacent to it, which could be impacted upon by the proposed development.
- » The current land-use on the site is agriculture (livestock grazing). The development of Project Blue Solar Energy Facility will allow current livestock grazing to continue on areas of the farm portions which will not be occupied by solar panels and associated infrastructure. Therefore the current land-use will be retained on much of the site, while the remainder will be utilised to generate renewable energy from the sun.
- » The local requirement for job opportunities and economic upliftment. Opportunities in this regard in the Kleinsee area are currently declining due to a reduction in mining activities in the area. The proposed solar energy facility will present job opportunities for the local community and will provide economic investment into the area.
- » The power can be readily evacuated to strengthen the local Eskom grid through connection to the Eskom Gromis Nama 1 (220kV) power line that lies parallel to the site.

2.2. Description of the Proposed Solar Energy Facility

The solar energy facility is proposed to accommodate an array of **photovoltaic** (PV) panels with a generating capacity of up to **65 MW** (potentially to be developed in two phases of 20MW and 45MW respectively). A broader study area of approximately 360ha has been considered within which the facility is to be constructed. Approximately 130 ha will be required for the installation of 65 MW. The following table provides details of the project components.

Table 2.1: Project components

Component	Description/ Dimensions
Location of the site	Portion 03 of the Farm Predikant Vlei 190, Portion 03 of the Farm Roode Vlei 189 and Portion 04 of the Farm Dikgat 195 near Kleinsee, Northern Cape Province
Municipal Jurisdiction	Namakwa District Municipality Nama Khoi Local Municipality
Electricity Generating capacity	65MW
Extent of the proposed development footprint	130 ha
Extent of broader site	360 ha
Site access	The site will be accessed via existing gravel road off the

Component	Description/ Dimensions
	provincial road R355
Proposed technology and Height of installed panels from ground level	Static PV panels Height: 4m
Number of Panels	305,000
Panel Dimensions	2m x 1m
Panel direction	North facing
Number of inverters	65
Main transformer / on-site substation capacity and size	150x150m
Office / workshop (size)	20m x 20m x 5m
New overhead power line between the site and the Gromis Nama 1 (220 kV) power line	Length: 2km Servitude width: ~55m Tower height: ~35m
Services required	<ul style="list-style-type: none"> » Sewage and Refuse material disposal - all sewage and refuse material generated during the establishment of the proposed site will be collected by a contractor to be disposed of at a licensed waste disposal site » Water and electricity - water will be obtained from the municipality or a licence will be obtained from DWA for abstracting water from local boreholes. » Electricity will be generated from generators for any electrical work on site or electricity will be obtained from an Eskom auxiliary supply, depending on the feasibility during construction.
Infilling or depositing material	<p>Any infilling material that may be required for project development will be obtained from:</p> <ul style="list-style-type: none"> » Option 1: Cut and fill material from construction activities on the site (i.e. from Portion 03 of the Farm Predikant Vlei 190, Portion 03 of the Farm Roode Vlei 189 and Portion 04 of the Farm Dikgat 195) » Option 2: Contractor to source suitable grade material from an approved/registered borrow pit in the broader region. Any excess/spoil material will be disposed of to a licensed landfill site.

2.2.1. Water Requirements

An operational PV plant has no direct water requirement associated with the generation of electricity. Water is required primarily for the construction of the facility and well as for human consumption (sanitation) during operation. In

many instances, water is used to clean off dust or dirt that builds up on the panels.

During the construction period, water will be used for site preparation, road preparation, and dust control where necessary. A 65MW plant will require approximately 15 000 m³ of water during the construction phase, although a higher volume could be required in the hotter periods of the year when dust suppression would be required on a more frequent basis. A volume of approximately 3000m³ per annum would be required during the operational phase.

2.3. Project Alternatives

In terms of the requirements of Regulation 27(e) of the EIA Regulations, alternatives are required to be considered within the EIA process, and may refer to any of the following:

- » Site alternatives
- » Activity alternatives
- » Design or layout alternatives
- » Technology alternatives
- » Operating alternatives
- » No-go alternative

The section below provides details of the feasible and reasonable alternatives identified for the Project Blue Solar Facility.

2.3.1. Site Alternatives

Only one technically and economically feasible alternative site for the establishment of the proposed project has been identified by the developer for investigation in an EIA process. This is based on results of pre-feasibility analyses undertaken by WWK Development, as well as constraints in terms of land availability in the area under consideration (due to mining potential and activities in the area).

Based on the following considerations, WWK Development considers the proposed site as a highly preferred site for the development of a PV facility.

Site Extent

Space is a restraining factor for the development of a PV facility. An area of approximately 130 ha would be required for a facility of up to 65 MW. The proposed site which is approximately 360ha in extent will therefore

be sufficient for the installation of the proposed facility, and should allow for the avoidance of any identified environmental constraints in terms of the final design of the facility.

Availability of the land

De Beers has awarded land to three Independent Power Producers (IPPs). WWK Development (Pty) Ltd is one of the three IPPs that were awarded a portion of land for the development of a renewable energy facility. In the area north of Kleinsee (proposed site under investigation in this EIA report) it was concluded by de Beers that the area falls outside the current and future mining area and has sufficient land area available to construct a renewable energy facility. Land is therefore available for the proposed development.

Site access

Kleinsee can be accessed from the N7 via one of three possible routes (refer to Figure 2.2):

- » "Kleinsee pad": R355, via Springbok (~97 km). This constitutes the most direct route to Kleinsee from the N7, and the only proclaimed public road to Kleinsee. The segment from Springbok to Buffelsrivier is tarred and provides sole access to the study area communities from Springbok. The segment from Buffelsrivier to Kleinsee is untarred and the road in a relatively bad state;
- » "Rooipad": Buffelsrivier-Kommagas Road off the R355, linking up with the KDBC Koiingnaas-Kleinsee road south of Kleinsee. The segment from Buffelsrivier to Kommagas is tarred; the portion from Kommagas to the De Beers Consolidated Koingnaas road is a De Beers Consolidated owned gravel road. This Kommagas Road ("rooipad" due to red soils) is preferred by Kleinsee residents and Kleinsee farmers for accessing Springbok;
- » "Hondekliipbaai pad": Combination of (mainly gravel) roads from Garies (off the N7), via Hondelikpbaai and Koingnaas. This constitutes the most direct road link to the harbours of Cape Town and Saldanha via the N7. Garies is located approximately 176 km south-east of Kleinsee (by road). The De Beers Consolidated owned Kleinsee-Koingnaas segment is the only tarred segment at present. The remainder of the road is essentially only safely negotiable by 4x4 or truck. Tarring of the Garies-Hondeklipbaai segment is envisaged by the Kamiesberg Local Municipality SDF in the medium to long term, but no funds appear to have been allocated.



Figure 2.2: Road network for the proposed Project Blue Solar Energy Facility

Two additional secondary roads provide access to the study area, namely:

- » Port Nolloth gravel road, from R355 outside Kleinsee to R382 south of Port Nolloth;
- » Gravel road from Koiingnaas to Springbok via the NNP.

The route proposed for the transport of PV panels etc. is not known at this stage, but the N7 - R355 seems the most probable route.

The proposed site is essentially only accessible from the N7 (via Garies or Springbok). Access/haul roads to the site as well as internal access roads within the site are required to be established prior to the commencement of construction. Access to the site is likely to be from the gravel roads in the study area. As far as possible, existing access roads would be utilised, and upgraded where required. Within the site itself, access will be required between the PV panels for construction purposes (and later limited access for maintenance). Special haul roads may need to be constructed to and within the site to accommodate abnormally loaded vehicle access and circulation. The internal service road alignment will be informed by the final micro-siting/positioning of the infrastructure.

These access roads will have to be constructed in advance of any components being delivered to site, and will remain in place after completion for future access

and possibly access for replacement of parts if necessary. It is proposed that in preparing the access road a portion of it will be constructed as a permanent access road and the remainder as a temporary access road that can be de-compacted and returned to its previous condition prior to construction.

Climatic Conditions

Due to the nature of the development (i.e. PV solar energy facilities), the location of the facilities are 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. Studies of solar irradiation worldwide indicate that the Northern Cape shows great potential for the generation of solar power. The region within which the PV facility is proposed has a high level of solar irradiation levels (refer to Figure 2.3) and is to be a technically feasible site for the placement of a solar facility.

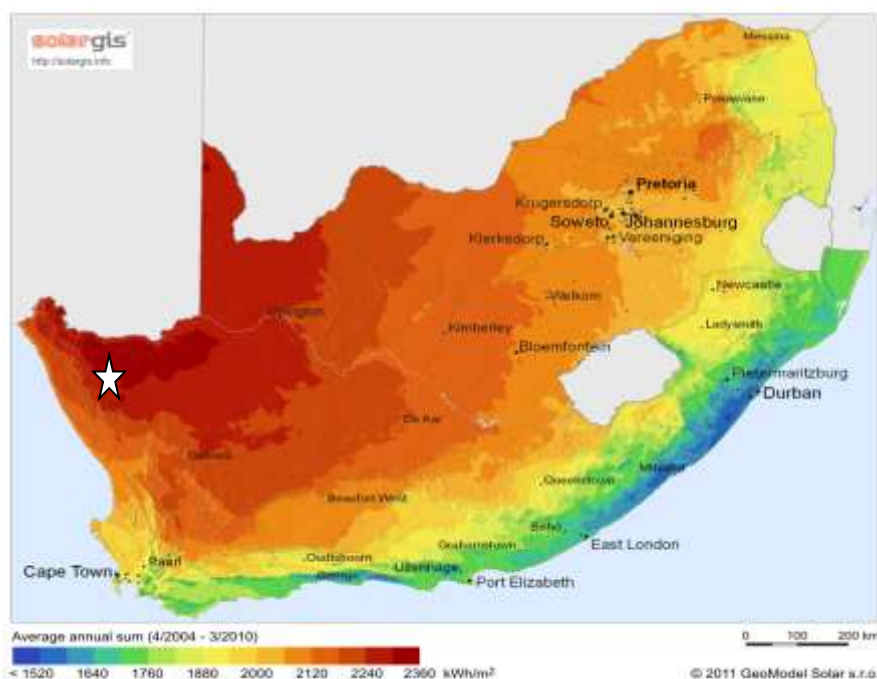


Figure 2.3: Solar irradiation map for South Africa (Source: adapted from GeoModel Solar, 2011)

Gradient

A level surface area (i.e. with a minimal gradient in the region of 3%) is preferred for the installation of PV panels. The slope of the proposed site is considered to be acceptable from a development perspective, which reduces the need for extensive earthworks and associated levelling activities, thereby minimising environmental impacts.

Grid Connection

One overhead power line (up to 220 kV distribution line) will connect the substation to the electricity distribution network/grid from the proposed site to the Gromis Substation. A route for the power line will be assessed, surveyed and pegged prior to construction.

Based on the above considerations, WWK Development considers the proposed site as being highly suitable for the development of the Project Blue PV Solar Energy Facility. No feasible alternative sites are considered further in the EIA process.

2.3.2. Activity Alternatives

No activity alternatives were assessed because the site has been identified by WWK Development as being highly desirable for the establishment of a photovoltaic plant and not any other development or renewable technologies such as concentrated solar power (CSP). CSP installations were not considered as a feasible and reasonable alternative as they require a large amount of water for cooling, unlike PV where water is only required for cleaning purposes (considering the fact that the site is in an arid area). PV is also relatively easier to construct as opposed to CSP.

Therefore, a PV facility is considered by WWK Development to be the only feasible activity for the proposed site.

2.3.3. Design or Layout Alternatives

The proposed facility is expected to have a developmental footprint of approximately 130ha. This is smaller than the identified site which is 360ha in extent. Therefore the PV facility and its associated infrastructure (i.e. transformer, substation, internal roads, etc.) can be appropriately located within the site to avoid any environmentally sensitive areas and other constraints identified on the site.

No feasible design or layout alternatives have been identified for consideration in the EIA Phase. However, technical (including current and future mining constraints), social and environmental issues were considered prior to the layout design/micro-siting exercise in order to determine the most feasible siting of the infrastructure on site. Issues considered included the identified sensitive areas (i.e. the drainage lines), and existing infrastructure on the site (i.e. power lines). In order to meet the proposed generating capacity within the proposed development area and maximise all available space after considering environmental, technical and social issues as identified in the Scoping phase, all available space will be utilised for the PV facility.

2.3.4. Technology Alternatives

Electricity Generating alternatives have been addressed as part of the National Integrated Resource Plan (IRP) by the Department of Energy. In this regard, the need for power generation from solar resources as part of the technology mix for power generation in the country in the next 20 years has been identified. WWK Developments is proposing the development of a solar facility and have not considered any other power generation options for this project.

PV technology is preferred by WWK Developments for this facility over Concentrating Solar Power (CSP) due to the limited water availability in the area (since SCP facilities require large amounts of water for the operational phase).

Very few technological options exist in as far as PV technologies are concerned. Those that are available are usually differentiated by weather and temperature conditions that prevail such that optimality is obtained by the final choice. The PV technological options available include monocrystalline, polycrystalline and thin film modules. The environmental impacts of any of the PV technology choices are the same. Therefore, the choice of technology does not affect the environmental impact of the proposed development. The construction, operation and decommissioning of the facility will also be the same irrespective of the technology chosen. Therefore, no alternatives were assessed in this regard.

2.3.5. Operating Alternatives

No operational alternatives were assessed as no feasible and reasonable operational alternatives were identified.

2.3.6. No-go Alternative

The no-go option would mean that the proposed Project Blue Solar Facility including all associated infrastructure would not be developed. Should this alternative be selected, there would be no impacts on the area designated for the construction of Project Blue Solar Facility due to the associated construction and operation activities.

It is noteworthy that receipt of an environmental authorisation for the project may not necessarily result in the project being implemented due to other external factors, including whether the developers are awarded preferred bidder status by the DoE. The region surrounding Kleinsee has received a considerable amount of attention with respect to renewable energy facility applications. Four other renewable energy facility applications have been identified within 50km of the proposed site. These are the Project Blue Wind Energy Facility (located adjacent to the site), the Eskom Kleinsee Wind Energy Facility (located 12km south west of

the site), the proposed Kannikwa Vlake wind farm (located 25km north of the site) and the Nigramoep PV Solar Energy Facility (located 40km east of the site). None of these projects are preferred bidder projects, and the Eskom site is currently still in the feasibility phase.

While the no-go alternative will have socio-economic implications at a local and broader scale, the extent of the impact is minimised by the number of renewable energy projects proposed to be developed in the Kleinsee area. The do-nothing alternative will therefore likely result in minimising the cumulative impact associated with cumulative solar energy developments in the Kleinsee area, although it is expected that pressure to develop the site for renewable energy purposes will be actively pursued due to the very factors which make the site a viable option for renewable energy development as discussed previously in this chapter. Other developers will likely seek to develop the site for renewable energy purposes in order to realise targets for renewable energy in the country, and the socio-economic and environmental benefits of which 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 decentralised manner close to consumers, they offer the opportunity for improving grid strength and supply quality, while reducing expensive transmission and distribution losses.
- » **Resource saving:** Conventional coal fired plants are major consumers of water during their requisite cooling processes. 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, when compared with wet cooled conventional power stations. This translates into revenue savings of R26.6 million. 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.
- » **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. The use of solar radiation for power generation is considered a non-consumptive use of a natural resource which produces zero greenhouse gas emissions.
- » **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 approximately 1% of global GHG emissions and is currently ranked 9th worldwide in terms of per capita carbon dioxide 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.

2.4. Solar Energy as a Power Generation Technology

The generation of electricity can be easily explained as the conversion of energy from one form to another. Solar energy facilities operate by converting solar energy into a useful form (i.e. electricity). Solar technologies can be divided into two categories, those that use thermal energy from the sun and those that use the light energy. The former uses water (i.e. solar thermal) whereas the latter does not (i.e. photovoltaic technology which is proposed for this project).

The use of solar energy for electricity generation is a non-consumptive use of a natural resource and consumes no fuel for continuing operation. Renewable energy is considered a 'clean source of energy' with the potential to contribute greatly to a more ecologically, socially, and economically sustainable future. The challenge now is ensuring solar energy projects are able to meet all economic, social, and environmental sustainability criteria.

2.4.1 How do Grid Connected Photovoltaic Facilities Function?

Photovoltaic facilities generate electricity through the use of photovoltaic panels (semiconductors) which are comprised of individual photovoltaic cells which absorb solar energy to produce electricity (refer to Figure 2.2). The absorbed solar radiation excites the electrons inside the cells and produces what is referred to as the "**photovoltaic effect**". The individual photovoltaic cells are commonly

constructed from silicon, are linked together and placed behind a protective glass sheet to operate in unison as a photovoltaic panel.



Figure 2.4: Photo showing view of photovoltaic panels

In order to produce 65 MW of power, the proposed plant will require numerous panels arranged in multiples/arrays which will be fixed to a support structure (as shown in the photo above). In order to maximise the amount of electricity generated the panels need to be angled in such a fashion so to receive the maximum amount of solar radiation throughout the year. The preferred angle of the panels (which is dependent on the latitude of the proposed facility) may be adjusted to optimise for summer or winter solar radiation characteristics. Lastly, an **inverter** will be used to convert the electricity, which is produced as direct current, into alternating current.

2.5. Proposed Activities during the Project Life Cycle Phases

2.5.1. Construction Phase

The construction of the facility will be undertaken in a phased approach, i.e. the total 65MW will be developed in two different phases. The construction phase is expected to extend over a period of 8-10 months and create between 150-200 employment opportunities at peak construction. It is anticipated that approximately 25 % (50) will be available to skilled personnel (engineers, technicians, management and supervisory), ~ 15 % (30) to semi-skilled personnel (drivers, equipment operators), and ~ 60% (120) to low skilled personnel (construction labourers, security staff).

Members from the local community are likely to be in a position to qualify for the majority of the low skilled and some of the semi-skilled employment opportunities. The majority of these employment opportunities are also likely to accrue to Historically Disadvantaged (HD) members from the local community. Given the high unemployment levels and limited job opportunities in the area this will represent a significant social benefit. The remainder of the semi-skilled and majority of the skilled employment opportunities are likely to be associated with the contactors appointed to construct the solar energy facility and associated infrastructure. In terms of accessibility the majority of the construction workers from outside the area are likely to be accommodated in Kleinsee and transported to and fro the site.

The construction phase will entail a series of activities including:

Conduct Surveys

Prior to initiating construction, a number of surveys will be required including, but not limited to confirmation of the micro-siting footprint (i.e. the precise location of the PV panels and the plant's associated infrastructure) and a geotechnical survey. Geotechnical surveys are executed by geotechnical engineers and geologists to acquire information regarding the physical characteristics of soil and rocks underlying a proposed site. The purpose is to design earthworks and foundations for structures and to execute earthwork repairs necessitated due to changes in the subsurface environment.

A power line servitude survey will also be conducted for the proposed 220kV power line once the placement of the towers for the power line has been finalised. If necessary, a walk through survey will be undertaken for ecological, archaeology and heritage resources which may necessitate certain towers to be moved to avoid on-the-ground sensitivities.

Establishment of Access Roads

The route proposed for the transport of PV panels etc. is not known at this stage, but the N7 - R355 seems the most probable route.

The proposed site is essentially only accessible from the N7 (via Garies or Springbok). Access/haul roads to the site as well as internal access roads within the site are required to be established prior to the commencement of construction. Access to the site is likely to be from the gravel roads in the study area. As far as possible, existing access roads would be utilised, and upgraded where required. Within the site itself, access will be required between the PV panels for construction purposes (and later limited access for maintenance).

Special haul roads may need to be constructed to and within the site to accommodate abnormally loaded vehicle access and circulation. The internal service road alignment will be informed by the final micro-siting/positioning of the infrastructure.

Internal access roads will be required to access the individual components within the facility during construction and operation. The extent of earthworks and compaction required in the upgrade or construction of the access roads will be established through the detailed geotechnical study which will be undertaken as part of the design phase.

Undertake Site Preparation

Site preparation activities will include clearance of vegetation at the footprint of each support structure. These activities will require the stripping of topsoil which will need to be stockpiled, backfilled and/or spread on site. If the terrain is undulating, then the ground may have to level to one slope, if the land is not flat enough. Rocks may also be removed as well as trees that may be obstacles.

Transport of Components and Construction Equipment to Site

The components for the proposed facility will be transported to site, in sections, by road. Some of the substation components may be defined as abnormal loads in terms of the Road Traffic Act (Act No. 29 of 1989)² by virtue of the dimensional limitations (i.e. length and weight). The 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 the components required for the establishment of the substation and power line.

Establishment of Construction Equipment Camps

Once the required equipment has been transported to site, a dedicated construction equipment camp will need to be established. The purpose of this camp is to confine activities and storage of equipment to one designated area to limit the potential ecological impacts associated with this phase of the project. The laydown area(s) will be used for assembly purposes and the general placement/storage of construction equipment. The storage of fuel for the on-site construction vehicles and equipment will need to be secured in a temporary bunded facility so to prevent the possibility of leakages and soil contamination.

² A permit will be required for the transportation of these abnormal loads on public roads.

Establishment of the PV Panels

The PV panels will be mounted via steel structures which will be attached to uprights which are stabilised by concrete foundations where necessary. The foundation holes will be mechanically excavated to a depth of approximately 100 - 150 cm. The concrete foundations where necessary will be poured and then be left for up to a week to cure. Aggregate and cement to be transported from the closest centre to the development. The installation of the underground cables will require the excavation of trenches of approximately 40 cm – 100 cm deep within which they can then be laid.

Establishment of Ancillary Infrastructure

Ancillary infrastructure includes invertors, a single substation, an overhead power line (up to 220kV) to the Gromis substation (The Gromis substation is a distance of approximately 1.6km from the proposed PV facility), and a workshop for maintenance and storage.

The establishment of these facilities/buildings will require the clearing of vegetation and levelling of the development site and the excavation of foundations prior to construction. A laydown area for building materials and equipment associated with these buildings will also be required.

Construct on-site substation

An on-site substation of approximately 150 m x 150 m will be required to be established on the site. The construction of the substation would include the construction of the foundations, erection and installation of equipment (including the transformer) and connection of the necessary conductors.

Once micro-siting/positioning of the PV panels has been finalised, the position of the main substation will be chosen to optimise cable lengths and associated losses. Due to the prevailing corrosive environmental conditions an indoor substation is preferred, but a small switchyard (approx. 50 x 80m) containing the 220kV step-up transformers and overhead line feeder switchgear may be required. The construction of the substation would require a survey of the site; site clearing and levelling and construction of an access road to substation site (where required); construction of substation terrace and foundations; substation building, assembly, erection and installation of equipment (including transformers); connection of conductors to equipment; and rehabilitation of any disturbed areas and protection of erosion sensitive areas.

Undertake Site Rehabilitation

As construction is completed in an area, and as all construction equipment is removed from the site, the site must be rehabilitated where practical and reasonable. On full commissioning of the facility, any access points to the site which are not required during the operation phase will be closed and prepared for rehabilitation.

2.5.2. Operational Phase

The proposed operational phase is expected to run for a period of approximately 25 - 30 years with plant maintenance. It is anticipated that during this time a full time security, maintenance, supervision and monitoring teams will be required on site. Maintenance activities will include *inter alia*, replacement and cleaning of the panels (using pressurised air and water). The photovoltaic plant will be operational during daylight hours only. However, it will not be operational under circumstances of mechanical breakdown, extreme weather conditions or maintenance activities. No energy storage mechanisms (i.e. batteries) which would allow for continued generation at night or on cloudy days are proposed.

2.5.3. Decommissioning Phase

Depending on the economics of the development following the operational period, the plant will either be decommissioned or the operational phase will be extended. If it is deemed financially viable to continue, existing components would be disassembled and replaced with more appropriate technology/infrastructure available at that time. However, if the decision is made to decommission the facility the following activities will form part of the project scope.

Site Preparation

Site preparation activities will include confirming the integrity of the access to the site to accommodate the required decommissioning equipment.

Disassemble and Remove Existing Components

The components of the plant will be disassembled and removed. Thereafter they will be reused and recycled (where possible) or disposed of in accordance with regulatory requirements.

3.1 Policy and Planning Context at a National Level

The need to expand electricity generation capacity in South Africa is based on national policy and 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 solar energy facilities is illustrated in **Figure 3.1**. 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 solar energy facility.

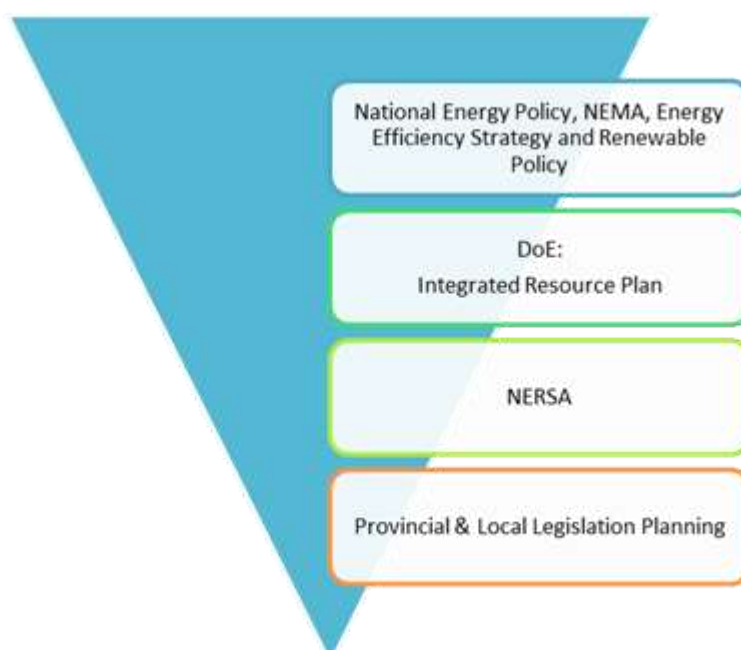


Figure 3.1: Hierarchy of electricity policy and planning documents

3.1.1 The National Energy Act (2008)

The National Energy Act was promulgated in 2008 (Act No 34 of 2008). One of the objectives of the Act was 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.

3.1.2 White Paper on the Energy Policy of South Africa, 1998

Development within the South African energy sector is governed by the White Paper on a National Energy Policy (DME, 1998). The White Paper identifies key objectives for energy supply, such as increasing access to affordable energy services, managing energy-related environmental impacts and securing energy supply through diversity.

As such, investment in renewable energy initiatives is supported, based on an understanding that renewable energy sources have significant medium - long-term commercial potential and can increasingly contribute towards a long-term sustainable energy future.

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

The White paper on renewable energy supplements the Governments 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 recognizes 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 White Paper on Energy Policy's position with respect to 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."

This White Paper on Renewable Energy (November, 2003) sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa. 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, so far these have remained

largely untapped. The White Paper on Renewable Energy sets a target of generating 10 000GWh from renewable energy sources. Therefore the policy supports the investment in renewable energy facilities sources at ensuring energy security through the diversification of supply.

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) and 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.

The White Paper on Renewable Energy states *"It is imperative for South Africa to supplement its existing energy supply with renewable energies to combat Global Climate Change which is having profound impacts on our planet."*

3.1.4 Final Integrated Resource Plan, 2010 - 2030

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; 11,4 GW of renewables; and 11,0 GW of other generation sources.

A second round of public participation was conducted in November/December 2010, which led to several changes to the IRP model assumptions. The main changes were the disaggregation of renewable energy technologies to explicitly

display solar photovoltaic (PV), concentrated solar power (CSP) and wind options; the inclusion of learning rates, which mainly affected renewables; and the adjustment of investment costs for nuclear units, which until then represented the costs of a traditional technology reactor and were too low for a newer technology reactor (a possible increase of 40%).

Additional cost-optimal scenarios were generated based on the changes. The outcomes of these scenarios, in conjunction with the following policy considerations, led to the Policy-Adjusted IRP:

- » The installation of renewables (solar PV, CSP and wind) were brought forward in order to accelerate a local industry;
- » To account for the uncertainties associated with the costs of renewables and fuels, a nuclear fleet of 9,6 GW was included in the IRP;
- » The emission constraint of the RBS (275 million tons of carbon dioxide per year after 2024) was maintained; and
- » Energy efficiency demand-side management (EEDSM) measures were maintained at the level of the RBS.

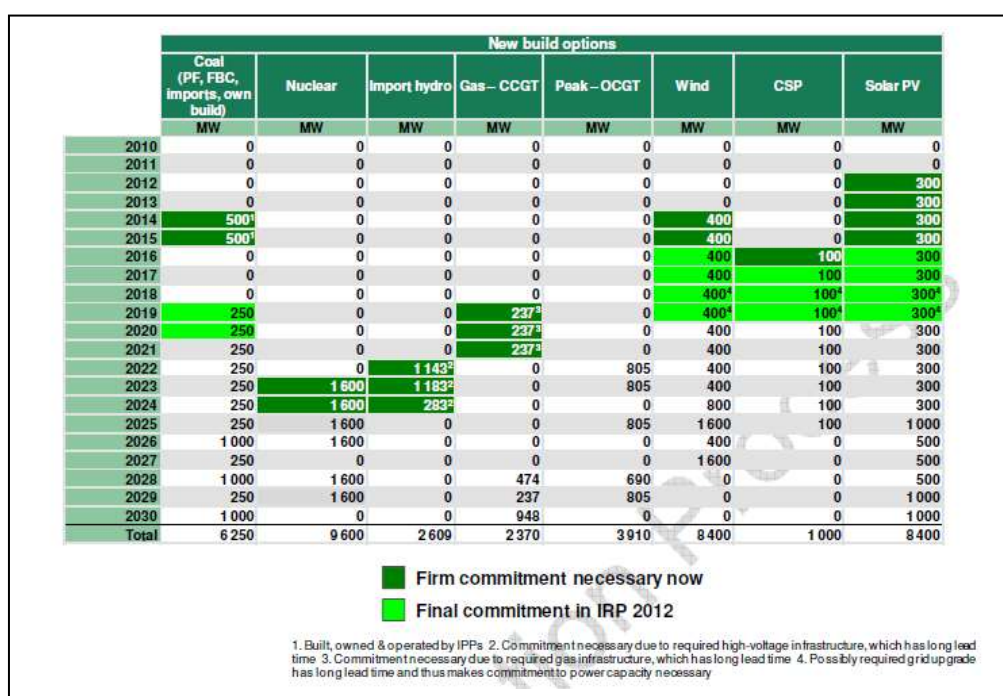


Figure 3.2: National Energy Development Commitments before the next IRP

Figure 3.2 above indicates the new capacities of the Policy commitment. The dates shown in **Figure 3.2** indicate the latest that the capacity is required in order to avoid security of supply concerns. The document notes that projects could be concluded earlier than indicated.

The Policy-Adjusted IRP includes the same amount of coal and nuclear new builds as the RBS, while reflecting recent developments with respect to prices for renewables. In addition to all existing and committed power plants (including 10 GW committed coal), the plan includes 9,6 GW of nuclear; 6,3 GW of coal; 17,8 GW of renewables; and 8,9 GW of other generation sources. The Policy-Adjusted IRP has therefore resulted in an increase in the contribution from renewables from 11,4 GW to 17,8 GW. The key recommendations pertaining to PV solar energy contained in the IRP 2010 to 2013 (March 2011) include:

- » Solar PV programme 2012-2015: In order to facilitate the connection of the first solar PV units to the grid in 2012 a firm commitment to this capacity is necessary. Furthermore, to provide the security of investment to ramp up a sustainable local industry cluster, the first four years from 2012 to 2015 require firm commitment; and
- » Solar PV 2016 to 2019: Grid upgrades might become necessary for the second round of solar PV installations from 2016 to 2019, depending on their location. To trigger the associated tasks in a timely manner, a firm commitment to these capacities is necessary in the next round of the IRP at the latest. By then, the assumed cost decreases for solar PV will be confirmed.

The Integrated Resource Plan (IRP) 2010-30 was promulgated in March 2011. It was indicated at the time that the IRP should be a "living plan" which would be revised by the Department of Energy (DoE) every two years. Since the promulgation of the Integrated Resource Plan (IRP) 2010-30 there have been a number of developments in the energy sector in South and Southern Africa. In addition the electricity demand outlook has changed markedly from that expected in 2010.

The Department of Energy have now completed an IRP 2010 Update (which was available for comments until 7 February 2014). It is expected that the final IRP 2010 Update will be submitted to Cabinet for final approval by March 2014, and subsequently promulgated and published in the Government Gazette.

3.1.5 Electricity Regulation Act, 2006

Under the National Energy Regulator Act, 2004 (Act No 40 of 2004), the Electricity Regulation Act, 2006 (Act No 4 of 2006) and all subsequent relevant Acts of Amendment, NERSA has the mandate to determine the prices at and conditions under which electricity may be supplied by licence to Independent

Power Producers (IPPs). NERSA has recently awarded electricity generation licences for new generation capacity projects under the IPP procurement programme.

3.2 Provincial Policy and Planning Context

3.2.1. Northern Cape Provincial Spatial Development Framework (2012)

Northern Cape Provincial Spatial Development Framework (NCSDF) lists a number of sectoral strategies and plans to be read and treated as key components of the PSDF. Of these, there are a number that are relevant to the proposed solar energy facility. These include:

- » Sectoral Strategy 1: Provincial Growth and Development Strategy of the Provincial Government.
- » Sectoral Strategy 2: Comprehensive Growth and Development Programme of the Department of Agriculture, Land Reform and Rural Development.
- » Sectoral Strategy 5: Local Economic Development (LED) Strategy of the Department of Economic Development and Tourism.
- » Sectoral Strategy 11: Small Micro Medium Enterprises (SMME) Development Strategy of the Department of Economic Development and Tourism.
- » Sectoral Strategy 12: Tourism Strategy of the Department of Economic Development and Tourism.
- » Sectoral Strategy 19: Provincial renewable energy strategy (to be facilitated by the Department of Economic Development and Tourism).

The NCSDF (2012) notes the total area of high radiation in South Africa amounts to approximately 194 000 km² of which the majority falls within the Northern Cape. It is estimated that, if the electricity production per km² of mirror surface in a solar thermal power station were 30.2 MW and only 1% of the area of high radiation were available for solar power generation, then generation potential would equate to approximately 64 GW. A mere 1.25% of the area of high radiation could thus meet projected South African electricity demand in 2025 (80 GW) (NCPSDF, 2012). However the SDF does indicate that this would require large investments in transmission lines from the areas of high radiation to the main electricity consumer centres. The SDF also notes that the implementation of large concentrating solar power (CSP) plants has been proposed as one of the main contributors to greenhouse gas emission reductions in South Africa. In this regard various solar parks and CSP and PV plants have been proposed in the province with Upington being the hub of such developments (NCPSDF, 2012). A solar corridor has been defined for the province. Upington is included within this corridor.

Section C8.2.3 of the NPSDF, sets out the energy objectives for the Northern Cape Province. The section makes specific reference to renewable energy. The objectives are listed below:

- » Promote the development of renewable energy supply schemes. Large-scale renewable energy supply schemes are strategically important for increasing the diversity of domestic energy supplies and avoiding energy imports while minimising detrimental environmental impacts.
- » Enhance the efficiency of Eskom's power station at the Vanderkloof power station.
- » In order to reinforce the existing transmission network and to ensure a reliable electricity supply in the Northern Cape, construct a 400 kV transmission power line from Ferrum Substation (near Kathu/Sishen) to Garona Substation (near Groblershoop). There is a national electricity supply shortage and the country is now in a position where it needs to commission additional plants urgently. Consequently, renewable energy projects are a high priority.
- » Develop and institute innovative new energy technologies to improve access to reliable, sustainable and affordable energy services with the objective to realize sustainable economic growth and development. The goals of securing supply, providing energy services, tackling climate change, avoiding air pollution and reaching sustainable development in the province offer both opportunities and synergies which require joint planning between local and provincial government as well as the private sector.
- » Develop and institute energy supply schemes with the aim to contribute to the achievement of the targets set by the White Paper on Renewable Energy (2003).

Section C8.3.3, Energy Policy, sets out the policy guidelines for the development of the energy sector, with specific reference to the renewable energy sector.

- » The construction of telecommunication infrastructure must be strictly regulated in terms of the spatial plans and guidelines put forward in the PSDF. They must be carefully placed to avoid visual impacts on landscapes of significant symbolic, aesthetic, cultural or historic value and should blend in with the surrounding environment to the extent possible.
- » Renewable energy sources such as wind, solar thermal, biomass and domestic hydroelectricity are to constitute 25% of the province's energy generation capacity by 2020.
- » The following key policy principles for renewable energy apply:
 - * Full cost accounting: Pricing policies will be based on an assessment of the full economic, social and environmental costs and benefits of energy production and utilisation.

- * Equity: There should be equitable access to basic services to meet human needs and ensure human well-being. Each generation has a duty to avoid impairing the ability of future generations and their own well-being.
- * Global and international cooperation and responsibilities: Government recognises its shared responsibility for global and regional issues and act with due regard to the principles contained in relevant policies and applicable regional and international agreements.
- * Allocation of functions: Government will allocate functions within the framework of the Constitution to competent institutions and spheres of government that can most effectively achieve the objectives of the energy policy.
- * The implementation of sustainable renewable energy is to be promoted through appropriate financial and fiscal instruments.
- * An effective legislative system to promote the implementation of renewable energy is to be developed, implemented, and continuously improved.
- * Public awareness of the benefits and opportunities of renewable energy must be promoted.
- * The development of renewable energy systems is to be harnessed as a mechanism for economic development throughout the province in accordance with the Sustainable Development Initiative (SDI) approach (refer to Toolkit D10) or any comparable approach.
- * Renewable energy must, first, and foremost, be used to address the needs of the province before being exported.

3.2.3. Northern Cape Climate Change Response Strategy

The key aspects of the Northern Cape Climate Change Response Strategy (NCCCRS) Report are summarised in the MEC's (NCPG: Environment and Nature Conservation) 2011 budget speech: "The Provincial Climate Change Response Strategy will be underpinned by specific critical sector climate change adaptation and mitigation strategies that include the Water, Agriculture and Human Health sectors as the 3 key Adaptation Sectors, the Industry and Transport alongside the Energy sector as the 3 key Mitigation Sectors with the Disaster Management, Natural Resources and Human Society, livelihoods and Services sectors as 3 remaining key Sectors to ensure proactive long term responses to the frequency and intensity of extreme weather events such as flooding and wild fire, with heightened requirements for effective disaster management".

Key points from MEC address include the NCPG's commitment to develop and implement policy in accord with the National Green Paper for the National Climate Change Response Strategy (2010), and an acknowledgement of the NCP's extreme vulnerability to climate-change driven desertification. The development and promotion of a provincial green economy, including green jobs, and

environmental learnership is indented as an important provincial intervention in addressing climate change. The renewable energy sector, including **solar** and wind energy (but also biofuels and energy from waste), is explicitly indicated as an important element of the Provincial Climate Change Response Strategy. The MEC further indicated that the NCP was involved in the processing 7 wind energy facility and 11 solar energy facility EIA applications (March 2011)³.

3.3 Local Policy and Planning Context

3.3.1. The Namakwa District Municipality Draft Integrated Development Plan 2012-2016

The 2012-2016 NDM Integrated Development Plan (IDP) is the third 5-year IDP of the NDM. The IDP is currently in its first year, and in Draft format. The IDP is explicitly aligned with the applicable national and provincial policy and planning frameworks, including the 12 National Outcomes (2010) and National Development Plan (2011), as well as the PGDS. Focus in presentation below is on aspects of relevance to the assessment of the Project Blue facility.

The IDP identifies a number of key socio-economic development constraints and challenges with regard to the NDM, including:

- » The lack of surface and ground water resources to enable development.
- » Generally poor soils, unsuited to cropping activities.
- » For many of the smaller settlements, a settlements pattern largely unsupported by an adequate economic base.
- » High unemployment, underemployment and economic non-participation levels, with only ~20% of the labour force permanently employed in 2010, and an increasingly larger part of the population becoming dependent on social grants.
- » High poverty levels, with ~44% of households living below the poverty datum in 2010, and an overall increase in the number of poor households of 270% since 1996.
- » A low growth rate in employment creation. From 1996 to 2010, only ~1 000 jobs were created in the NDM.
- » A steady decline in employment provision by the NDM's traditionally key Agricultural and Mining sectors since 1996, with the former declining in 8% in relative significance in 2010, and Mining by 4.5%, resulting in a loss of ~3 100 opportunities during this period. The loss of primary sector opportunities significantly impacts on the lower skilled part of the population.

³ (www.info.gov.za/speech/DynamicAction?pageid=461&sid=22143&tid=45200).

- » Lack of adequate and sufficient tertiary institutions and skills training opportunities in the NCP and NDM.
- » Extensive damage to the NDM's coastline and beaches by historic mining activities since the 1920s. The IDP notes that as diamond resources become fully exploited, and access to the coastline improves, the full extent of the damage, but also potential opportunities will become apparent.
- » The potential impacts of climate change on the NDM. Generally hotter, drier, more fire-prone conditions, resulting in less predictable rainfall patterns, more frequent droughts, and an overall greater scarcity of water, are anticipated for the NDM.

Key identified development priorities therefore include the following:

- » Employment creation, specifically including female-orientated employment opportunities, to address the current high rate of out-migration of women in the 20-34 age group.
- » Skills training and reskilling opportunities, also including provision for people with low education levels.
- » Economic diversification away from primary sector activities (agriculture and mining), and a greater focus on tourism as growth and employment sector.
- » Realising any opportunities resulting from appropriate developments in the historically transformed coastal zone to counteract the decline of employment and other opportunities associated with a decline in the diamond mining industry.

Section 2.5 of the IDP includes a summary of a recent NDM research report on the "Possible effects and impact of climate change on human settlements and population development in the Northern Cape" (date unclear). Key findings of the report indicated that the Namakwa District, including its Atlantic fisheries, is in the direct path of extreme anticipated climate change impacts. Key recommendations include the NDM's need to mainstream climate change into planning activities and implement institutional arrangements that support integration of climate change across sectors. Renewable energy is not explicitly addressed in the document.

Projects listed under Key Performance Area (KPA) 3 (Local Economic Development), of the 2010-2011 NDM IDP indicated current NCPG support for/involvement with two projects in which the generation of wind energy plays a major role, namely:

- » Project no. LE02: *Renewable Energy Sector: the development of a synergy between the energy resources within Namakwa Region*, which, in line with NDM's objective of establishing a competitive renewable energy sector, supports projects related to a variety of renewable energy generation,

including "wind farms with capacity to generate 200 MW energy within 3 Local Municipalities".

- » Project LE15: *LEAP – Living Edge - Tourism and Environment Cluster* indicates current support for post-mining LED development in the Koingnaas/Hondeklipbaai area (Kamiesberg LM). Significantly, focus is on "post mining economic and employment opportunities with an emphasis on (green economic activities such as) mariculture, wind/other forms of green energy and tourism".

3.3.2. Nama Khoi Local Municipality 2011/2012 Revision

The 2011/ 2012 NKLM IDP Revision is the most recent IDP available, and was still compiled in terms of the 2004 NKLM 5-year IDP. Only the 2012-2013 IDP Process Plan is currently available. Review below is therefore of the 2011/ 2012 IDP. The IDP is underpinned by the national Strategic Plan for Local Government 2006-2011⁴, the PGDS, the national Accelerate and Shared Growth Initiative – South Africa (2006-2014) (ASGISA), and the 2009 national Local Government Turn Around Strategy (re. service delivery challenges and financially sustainable local government).

Socio-economic developmental planning in the NKLM is further underpinned by the objectives of national Medium-term Strategic Framework (or 12 National Outcomes by 2014), namely:

- » Speeding up growth and transforming the economy to create decent work and sustainable livelihoods.
- » A massive programme to build economic and social infrastructure.
- » A comprehensive rural development strategy linked to land and agrarian reform and food security.
- » To strengthen the skills and human resource base.
- » To improve the health profile of all South Africans.
- » To intensify the fight against crime and corruption.
- » To build cohesive, caring and sustainable communities.
- » Pursuing African advancement and enhanced international cooperation.
- » Sustainable Resource Management and use.
- » Building a developmental state including improvement of public services and strengthening democratic institutions.

Of specific relevance to the proposed Project Blue solar energy facility, the IDP notes that mining used to form the backbone of the economy, but that tourism is

⁴ The SPLG 2006-2011 identified 5 national Key Performance Areas – or KPA – to guide reporting in the drafting of IDP documents and to monitor (and adjust, where applicable) annual municipal delivery performance against set developmental goals in the relevant KPAs.

currently seen as the “new frontier” for economic development in the municipal area (NKLM Draft 2011/12 IDP). The IDP makes no mention of renewable energy projects or policy pertaining thereto.

3.4. Alignment of Project Blue Solar Energy Facility with the Policies and Planning

From the above review of legislation and policies it can be said that the proposed Project Blue Solar Energy Facility is in line with both the local and the provincial policies. The proposed projects will contribute towards the promotion of SMMEs in order to strengthen the Local Economic Sector and bring job opportunities to the locals which are some of the top priority in these policies.

3.5. Regulatory Hierarchy for Energy Generation Projects

The South African energy industry is evolving rapidly, with regular changes to legislation and industry role-players. 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. As solar energy development is a multi-sectorial issue (encompassing economic, spatial, biophysical, and cultural dimensions) various statutory bodies are likely to be involved in the approval process for solar energy facility project and the related statutory environmental assessment process.

3.5.1. Regulatory Hierarchy

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 solar 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.
- » *National Department of Agriculture, Forestry, and Fisheries (DAFF)*: This Department is responsible for activities pertaining to subdivision and rezoning

of agricultural land. The forestry section is responsible for the protection of tree species under the National Forests Act (Act No 84 of 1998).

- » *South African National Roads Agency (SANRAL)*: This Agency is responsible for the regulation and maintenance of all national routes.
- » *National Department of Water Affairs*: This Department is responsible for water resource protection, water use licensing and permits. This area of the Northern Cape is not generally authorised, so applications go through the National Department.

At the Provincial Level, the main regulatory agencies are:

- » *Provincial Government of the Northern Cape – Department of Environmental and Nature Conservation (NC DENC)*: This Department is the commenting authority for these projects.
- » *Department of Transport and Public Works*: This Department is responsible for roads and the granting of exemption permits for the conveyance of abnormal loads on public roads.
- » *Provincial Department of Water Affairs*: This Department is responsible for water resource protection, water use licensing and permits.
- » *Ngwao Boswa ya Kapa Bokone (Northern Cape Heritage Authority)*: This body is responsible for commenting on heritage related issues in the Northern Cape Province.
- » *Northern Cape Department of Agriculture, Land Reform and Rural Development*: This Department is responsible for all matters which affect agricultural land.
- » *Northern Cape Department of Mineral Resources (DMR)*: Approval from the may be required to use land surface contrary to the 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.

At the **Local Level**, the local and municipal authorities are the principal regulatory authorities responsible for planning, land use and the environment. In the Northern Cape, both the local and district municipalities play a role. The local municipality is the Nama Khoi Local Municipality which forms part of the Namakwa District Municipality. There are also numerous non-statutory bodies such as environmental non-governmental organisations (NGOs) and community based organisations (CBO) working groups that play a role in various aspects of planning and environmental monitoring that will have some influence on proposed solar energy development in the area.

An EIA Process is dictated by the EIA Regulations which involves the identification and assessment of direct, indirect, and cumulative environmental impacts associated with a proposed project. The EIA process, which comprises a **Scoping** and an **EIA Phase**, culminates in the submission of an EIA Report, including a draft Environmental Management Programme (EMPr), to the competent authority for decision-making.



Figure 4.1: EIA Process

4.1. Requirement for an Environmental Impact Assessment Process

The proposed solar energy facility is subject to the requirements of the EIA Regulations published in terms of Section 24(5) of the National Environmental Management Act (NEMA, Act No. 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 authority⁵ and the Northern Cape Department of Environmental and Nature Conservation (DENC) will act as a commenting authority for the application. An application for environmental authorisation has been accepted by

⁵ In terms of the Energy Response Plan, the DEA is the competent authority for all energy related applications.

DEA under application reference number **14/12/16/3/3/2/316** and listed activities are outline in Table 4.1.

Compliance with the requirements of the EIA Regulations ensures that decision-makers are provided with an 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 studies are required in accordance with the EIA Regulations to provide the competent authority with sufficient information in order to make an informed decision.

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 developer with the opportunity of being fore-warned of potential environmental issues. Subsequently it may assist with the resolution of issues reported on in the Scoping and EIA Phases as well as promoting dialogue with interested and affected parties (I&APs) and stakeholders. In terms of sections 24 and 24D of NEMA, as read with the EIA Regulations R543, an EIA is required to be undertaken for this proposed project as the proposed project includes the following "listed activities" applicable to the project, in terms of GN R544, R545 and R546 (GG No 33306 of 18 June 2010 as amended).

The EIA process was conducted in accordance with the requirements of the EIA Regulations published in terms of Section 24(5) of NEMA.

Table 4.1: EIA Listed Activities Applicable to the Project Blue Solar Energy Facility applied for to be authorised⁶

Relevant Notice	Activity No.	Description of Listed Activity	Relevant Component(s) of Facility	Applicability of proposed project to listed activity
GN544, 18 June 2010	10	The construction of facilities or infrastructure for the transmission and distribution of electricity- (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts	<i>The proposed solar energy facility will require the construction of power line to connect the facility into the national grid</i>	An on-site substation (150m x 150m) and overhead power line (up to 220kV) is to be constructed to facilitate the connection between the solar energy facility and the existing Eskom Gromis Substation
GN 544, 18 June 2010	11	The construction of: (x) buildings exceeding 50 square metres in size; or (xi) infrastructure or structures covering 50 square metres or more Where such construction occurs within a watercourse or within 32 metres of a watercourse, measures from the edge of a watercourse, excluding where such construction will occur behind the development setback line.	<i>There may be drainage lines on the development site affected by the proposed development.</i>	The proposed solar energy facility lies parallel to the Buffels River which lies approximately 3 km to the south, and drainage lines connecting to this river may be impacted upon during the development of the facility
GN544, 18 June 2010	13	The construction of facilities or infrastructure for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 but not	<i>The PV facility may require the storage of dangerous good.</i>	The listed activity was deemed not applicable as the storage and handling of dangerous goods will be less than 500 cubic metres.

⁶ An application for Project Blue Solar Energy Facility was amended to include and remove listed activities based on the findings of the scoping study which was conducted. Some listed activities were deemed unnecessary whereas some were crucial in the assessment of the proposed facility; Table 4.1 shows all the relevant applicable activities for Project Blue Solar Energy Facility.

Relevant Notice	Activity No.	Description of Listed Activity	Relevant Component(s) of Facility	Applicability of proposed project to listed activity
		exceeding 500 cubic metres.		
GN544, 18 June 2010	18	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 or more than 5 cubic metres from (i). a water course	<i>The proposed activity might require the infilling and deposition of materials within watercourses.</i>	The infilling or depositing of material for access roads will be obtained from a registered borrow pit. Infilling or depositing of these access roads may impact on watercourse outside development area.
GN545, 18 June 2010	1	The construction of facilities or infrastructure, for the generation of electricity where the output is 20 megawatts or more.	<i>The PV facility will have a generating capacity of up to 65MW.</i>	The proposed PV facilities will have an export capacity of 65 MW to be exported to the Eskom national grid.
GN545, 18 June 2010	15	Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more;	<i>The development footprint for the proposed facility will be in excess of 20ha</i>	The establishment of the proposed Project Blue Solar Energy Facility will transform the farm (exceeding 20ha) from agriculture to a PV facility.
GN546⁷, 18 June 2010	4	The construction of a road wider than 4 metres with a reserve less than 13.5 metres a) In Northern Cape ii. Outside Urban areas, in: (cc) sensitive areas as identified in an environmental management	<i>Access roads will be constructed (4-6m) within the site during the development of the proposed facility.</i>	Access roads will be constructed during the development of the proposed facilities on sensitive areas as identified by the Namakwa District Municipality EMF

⁷ The site is located within an area of low sensitivity as defined in the Namakwa District EMF. The activities in Listing Notice 3 are therefore not applicable.

Relevant Notice	Activity No.	Description of Listed Activity	Relevant Component(s) of Facility	Applicability of proposed project to listed activity
		framework as contemplated in chapter 5 of the Act and as adopted by the competent authority		
GN546, 18 June 2010	10	The construction of facilities or infrastructure for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres.	<i>The construction for the proposed facility will require the handling and storage of dangerous goods i.e. fuels for vehicles on site</i>	The development of the proposed facility will require the handling and storage of dangerous good such as fuels and hazardous waste of which the maximum capacity of 80 cubic metres will not be exceeded.
GN546, 18 June 2010	14	The clearance of an area of 5ha or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation (a) In the Northern Cape: i. All areas outside urban areas	<i>The solar energy facility will be located outside urban areas and will require the clearance of an area of 5hhha or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation cover.</i>	The establishment of the proposed Project Blue Solar Energy Facility projects and access roads will require the clearance of indigenous vegetation within the site over an area of 130ha in total.
GN546, 18 June 2010	13	The clearance of an area of 1 hectare or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation	<i>The solar energy facility will be located outside urban areas and will require the clearance of an area of 1 hectare or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation cover.</i>	The listed activity was deemed not applicable with the application of the above-mentioned activity.

4.2. Objectives of the EIA Process

The Scoping Phase was completed in May 2012 with the submission of a Final Scoping Report to the DEA, and the acceptance of scoping was received from DEA in June 2012. The scoping phase included desk-top studies and served to identify potential impacts associated with the proposed project and to define the extent of studies required within the EIA Phase. The Scoping Phase included input from the project proponent, specialists with experience in the study area and in EIAs for similar projects, as well as a public consultation process with key stakeholders that included both government authorities and interested and affected parties (I&APs).

The EIA Phase (i.e. the current phase) assesses identified environmental impacts (direct, indirect, and cumulative as well as positive and negative) associated with the different project development phases (i.e. design, construction, operation, and decommissioning) for the proposed project. The EIA Phase also recommends appropriate mitigation measures for potentially significant environmental impacts. The release of a draft EIA Report provides stakeholders with an opportunity to verify that issues they have raised through the EIA Process have been captured and adequately considered. This final EIA Report incorporates all issues and responses raised during the public review phase prior to submission to DEA.

4.3. Scoping Phase

The Scoping Report aimed at detailing the nature and extent of the proposed 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 consultation process with key stakeholders that included both relevant government authorities and I&APs. In accordance with the requirements of the EIA Regulations, feasible project-specific alternatives were investigated for consideration within the EIA process. However, no feasible and reasonable alternatives were identified for some aspects of the project. Details of alternatives considered and reasons for not considering other alternatives are detailed in Chapter 2.

The Scoping Phase also provided interested and affected parties (I&APs) with the opportunity to receive information regarding the proposed project, to participate in the process and to raise issues or concerns. To further facilitate this, the Draft Scoping Report was made available for public review. All comments, concerns, and suggestions received during the Scoping Phase and the review period were included within the Final Scoping Report, which was submitted to the National Department of Environmental Affairs (DEA) together with a Plan of Study for the

EIA Phase for acceptance. The Scoping Phase concluded in June 2012 with the acceptance of the Final Scoping Report. In terms of this acceptance, an EIA was required to be undertaken for the proposed project as per the accepted plan of study. In addition, comments from the relevant Organs of State are to be requested and those received are to be submitted with the Final Environmental Impact Report (EIR). The EIA Report is to contain a construction and operational phase Environmental Management Programme (EMPr).

4.4. Environmental Impact Assessment Phase

The EIA Phase aimed to achieve the following:

- » Provide an overall assessment of the social and biophysical environments affected by the proposed alternatives put forward as part of the project.
- » Assess potentially significant impacts (direct, indirect, and cumulative, where required) associated with the proposed facility.
- » Comparatively assess any identified and feasible alternatives put forward as part of the project.
- » Identify and recommend appropriate mitigation measures for potentially significant environmental impacts.
- » Undertake a fully inclusive public participation process to ensure that I&APs are afforded the opportunity to participate, and that their issues and concerns are recorded.

The EIA addresses potential environmental impacts and benefits associated with all phases of the project including design, construction, operation, and decommissioning, and aims to provide the environmental authorities with sufficient information to make an informed decision regarding the proposed project.

4.5. Overview of the EIA Phase

The EIA Phase has been undertaken in accordance with the EIA Regulations published in GN 33306 of 18 June 2010, in terms of NEMA. Key tasks undertaken within the EIA phase included:

- » Consultation with relevant decision-making and regulating authorities (at National, Provincial and Local levels).
- » Undertaking a public participation process throughout the EIA process in accordance with Regulation 54 of GN R543 of 2010 in order to identify any additional issues and concerns associated with the proposed project.

- » Preparation of a Comments and Response Report detailing key issues raised by I&APs as part of the EIA Process (in accordance with Regulation 57 of GN R543 of 2010).
- » Undertaking of independent specialist studies in accordance with Regulation 32 of GN R543 of 2010.
- » Preparation of an EIA Report in accordance with the requirements of the Regulation 31 of GN R543 of 2010.

These tasks are discussed in detail below.

4.5.1. Authority Consultation

The National DEA is the competent authority for this application. A record of all authority consultation undertaken prior to the commencement of the EIA Phase is included within the Scoping Report and this EIA report. Consultation with the regulating authorities (i.e. DEA and NC DENC) has continued throughout the EIA process. On-going consultation included the following:

- » Ad hoc discussions with DEA in order to clarify the findings of the Scoping Report and the issues identified for consideration in the EIA Phase.
- » Provision of an opportunity for DEA and NC DENC representatives to visit and inspect the proposed site, and the study area.

The following will also be undertaken as part of this EIA process:

- » Submission of a final EIA Report following the 30-day public review period.
- » Consultation with Organs of State that may have jurisdiction over the project, including:
 - * Provincial and local government departments (including South African Heritage Resources Agency, Department of Water Affairs, South African National Roads Agency Limited, Department of Agriculture, etc.).
 - * Government Structures (including the Department of Public Works, Roads and Transport, etc.)

A record of all authority consultation undertaken prior to the commencement of the EIA Phase is included within the Scoping Report. A record of the consultation in the EIA process is included within **Appendix B**.

4.5.2. Public Involvement and Consultation

The aim of the public participation process was primarily to ensure that:

- » Information containing all relevant facts in respect of the proposed project was made available to potential stakeholders and I&APs.

- » Participation by potential I&APs was facilitated in such a manner that all potential stakeholders and I&APs were provided with a reasonable opportunity to comment on the proposed project.
- » Comment received from stakeholders and I&APs was recorded and incorporated into the EIA process.

Below is a summary of the key public participation activities conducted thus far.

» **Identification of I&APs and establishment of a database**

Identification of I&APs was undertaken by **Sustainable Futures** (specialist public participation consultants) through existing contacts and databases, recording responses to site notices and the newspaper advertisement, as well as through the process of networking. The key stakeholder groups identified include authorities, local and district municipalities, public stakeholders, Parastatals and Non-Governmental Organisations (refer to Table 4.1 below).

Table 4.1: Key stakeholder groups identified during the EIA Process

Stakeholder Group	Department
National and Provincial Authorities	<ul style="list-style-type: none"> » Provincial and local government departments (including DEA, DENC, SAHRA, DWA, DAFF, SANRAL, etc.) » Government structures (including the provincial roads authority, etc.) » Namaqua National Park
Municipalities	<ul style="list-style-type: none"> » Nama Khoi Local Municipality » Namakwa District Municipality » Ward councillors
Public stakeholders	<ul style="list-style-type: none"> » Adjacent and surrounding landowners (refer to Appendix E) » Farmers Unions » Nearby residents » De Beers Mine in Kleinsee
Parastatals & service providers	<ul style="list-style-type: none"> » Eskom

Through on-going consultation with key stakeholders and I&APs, issues raised through the Scoping Phase for inclusion within the EIA Phase were confirmed. All relevant stakeholder and I&AP information has been recorded within a database of affected parties (refer to **Appendix C**). While I&APs were encouraged to register their interest in the project from the onset of the process, the identification and registration of I&APs has been on-going for the duration of the EIA Process and the project database has been updated on an on-going basis.

» Newspaper Advertisements

During the scoping phase, in order to notify and inform the public of the proposed project notices were placed in the local media (Die Burger, Die Namakwalander and Die Namakwa Kletz), on site and in public places. In addition, adverts were placed in the local media in order to notify the public on the availability of the Draft Scoping report for public review and public meeting.

During the EIA phase, a first round of newspaper adverts was placed to inform the public about the availability of the Draft EIA report in the following newspapers:

- * Die Burger
- * Die Namakwalander

» Consultation

In order to accommodate the varying needs of stakeholders and I&APs, the following opportunities have been provided for I&AP issues to be recorded and verified through the EIA phase, including:

- * Focus group meetings (stakeholders invited to attend)
- * Public meeting (advertised in the local press)
- * Written, faxed or e-mail correspondence

A public meeting was held in the EIA Phase of the process. All interested and affected parties were invited to attend a public meeting to be on:

- * **Date:** 4 July 2012
- * **Time:** 17:00 – 18:30
- * **Venue:** Kleinsee Recreational Club

Records of all consultation undertaken are included within **Appendix D and Appendix E**.

4.5.3. Identification and Recording of Issues and Concerns

Issues and comments raised by I&APs over the duration of the EIA process will be synthesised into a Comments and Response Report (refer to **Appendix E** for the Comments and Response Reports compiled from the EIA Process to date).

The Comments and Response Report will include responses from members of the EIA project team and/or the project proponent. Where issues are raised that the EIA team considers beyond the scope and purpose of this EIA process, clear reasoning for this view is provided.

4.5.4. Assessment of Issues Identified through the Scoping Process

Through the Scoping Study, a number of issues requiring further study during the EIA Phase were highlighted. Issues which require further investigation within the EIA Phase, as well as the specialists involved in the assessment of these impacts are indicated below.

Table 4.2: Specialist studies undertaken within the EIA Phase

Specialist	Area of Expertise	Refer Appendix
Dave McDonald of BergWind Botanical Surveys	Vegetation	Appendix E
Simon Todd of Simon Todd Consulting cc	Terrestrial Fauna	Appendix F
Johan van der Waals of Terrasoil Science	Geology, soils and agricultural potential study)	Appendix G
Jayson Orton of ACO	Heritage / Archaeology	Appendix H
Lourens du Plessis of MetroGIS	Visual Impacts	Appendix I
Tony Barbour of Tony Barbour Consulting and Research	Social Impacts	Appendix J

The proposed solar facility was originally proposed as a fourth phase of a renewable energy facility which also includes wind technology. These projects have subsequently been separated, with the wind energy facility having received authorisation in August 2014. The specialist studies contained within Appendix E-J consider all phases of the larger renewable energy project.

Specialist studies considered direct, indirect, cumulative, and residual environmental impacts associated with the development of the proposed Project Blue Solar Energy Facility. Issues were assessed in terms of the following criteria:

- » The **nature**, 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, national or international. A score of between 1 and 5 is assigned as appropriate (with a score of 1 being low and a score of 5 being high)
- » The **duration**, wherein it is 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

- * 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)
 - * 10 is very high and results in complete destruction of patterns and permanent cessation of processes
- » The **probability of occurrence**, which describes the likelihood of the impact actually occurring. Probability is 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)
 - * Assigned a score of 5 is definite (impact will occur regardless of any prevention measures)
- » The **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high
- » The **status**, which is 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 the developer has the responsibility to avoid or minimise impacts and plan for their management (in terms of the EIA Regulations), the mitigation of significant impacts is discussed. Assessment of impacts with mitigation is made in order to demonstrate the effectiveness of the proposed mitigation measures. A separate draft EMP is included as **Appendix K**.

4.5.5. Assumptions and Limitations

The following assumptions and limitations are applicable to the studies undertaken within this EIA Phase:

- » All information provided by the developer and I&APs to the environmental team was correct and valid at the time it was provided.
- » It is assumed that the development site identified by the developer represents a technically suitable site for the establishment of the proposed solar facility.
- » It is assumed correct 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 E – J** for specialist study specific limitations.

4.5.6. Legislation and Guidelines that have informed the preparation of this EIA Report

The following legislation and guidelines have informed the scope and content of this EIA Report:

- » National Environmental Management Act (Act No. 107 of 1998)
- » EIA Regulations, published under Chapter 5 of the NEMA (GNR R543 in Government Gazette 33306 of 18 June 2010)
- » Guidelines published in terms of the NEMA EIA Regulations, in particular:
 - * Companion to the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations of 2010 (Draft Guideline; DEA, 2010)
 - * Public Participation in the EIA Process (DEA, 2010)

- * Integrated Environmental Management Information Series (published by DEA)
- » Nama Khoi Municipality Integrated Development Plan
- » Namakwa District Municipality Integrated Development Plan (2012-2016)
- » International guidelines – the Equator Principles and the International Finance Corporation and World Bank Guidelines.

Several other Acts, standards or guidelines have also informed the project process and the scope of issues assessed in this report. A listing of relevant legislation is provided in **Table 4.2** and **Table 4.3**.

Table 4.2: Relevant legislative permitting requirements applicable to the proposed solar energy facility

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Legislation			
National Environmental Management Act (Act No 107 of 1998)	<p>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.</p> <p>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.</p> <p>In terms of GN R543, R544, R545 and R546 of 18 June 2010, a Scoping and EIA Process is required to be undertaken for the proposed project.</p>	<p>Department of Environmental Affairs – competent authority</p> <p>Department of Environmental and Nature Conservation (DENC)- commenting authority</p>	<p>The listed activities triggered by the proposed solar energy facility have been identified and assessed in the EIA process being undertaken (i.e. Scoping and EIA).</p> <p>This EIA Report will be submitted to the competent and commenting authority in support of the application for authorisation.</p>
National Environmental Management Act (Act No 107 of 1998)	<p>In terms of the Duty of Care Provision in S28(1) the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with this project is avoided, stopped or minimised.</p> <p>In terms of NEMA, it has become the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.</p>	Department of Environmental Affairs	While no permitting or licensing requirements arise directly by virtue of the proposed project, this section has found application during the EIA Phase through the consideration of potential impacts (cumulative, direct, and indirect). It will continue to apply throughout the life cycle of the project.
Environment Conservation Act (Act No 73 of 1989)	National Noise Control Regulations (GN R154 dated 10 January 1992)	Department of Environmental Affairs	Noise impacts are expected to be associated with the construction phase of the project and are not

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
		Department of Environmental and Nature Conservation (DENC)- Local Authorities	likely to present a significant intrusion to the local community. Therefore is no requirement for a noise permit in terms of the legislation. On-site activities should be limited to 6:00am - 6:00pm, Monday – Saturday (excluding public holidays). Should activities need to be undertaken outside of these times, the surrounding communities will need to be notified and appropriate approval will be obtained from DEA and the Local Municipality.
National Water Act (Act No 36 of 1998)	<p>Water uses under S21 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).</p> <p>Consumptive water uses may include the taking of water from a water resource and storage - Sections 21a and b.</p> <p>Non-consumptive water uses may include impeding or diverting of flow in a water course - Section 21c;</p>	Department of Water Affairs Provincial Department of Water Affairs	<p>A water use license (WUL) is required to be obtained if wetlands or drainage lines are impacted on, or if infrastructure lies within 500m of such features.</p> <p>Should water be extracted from a borehole on site for use within the facility, a water use license will be required in terms of Section 21(a) and 21 (b) of the National Water Act.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	and altering of bed, banks or characteristics of a watercourse - Section 21i.		
Minerals and Petroleum Resources Development Act (Act No 28 of 2002)	<p>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.</p> <p>Requirements for Environmental Management Programmes and Environmental Management Plans are set out in S39 of the Act.</p> <p>S53 Department of Mineral Resources: Approval from the Department of Mineral Resources (DMR) may be required to use land surface contrary to the 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.</p>	Department of Mineral Resources	<p>The infilling or depositing of material for access roads will be obtained from a registered borrow pit no mining permit or right is required to be obtained.</p> <p>A Section 53 application will be submitted the Northern Cape DMR office.</p>
National Environmental Management: Air Quality Act (Act No 39 of 2004)	Measures in respect of dust control (S32) and National Dust Control Regulations of February 2014. Measures to control noise (S34) - no regulations promulgated yet.	Department of Environmental Affairs	<p>No permitting or licensing requirements arise from this legislation. However, National, provincial and local ambient air quality standards (S9 - 10 & S11) to be considered.</p> <p>Measures in respect of dust control (S32) and the National Dust Control Regulations of February</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			2014. The Act provides that an air quality officer may require any person to submit an atmospheric impact report if there is reasonable suspicion that the person has failed to comply with the Act.
National Heritage Resources Act (Act No 25 of 1999)	<ul style="list-style-type: none"> » Stipulates assessment criteria and categories of heritage resources according to their significance (S7). » Provides for the protection of all archaeological and palaeontological sites, and meteorites (S35). » Provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority (S36). » 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). » Requires the compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites as part of tourism attraction (S44). 	South African Heritage Resources Agency	An HIA has been undertaken as part of the EIA Process to identify heritage sites, there are not sensitive heritage object found on site, should a heritage resource be impacted upon, a permit may be required from SAHRA.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
<p>National Environmental Management: Biodiversity Act (Act No 10 of 2004)</p>	<ul style="list-style-type: none"> » 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 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. 	<p>Department of Environmental Affairs</p>	<p>Under this Act, a permit would be required for any activity which is of a nature that may negatively impact on the survival of a listed protected species.</p> <p>An ecological study has been undertaken as part of the EIA Phase. As such the potentially occurrence protected species and the potential for them to be affected has been considered. This report is contained in Appendix E</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
Conservation of Agricultural Resources Act (Act No 43 of 1983)	<ul style="list-style-type: none"> » Prohibition of the spreading of weeds (S5) » Classification of categories of weeds & invader plants (Regulation 15 of GN R1048) & restrictions in terms of where these species may occur. » Requirement & methods to implement control measures for alien and invasive plant species (Regulation 15E of GN R1048). 	Department of Agriculture	<p>This Act will find application throughout the life cycle of the project. In this regard, soil erosion prevention and soil conservation strategies must be developed and implemented. In addition, a weed control and management plan must be implemented.</p> <p>The permission of agricultural authorities will be required if the Project requires the draining of vleis, marshes or water sponges on land outside urban areas. There are none for the projects.</p>
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'.	National Department of Forestry	A licence is required for the removal of protected trees.
National Veld and Forest Fire Act (Act 101 of 1998)	In terms of S12 the applicant must ensure that the firebreak is wide and long enough to have a reasonable chance of preventing the fire from spreading, not causing erosion, and is reasonably free of inflammable material.	Department of Agriculture, Forestry and Fisheries (DAFF)	While no permitting or licensing requirements arise from this legislation, this Act will find application during the construction and operational phase of the

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>In terms of S17, the applicant must have such equipment, protective clothing, and trained personnel for extinguishing fires.</p>		<p>project.</p>
<p>Hazardous Substances Act (Act No 15 of 1973)</p>	<p>This Act regulates the control of substances that may cause injury, or ill health, or 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.</p> <p>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</p> <ul style="list-style-type: none"> • Group IV: any electronic product; and • Group V: any radioactive material. <p>The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.</p>	<p>Department of Health</p>	<p>It is necessary to identify and list all the Group I, II, III, and IV hazardous substances that may be on the site and in what operational context they are used, stored or handled. If applicable, a license is required to be obtained from the Department of Health.</p>
<p>Development Facilitation Act (Act No 67 of 1995)</p>	<p>Provides for the overall framework and administrative structures for planning throughout</p>	<p>Nama Khoi Local Municipality</p>	<p>The applicant must submit a land development application in the</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>the Republic.</p> <p>S (2-4) provide general principles for land development and conflict resolution.</p>		<p>prescribed manner and form as provided for in the Act. A land development applicant who wishes to establish a land development area must comply with procedures set out in the Act.</p>
<p>National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)</p>	<p>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.</p> <p>The Minister may amend the list by –</p> <ul style="list-style-type: none"> » Adding other waste management activities to the list. » Removing waste management activities from the list. » Making other changes to the particulars on the list. <p>In terms of the Regulations published in terms of this Act (GN 921), A Basic Assessment or Environmental Impact Assessment is required to be undertaken for identified listed activities.</p> <p>Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that:</p> <ul style="list-style-type: none"> » The containers in which any waste is stored, are 	<p>National Department of Water and Environmental Affairs (hazardous waste)</p> <p>Provincial Department of Environmental Affairs (general waste)</p>	<p>As no waste disposal site is to be associated with the proposed project, no permit is required in this regard.</p> <p>General waste handling, storage and disposal during construction and operation is required to be undertaken in accordance with the requirements of the Act, as detailed in the EMPr. The DWAF (1998) Waste Management Series. Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste will also need to be considered.</p> <p>The volumes of solid waste to be generated and stored on the site during construction and operation of the facility will not require a waste license (provided these remain below the prescribed thresholds).</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	intact and not corroded or in » any other way rendered unfit 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.		The contractor's camp will result in sewage and grey water handling. Sewage is regarded as hazardous waste in terms of this Act. However the volume of hazardous waste generated from the construction and operation of the facility will not exceed the specified threshold volumes within the Waste Act (i.e. an annual throughput capacity of 2000m ³) and therefore a waste license from National DEA will not be required.
Subdivision of Agricultural Land Act (Act No 70 of 1970)	Details land subdivision requirements and procedures. Applies for subdivision of all agricultural land in the Province	Department of Agriculture	Subdivision will have to be in place prior to any subdivision approval in terms of S24 and S17 of the Act.
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	» South African National Roads Agency Limited (national roads) » Provincial Department of Transport	An abnormal load/vehicle permit may be required to transport the various components to site for construction. These include route clearances and permits will be required for vehicles carrying abnormally heavy or abnormally dimensioned loads. Transport vehicles exceeding the dimensional limitations (length) of 22m. Depending on the trailer configuration and height when

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>road pavements, bridges, and culverts.</p> <ul style="list-style-type: none"> » 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. 		<p>loaded, some of the power station components may not meet specified dimensional limitations (height and width).</p>
<p>Astronomy Geographic Advantage Act (Act No. 21 of 2007)</p>	<ul style="list-style-type: none"> » 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 whilst Chapter 3 pertains to the management and control of astronomy advantage areas. Management and control of astronomy advantage areas include, amongst others, the following: <ul style="list-style-type: none"> » 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 	<p>South Africa Kilometre Array</p>	<p>On 19 February 2010, the Minister of Science and Technology (the Minister) declared the whole of the territory of the Northern Cape province, excluding Sol Plaatje Municipality, as an astronomy advantage area for radio astronomy purposes in terms of Section 5 of the Act and on 20 August 2010 declared the Karoo Core Astronomy Advantage Area for the purposes of radio astronomy.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	advantage area; and » Authorisation to undertake identified activities.		
Provincial Legislation			
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 species for the Province.	Northern Cape Department of Environment and Nature Conservation	A collection/destruction permit must be obtained from Northern Cape Nature Conservation for the removal of any protected plant species found on site. Additionally, a permit for the disturbance or destruction of indigenous species must be applied for.

Table 4.3: Standards applicable to Project Blue Solar Energy Facility

Issue	Standard	Summary
Air	South African National Standard (SANS) 69	Framework for setting and implementing national ambient air quality standards
	SANS 1929: Ambient Air Quality	Sets limits for common pollutants
Noise	SANS 10328:2003: Methods for Environmental Noise Impact Assessments	General procedure used to determine the noise impact
	SANS 10103:2008: The Measurement and Rating of Environmental Noise with Respect to Land Use, Health, Annoyance and Speech Communication	Provides noise impact criteria
	National Noise Control Regulations	Provides noise impact criteria
	SANS 10210: Calculating and Predicting Road Traffic Noise	Provides guidelines for traffic noise levels
Waste	DWAF (1998) Waste Management Series. Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste	DWAF Minimum Requirements
	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) – National norms and standard for the storage of waste.	<ul style="list-style-type: none"> » Provides uniform national approach relating the management of waste facilities » Ensure best practice in management of waste storage » Provides minimum standards for the design and operation of new and existing waste storage
Water	Best Practise Guideline (G1) Storm Water Management DWA 2006	Provides guidelines to the management of storm water
	South African Water Quality Guidelines	Provides water quality guidelines
Others	<ul style="list-style-type: none"> » Nama Khoi Local Municipality IDP » Namakwa District Municipality Integrated Development Plan (2012-2016) 	According to the Municipal Systems Act of 2000, all Municipalities have to undertake an Integrated Development Planning (IDP) process to produce Integrated Development Plans (IDPs). As the IDP is a legislative requirement it has a legal status and it supersedes all other plans that guide development at local government level.

This section of the Final EIA Report provides a description of the environment that may be affected by the proposed Project Blue Solar Energy Facility (the proposed solar energy facility which forms the basis of this report is referred to as phase 4; phases 1-3 are comprised of wind energy facilities) located north of Kleinsee in the Northern Cape Province. 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 biophysical, social and economic environment that could be directly or indirectly 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. A more detailed description of each aspect of the affected environment is included within the specialist reports contained within **Appendices E - J**⁸.

5.1. Regional Setting

The proposed Project Blue Solar Energy Facility site is located in the north-western portion of the Northern Cape Province of South Africa, in a region that is traditionally known as the Namaqualand. The site is located north of the small hamlet of Grootmis, approximately 3.5 km inland, just to the north of the course of the non-perennial Buffels River, and approximately 3 km north-east of the small De Beers Consolidated Mining (DBCM) settlement of Kleinsee. Kleinsee is located at the mouth of the Buffels River, approximately 80 km west of the town of Springbok and the N7 Cape Town–Namibia route. Large parts of the region are mine-owned, and as a result, significant mining activities are evident, especially within a 7 km band along the coast. The proposed site is not located within the restricted DBCM area, which is located along the coastal strip to the west of the site and includes the town of Kleinsee.

The nearest settlements to the proposed development site after Kleinsee are Kommagas (~36 km) and Buffelsrivier (~42 km), which are both located inland to the south-east of the site. Kleinsee is currently in the process of being proclaimed a town. However, a number of DBCM employee and other households (ca 180) continue to reside in the town.

⁸ It should be noted that the specialist reports include a description and assessment of both the wind and solar energy facility components. This report only considers the solar energy facility. The wind energy facility is the subject of a separate EIA application and report.

Administratively, the proposed site is located in the western part of Ward 8 of the Nama Khoi Local Municipality (NKLM), which in turn forms part of the Namakwa District Municipality (NDM) of the Northern Cape Province (refer to Figure 5.1). The NDM is South Africa's largest District Municipality and covers an area of ~126 000 km². The NDM is bounded to the west by the Atlantic Ocean, and to the north by the Gariiep River (Orange River) which forms the border with Namibia.

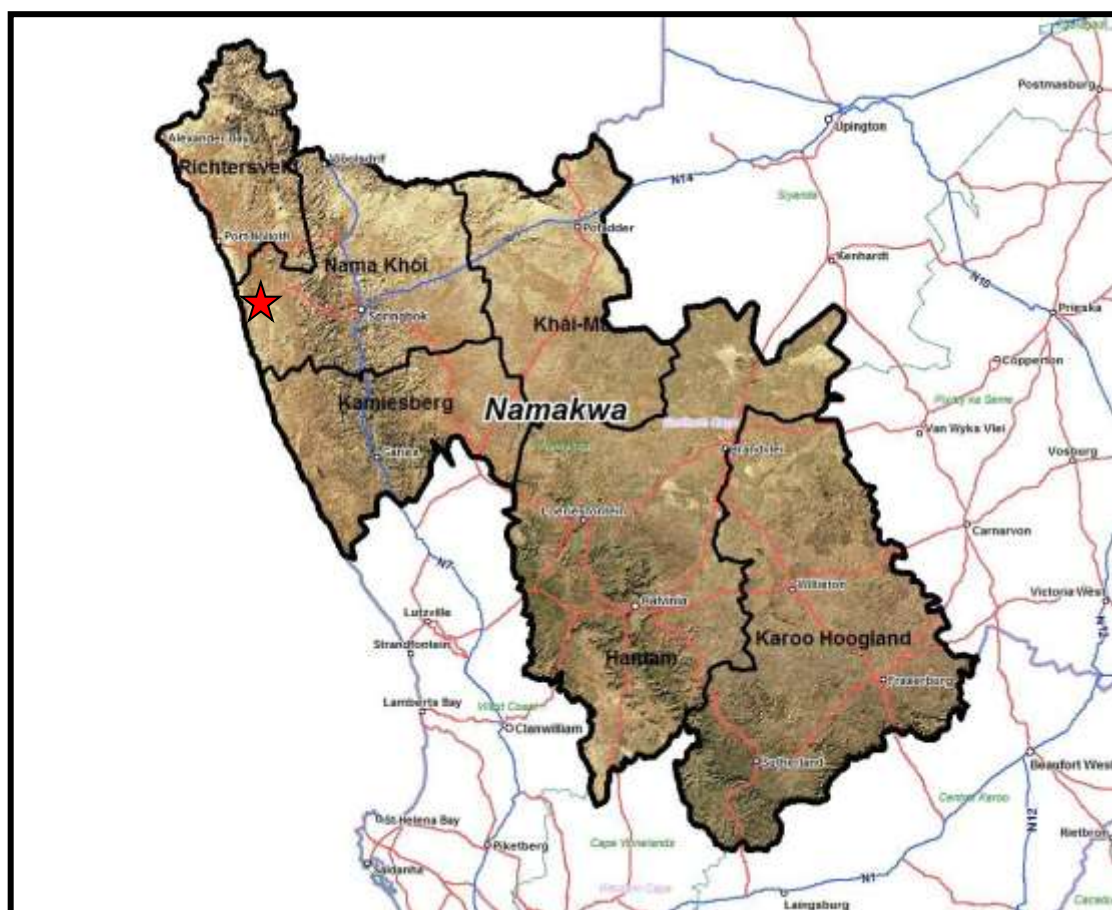


Figure 5.1: Location of the Nama Khoi Local Municipality within the NDM
(Source: NDM, 2012).

The area falls within the Succulent Karoo Biome on the 'Coastal Plain' which also is often called the Sandveld or Namaqualand Sandveld Bioregion. The study area ranges from flat, open shrubland to steeper rocky outcrops and is generally characterised by the rolling hills that are typical of Namaqualand. Several areas of distinctive relief are however present, namely the south-western part, just north of the Buffels River and hamlet of Grootmis, is characterised by a small plateau of silcrete that has been deeply incised and eroded to form a series of interlinking valleys. In the central western part a low hill called Arnot se Kop is present with the exposed gneiss at the edge of the palaeo-marine terrace dropping relatively steeply to its west, right at the edge of the proposed development area. A more prominent hill, known as Wolfberg, stands in the

north-western corner of the study area. The ground is generally covered by low vegetation but open, deflated areas with exposed hard sediments occur in places and a few informal roads cross the study area.

The terrain surrounding the proposed site is generally flat, sloping gently westwards towards the shore. The terrain type of the region is described as *slightly undulating plains*. Hilly terrain is evident in the north of the study area. These mountains mark the beginning of the escarpment which rises to the east (refer to Figure 5.2).

5.2. Location of the Study Area

The proposed study site falls within the Nama Khoi Local Municipality on Portion 03 of the Farm Predikant Vlei 190, Portion 03 of the Farm Roode Vlei 189 and Portion 04 of the Farm Dikgat 195. The proposed site is not currently used for any farming activities. No houses or structures are located on the properties. The general landscape context may be described as disturbed – both by widespread evidence of historic mining activities, as well as vertical elements such as an existing 220 kV line visible from the R355 and the Gromis Substation. There are no residential communities close to the proposed development. The study area has a rural character in terms of the background sound levels.

5.3. Site access

The study area is only accessible from the N7 (via Garies or Springbok). The N7 links Cape Town in the south to Noordoewer (Namibian border) in the north. North of Noordoewer, the N7 continues north to Windhoek as the B1. The road is of crucial importance to the economies of the West Coast and Namakwaland regions, as well as that of Namibia. At Springbok the N7 links up with the N15, which provides a link with Upington to the west (and ultimately the Gauteng Province). Springbok is located approximately 558 km north of Cape Town (N7), and ~450 km north of Saldanha (port) (refer to Figure 5.3).

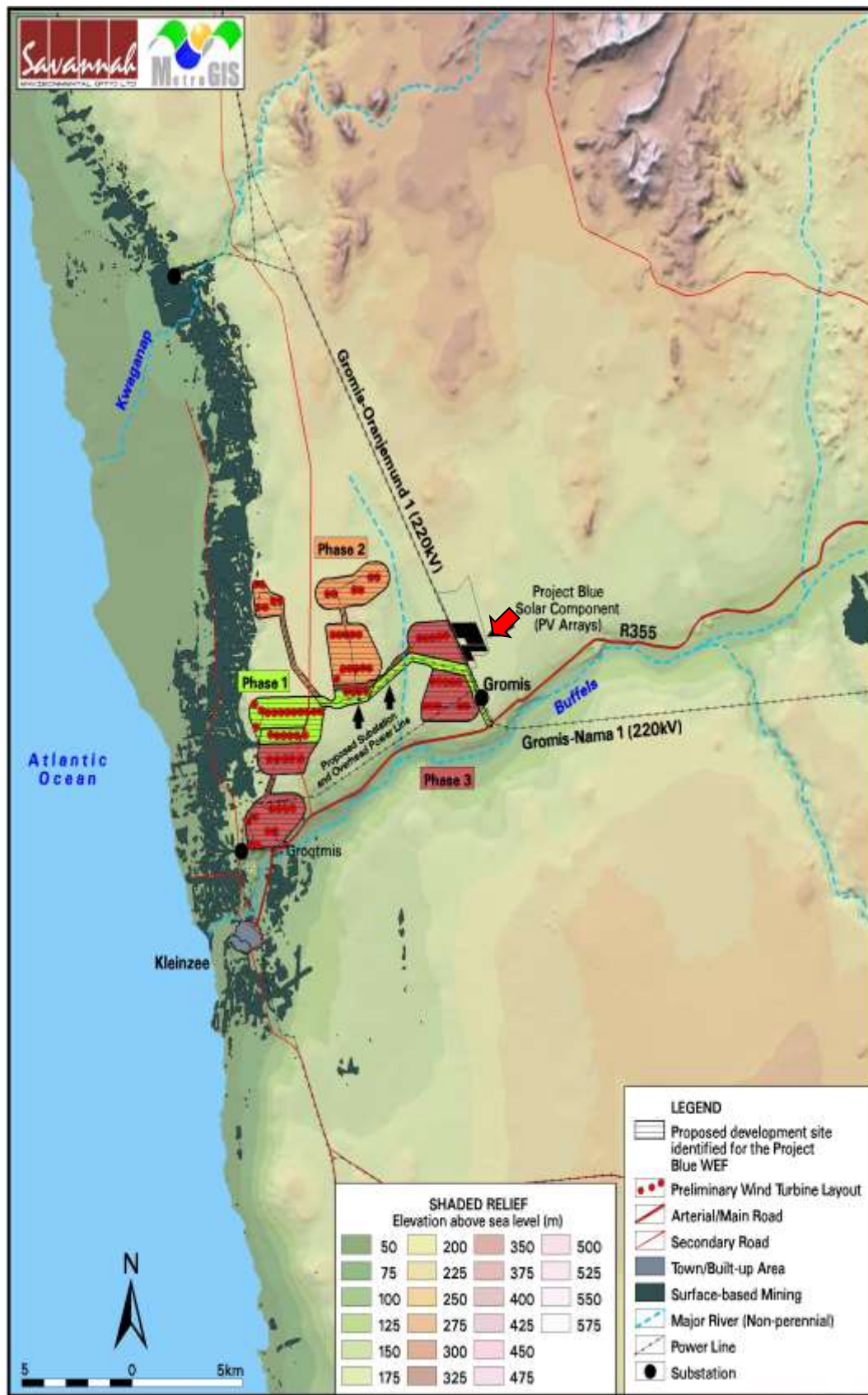


Figure 5.2: Shaded relief map (indicating the location of the proposed facility and the topography and elevation above sea level) of the study area (red arrow)



Figure 5.3: Road network for the proposed Project Blue Solar Energy(red star)

Kleinsee can be accessed from the N7 via one of three possible routes:

- » “Kleinsee pad”: R355, via Springbok (~97 km). This constitutes the most direct route to Kleinsee from the N7, and the only proclaimed public road to Kleinsee. The segment from Springbok to Buffelsrivier is tarred and provides sole access to the study area communities from Springbok. The segment from Buffelsrivier to Kleinsee is untarred and the road in a relatively bad state.
- » “Rooipad”: Buffelsrivier-Kommagas Road off the R355, linking up with the KDBC Koiingnaas-Kleinsee road south of Kleinsee. The segment from Buffelsrivier to Kommagas is tarred; the portion from Kommagas to the DBC Koiingnaas road is a DBC owned gravel road. This Kommagas Road (“rooipad” due to red soils) is preferred by Kleinsee residents and Kleinsee farmers for accessing Springbok.
- » “Hondeklipbaai pad”: Combination of (mainly gravel) roads from Garies (off the N7), via Hondelipbaai and Koiingnaas. This constitutes the most direct road link to the harbours of Cape Town and Saldanha via the N7. Garies is located approximately 176 km south-east of Kleinsee (by road). The DBC owned Kleinsee-Koiingnaas segment is the only tarred segment at present. The remainder of the road is essentially only safely negotiable by 4x4 or truck. Tarring of the Garies-Hondeklipbaai segment is envisaged by the Kamiesberg Local Municipality Spatial Development Framework in the medium to long term, but no funds appear to have been allocated.

Two additional secondary roads provide access to the study area, namely:

- » Port Nolloth gravel road, from R355 outside Kleinsee to R382 south of Port Nolloth.
- » Gravel road from Koiingnaas to Springbok via the Namaqua National Park.

5.4. Geology and Topography

The study area occurs on land that ranges in elevation from 0m a.s.l. (along the coast) to about 575m a.s.l. (at the top of hills in the north). The area lies on undulating and hilly terrain with a distinct "ridge" that forms the western boundary of the site. This is not the highest part of the site and the altitude varies between 80 and 220 m above mean sea level. The geology is aeolian material overlying Tertiary and Quaternary marine sediments.

The northern Namaqualand Region is underlain by rock of the Namaqua-Natal Metamorphic Belt. The surface geology on the coast consists of deep stabilized aeolian sands (Quaternary) that are white to grey and calcareous, overlying marine sediments that are composed of calcrete or dorbank hardpans. Immediately above the high-water mark the coastline has exposed granite of the Dikgat and Brazil Formations (Goraap Suite). Further inland the soils are derived from the underlying Proterozoic rocks with variable amounts of wind-blown sand inland towards the Escarpment. Yellow, high-base, moderately deep, uniform coarse-textured sandy soils underlain by a more clayey neocutanic horizon with high pH (6.5 – 9.5) occur near the coast. These soils change to yellow-red soils and then further inland to red, high base-status (Hutton form) soils, apedal, freely drained with medium to coarse texture, weakly structured and of variable thickness.

The undulating coastal plain is about 30 km wide and separates the coast from the inland Namaqualand Klipkoppe comprising Mokolian granites and gneisses that form domes and rock sheets which weather to form yellow-brown to brown loamy sand (Mucina et al., 2006).

At places in the study area such as near Grootmis, silcrete is exposed which gives rise to a particular and isolated habitat that supports a different plant community to the more general Namaqualand Strandveld.

5.5. Climatic Conditions

The cold Benguela Current that flows northwards along the coast of Namaqualand has a marked effect on the climate with regular fog occurring over the coastal zone, adding substantially to high soil moisture levels. Similar to the coast of

Namibia further north, but not as extreme, the Namaqualand coastal region is a hyper-arid area. It experiences winter rainfall ranging between 50 mm and 100 mm per annum (Le Roux, 2005). There is a rainfall gradient from the coast inland and according to a climate diagram for Namaqualand Strandveld (refer to Figure 5.4) (Mucina et al., 2006); mean annual precipitation (MAP) exceeds 100 mm for the areas where this vegetation type occurs. All areas with less than 400 mm rainfall are considered to be arid (Refer to Figure 5.5 for graph showing average rainfall for Kleinsee).

The mean maximum temperature does not vary much throughout the year whereas there is slightly greater amplitude in mean minimum temperature (refer to Figure 5.6). This is due to the proximity to the Atlantic Ocean and the effect of the Benguela Current. Temperatures can also be influenced by easterly berg wind conditions (off shore flow) in winter when the temperature may exceed 35 °C.

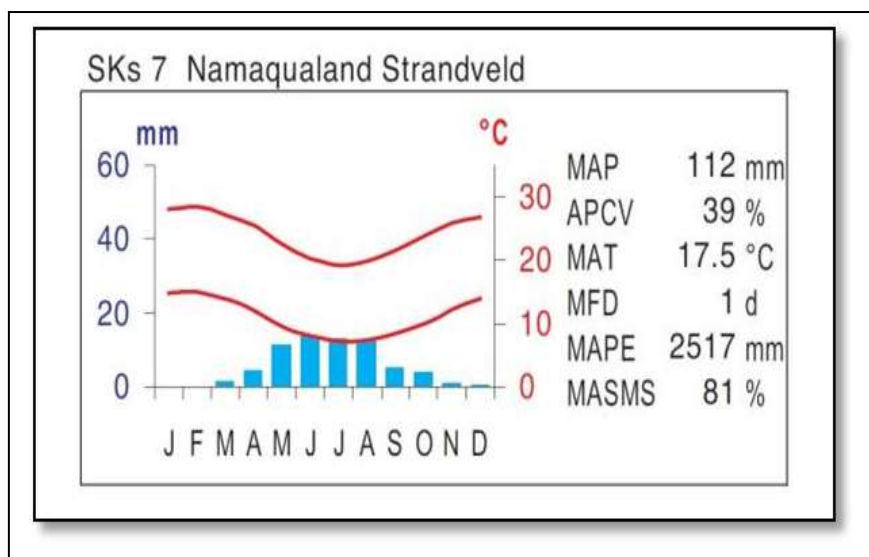


Figure 5.4: Climate diagram for Namaqualand Strandveld (from Mucina et al. 2006)

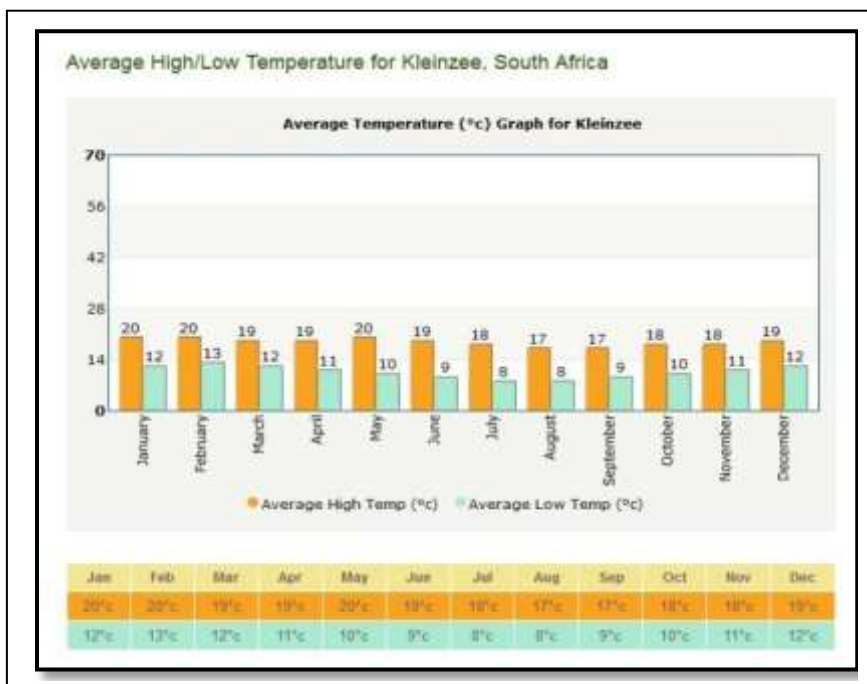


Figure 5.5: Average monthly temperatures for Kleinzee (source: <http://www.worldweatheronline.com/weather-averages/South-Africa/2610093/Kleinzee/2614644/info.aspx>)

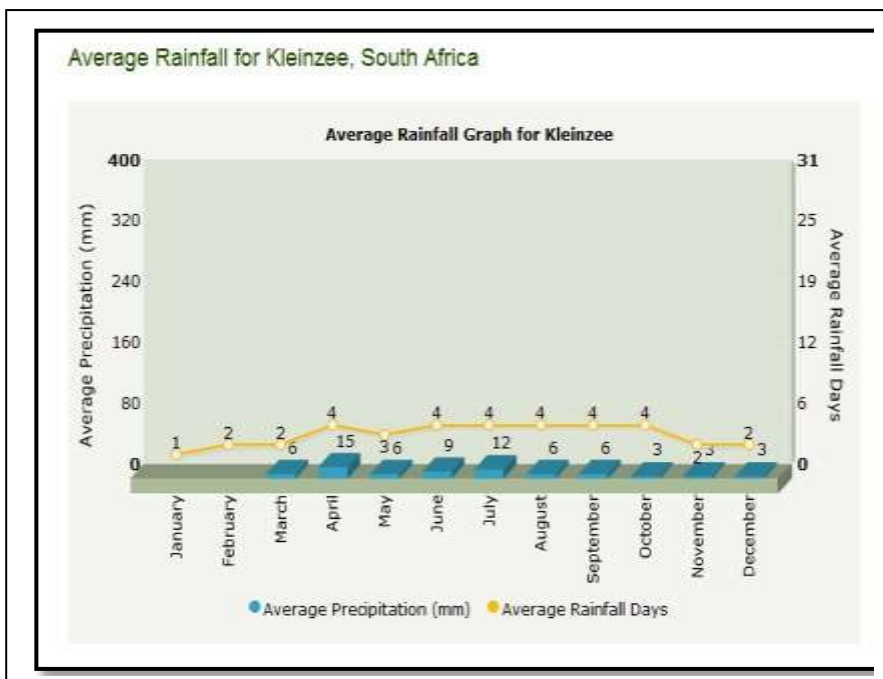


Figure 5.6: Average monthly rainfall for Kleinzee (source: <http://www.worldweatheronline.com/weather-averages/South-Africa/2610093/Kleinzee/2614644/info.aspx>)

The prevailing surface winds are mostly from the south and south-east in the summer when winds are strong and speeds can exceed 10 m/s. Strong winds can also occur from the west and north-west, mainly in winter.

5.6 Hydrology

The non-perennial, westward flowing Buffels and Kwaganap Rivers (and their tributaries) are the main hydrological features within the study area. The Buffels River bypasses the site to the south and the Kwaganap to the north.

5.7. Land Use and Settlement Patterns

Like most arid areas in South Africa, the vast majority of the region's population is concentrated in a handful of towns and settlements, with the remainder of the population sparsely distributed over a vast rural area. Commercial farming based on raising livestock on spatially extensive properties is by far the most dominant land use in the region (refer to Figure 5.7). Very limited labour and tenure opportunities are associated with commercial farming in the region. Dwellings are typically associated with main farms, and typically include a few labourer's cottages in the general vicinity of the farmstead. Due to the multi-farm farming practice, many farms are mainly used as stock posts and not inhabited at all, or only temporarily.

The evolved regional settlement is largely associated with the N7 (Springbok, Garies, Nababeep, Kharkams, Kamieskroon) and coastal mining activities (Alexanderbaai, Port Nolloth, and Kleinsee). The few remaining small settlements are located inland, to the west of the N7, and include Kommagas, Buffelsrivier, Soebatsfontein, Spoegrivier and Lepelsfontein. Springbok is the largest town (~10 300) in the NDM, and functions as the sub-regional center for administrative, commercial and higher order social facilities. Springbok was officially proclaimed in 1862 (as Springbokfontein), mainly in order to support recently established local copper mining operations in the area. The town is located at the intersection of the N7 and N14 national roads, and is a convenient stop-over for traffic along the Windhoek-Cape Town route. The rural settlements in the municipal area are largely mono-functional rural settlement areas with a poor economic base and depend primarily on the surrounding agricultural resource base to drive the limited economy (NKLM Draft 2011/12 IDP).

The key pillars of the regional economy are mining and extensive livestock farming. Commercial farming in the Kleinsee area is essentially located south of the Buffels River, away from the Project Blue site, and to the east and south of Kleinsee. The Project Blue site and all surrounding farms are currently majority owned by DBCM. Some of farms are currently leased out for grazing. On a

number of commercial farms like Manelsvlei and Steenvlei DBCM owns surface rights, with grazing rights and 1 ha of land belonging to other parties.

Due to the lack of water, farming in the study area is limited to stock farming, mainly small stock (sheep and goats), but also small herds of cattle. The carrying capacity of the Strandveld is very low – typically 10-15 hectares are required per sheep/ goat. Economically viable units are around 6000 ha, and most farmers rent land from De Beers or the state (e.g. Brazil south of Kleinsee). Very limited labour and tenure opportunities are associated with these extensive stock farming operations.

Some farmers share labourers, other get in labour as required. The settlement pattern is also very dispersed, with farmsteads located ~7-10 km apart. The nearest inhabited farmstead to the Project Blue site, Steenvlei/ Die Houthoop, is located ~13 km from the site. Die Houthoop on Steenvlei represents the only formal diversification into agro-tourism and tourist accommodation.

Large parts of the region remain pristine and undeveloped and consist of spectacular landscapes (e.g. the Richtersveld area north of the NKLM). The region therefore has significant and growing tourism sector. The NKLM IDP 2011/12 identifies tourism as the key emerging driver of economic growth in the municipality.

5.8 Soils

The site falls into the Af17 land type (Land Type Survey Staff, 1972 - 2006) (refer to Figure 5.8 for the land type map of the area). A brief description of the land type in terms of soils, land capability, land use and agricultural potential is as follows:

Land Types Af17

Soils: Mainly eutrophic and lime containing red deep sandy soils with limited occurrences of yellow brown and bleached soils. Rock outcrops occur occasionally, especially in valley bottom positions.

Land capability and land use: Exclusively extensive grazing and wilderness area due to severe climate constraints. Soil erosion is a risk due to low vegetation cover and the occasional heavy rainfall event.

Agricultural potential: Very low potential due to the low rainfall (less than 100 mm per year).



Figure 5.7: Land cover/land use map for the proposed Project Blue Solar Energy Facility (red arrow)

Most of the Project Blue study area has yellow to red sand-loam soil and a particular feature of the landscape is the presence of 'heuweltjies'. Heuweltjies are evenly spaced soil mounds that are understood to be primarily the result of termite activity with possible secondary activity of animals such as mole-rats contributing to their existence (Midgley & Musil 1990, Milton & Dean 1990; Milton & Dean 1996; Esler et al. 2006). The 'heuweltjies' or 'kraaltjies' are clearly visible in the veld as raised circular patches often with a distinct floral assemblage that differs from the surrounding vegetation (see Desmet et al. 2009 below). They are often overgrazed due to the concentration of more palatable plant species compared with 'off-heuweltjie' areas.

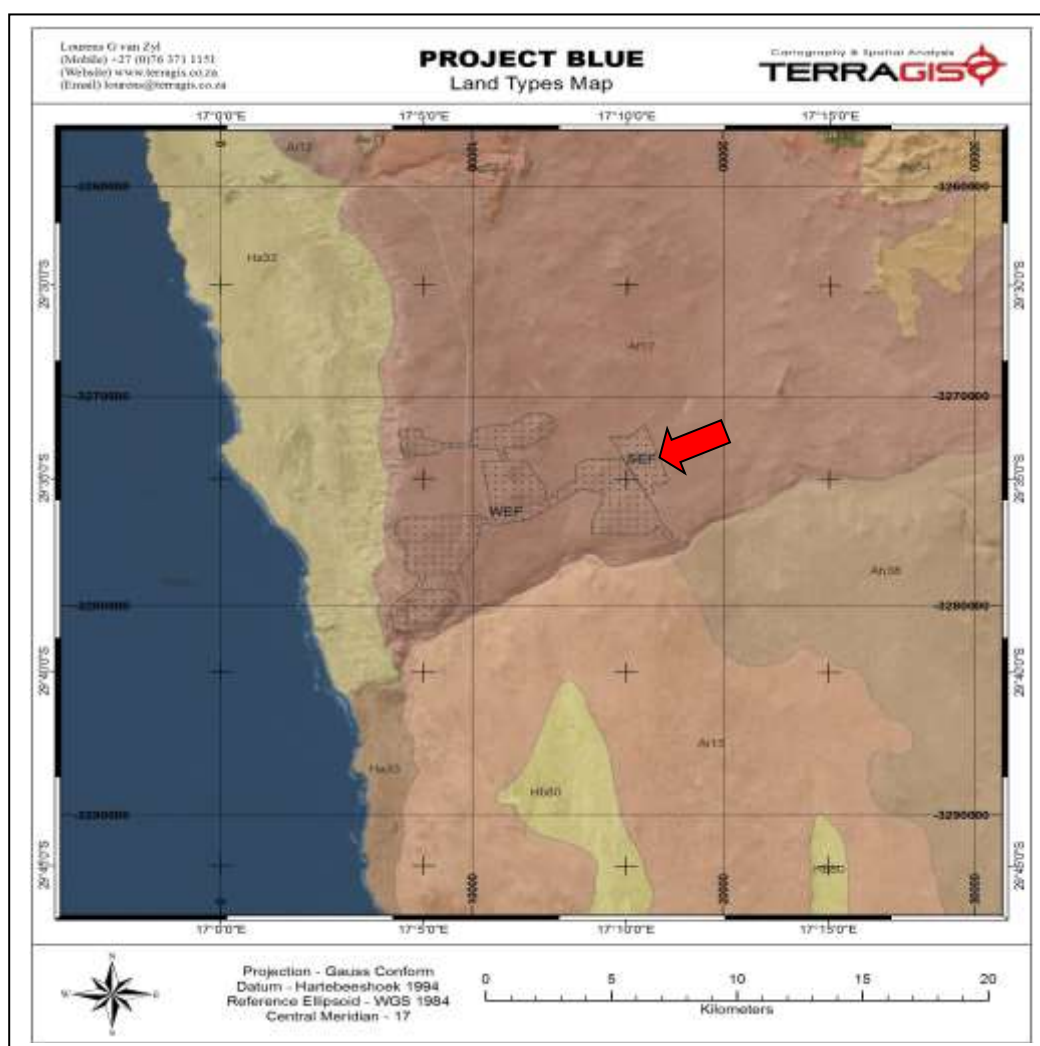


Figure 5.8: Land type map of the survey site for the proposed Project Blue Solar Energy Facility (red arrow)

5.9. Agricultural Potential

The agricultural potential of the site is low due to soil and climatic constraints. The presence of the lime and dorbank horizons require significant physical preparation before crop production can be considered. Consequently the site is suited to extensive but managed grazing even though the carrying capacity is low due to the very low rainfall of the area. The use of the site is limited to grazing by sheep and, with the rainfall of the area, it is considered to be unsuitable for cattle grazing.

5.10. Ecological Profile of the Study Area

5.10.1 Vegetation

Namaqualand falls within the Succulent Karoo Region. This biome has high levels of plant diversity and endemism and is one of the earth's 'hotspots' of plant diversity and the only entirely arid hotspot in the world. Regionally the Project Blue study area falls within the Namaqualand Sandveld Bioregion which lies parallel to the west coast in the western part of the Succulent Karoo Biome (refer to Figure 5.9).

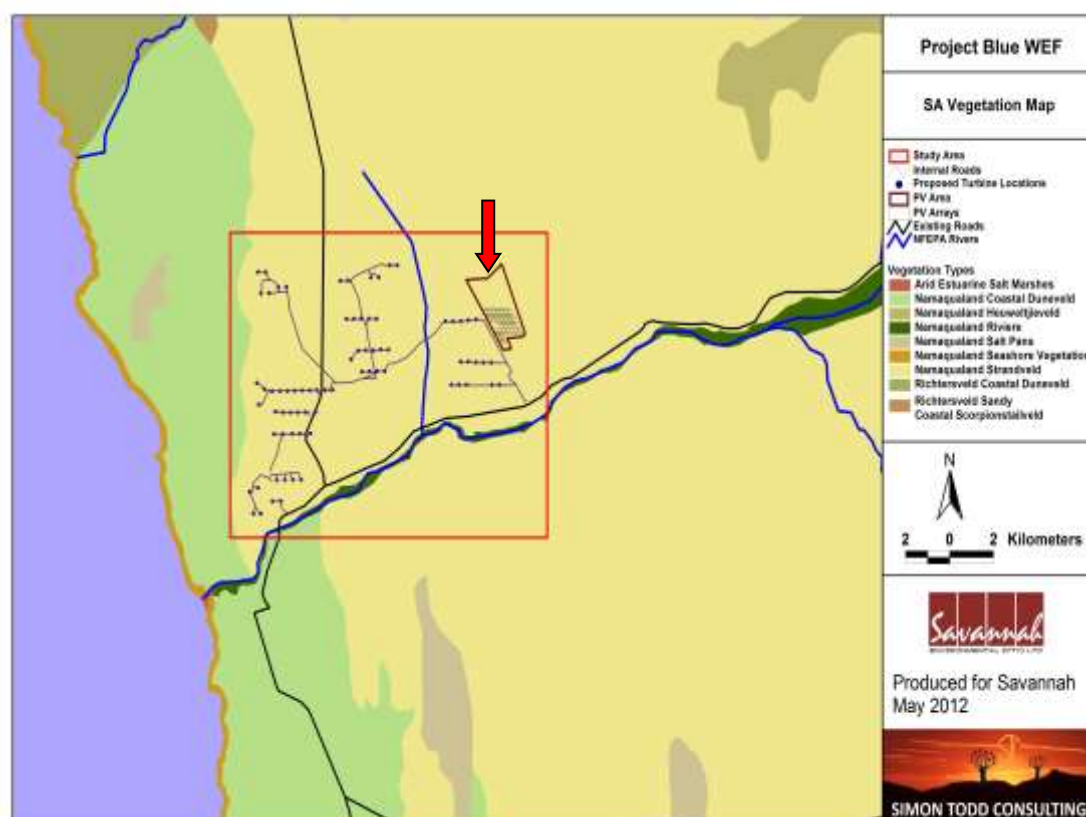


Figure 5.9: Broad-scale overview of the vegetation in and around the proposed Project Blue Solar Energy Facility (red arrow).

In the Kleinsee area of Northern Namaqualand the coastal vegetation communities consisting of Namaqualand Coastal Duneveld and to some extent Namaqualand Inland Duneveld have been heavily impacted by open-cast diamond mining. In contrast the inland areas where there has been no diamond mining has been farmed with small livestock and apart from the effects of grazing, the vegetation has remained largely undisturbed.

The Project Blue Solar Energy Facility occurs entirely within one vegetation type, i.e. Namaqualand Strandveld. This vegetation type has a wide distribution from the Richtersveld (Northern Cape) in the north to Donkins Bay (Western Cape) in the south.

Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) have been mapped for Namaqualand District Municipality. Portions of the proposed solar energy facility fall within these areas (refer to Figure 5.10).

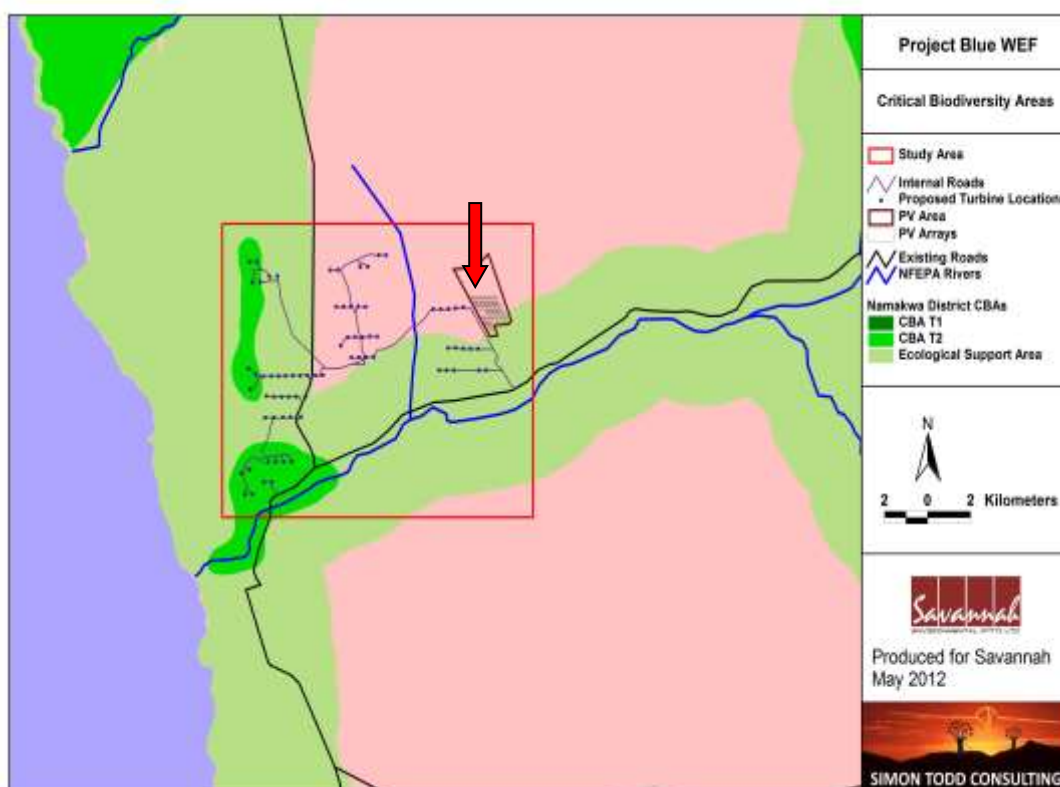


Figure 5.10: The map indicates that the development site falls partly within an Ecological Support Area, designed to function as a broad-scale ecological corridor.

Condition of the vegetation and conservation status

The vegetation of the Project Blue study area is impacted by grazing. No mining activities have taken place except on the extreme western boundary and these

have little bearing on the proposed project. The condition of the vegetation is medium to good and no rehabilitation of vegetation is currently required or taking place in the study area.

5.10.2 Terrestrial Fauna

Habitats

In terms of broad faunal habitats available at the site, the following were identified:

Riparian Areas & Drainage Lines



The most important drainage feature of the site is the Buffels River which forms the southern boundary of the site. Although the Buffels River itself is outside of the development footprint, the river provides habitat for certain species which are likely to forage within the affected area. Of

particular importance would be bats, which may find shelter in caves and crevices in some of the low cliffs along the river. The site also contains numerous small drainage lines with taller or dense vegetation which provides important habitat for fauna such as small antelope and hares. All drainage lines and riparian areas with the site are considered very high sensitivity environments and should be avoided by the development.

Red dunes



A large proportion of the eastern and southern parts of the site consist of red dunes. These areas are either relatively flat or may consist of low undulating or reasonably high dunes. The dunes are largely well vegetated and are not mobile. The reptile faunal communities

of this area are dominated by psammophilous (sand-loving) species such as sand lizards and horned adders. These areas are the habitat of Grant's Golden Mole *Eremitalpa granti* which is listed as Vulnerable. This area is however broadly homogenous and is considered to be of medium sensitivity. The whole of the PV Facility lies within this habitat unit.

Fauna observed or likely to occur in study area

Approximately 40 **mammal species** potentially occur at the site. Larger mammals observed or likely to occur at the site include Steenbok, Common Duiker, Jackal, Caracal, Porcupine and Aardvark.

The site contains a diverse **small mammal community** and a relatively large number of rodents, shrews, moles and mole rats occur in the area. Common species observed within the site include Brants's Whistling Rat, Namaqua Rock Mouse and the Bush Vlei Rat. Species associated with sandy habitats are likely to occur in the red dunes while those which require a firmer substrate are likely to occur in the granitic outcrops and Heuweltjie Veld. Several listed species potentially occur in the area, these include Grant's Golden Mole which is likely to occur in the dunes of the site and De Winton's Golden Mole which is a little known species recorded only from the Port Nolloth area, but could potentially occur at the site. Both of these species are listed as Vulnerable as a result of their scarcity and the impact coastal mining activities have had on their habitat.

The site lies within the known distribution range of seven **frog and toad species**. However as there is very little perennial water in the area, many of these are not likely to occur at the site or would be restricted to the vicinity of the Buffels River. Species such as the Common Platanna, Namaqua Stream Frog and to a lesser extent the Namaqua Caco are dependent to a greater or lesser degree on surface water for habitat or breeding purposes. The remaining species are either largely independent of water or well adapted to arid conditions. The Desert Rain Frog occurs in Strandveld vegetation up to 10 km from the coastline and is listed as Vulnerable.

5.10.3 Bats

The site is not likely to contain a very high diversity of bat species, largely on account of the aridity of the area. Fourteen species may occur in the area, of which 10 have a moderate to high possibility of occurring at the site. The species of conservation concern are the Cape horseshoe and Angolan wing-gland bat. The Cape horseshoe bat is endemic to the western parts of southern Africa and the likelihood that it occurs at the site would depend on the availability of suitable caves for roosting. The Angolan wing-gland bat, which is a little-known species recorded from a few widely scattered localities from western South Africa and

Namibia. It is usually associated with riverine vegetation along dry river beds. Based on this information, it could potentially occur along the Buffels River. The distribution of many bat species is controlled by the availability of suitable roosting sites. The majority of species which are likely to occur in the area, roost either in caves and mine audits or in rock crevices. The presence of such potential roosting sites is therefore an important predictor of potential bat abundance at the site. There are some low cliffs along the Buffels River in the vicinity of the site which may have suitable crevices. There are also some small caves in a tributary of the Buffels River near to Grootmis, which are potentially suitable for several species. As there are many old mining pits in the area, there may also be suitable roosting sites in these as well as in many of the old or disused buildings around Kleinsee, Grootmis and scattered about the site.

The north-western parts of the site are not likely to be highly significant from a bat perspective as this rather featureless area contains few potential bat roosts or foraging areas. The areas along the Buffels River and around Kleinsee/Grootmis are potentially important for bats as this area contains potentially suitable roosting sites as well as foraging areas along the drainage lines and low ridges of the area.

5.10.4 Avifauna

Bird habitats vary across the five proposed areas: habitats east of the Kleinsee mining fence comprise intact low succulent karoo bush used mainly by small endemic bird species. The ephemeral Buffels River runs through some of the area and supports low *Sarcocornia* vegetation. Farther upstream (c. 8 km from the west boundary of area 3) this is used by breeding pairs of the threatened Black Harrier. Other avian microhabitats are provided by some farm dams that are scattered across the landscape (attracting wetland species), and the power poles (providing Pied and Cape Crows and Greater Kestrels with nesting opportunities).

West of the de Beers Kleinsee mining fence the habitat is drastically altered, with little to no vegetation suitable for birds in the mining area. Where open-cast mining has created deep pits (> 20 m deep) wetland birds (e.g. Coots and Blacksmith Lapwings) occur where the pits are water-filled. Cliff-nesting habitat is also provided for species such as Rock Kestrels and Familiar Chats. A large storage tank on the hill within Area 1 has attracted nesting Jackal Buzzards and Rock Kestrels.

Species of Special Concern (SSC) recorded in the study area

A total of 168 bird species has been recorded around the study area. Among the species recorded are 15 threatened or red-listed in South Africa. Bird species

recorded within the study area include four species of raptor foraging and soaring through the five areas (refer to Figures 2-7 of the Avifauna Impact Assessment). These included a Secretarybird (Area 2), two kestrels (Rock and Greater in Areas 2 and 4), and the larger Jackal Buzzard (Area 1 and 5). Raptors such as this are likely to use the updrafts along the hilltops from the prevailing south-west wind to commute, or hover-hunt. Further (7.8 km) up the Buffels River is an expected breeding site of a Black Harrier.

5.11. Heritage Profile

A significant, but somewhat poor quality occurrence of stone artefacts was found at the proposed site. Despite the poor quality, the find is considered important since it is the only known occurrence of late Pleistocene (c. 18 000 – 10 000 years ago) LSA material in Namaqualand. This site lies at the south-western edge of the currently proposed Wind Energy Facility site. Unmarked burials are common in coastal Namaqualand but all thus far have been uncovered in the coastal mines. However, with its good sand cover, burials could be present almost anywhere on the Namaqualand coastal plain. Only one has ever been found in an archaeological excavation, just north of Kleinsee which lies at the immediate south-western edge of the currently proposed Wind Energy Facility.

The archaeology of the coastal strip is generally quite well understood as a result of the extensive survey and mitigation work carried out there. High quality data have been extracted from these sites but further inland very little work has been carried out. Historical material is sparsely scattered in the general vicinity of the proposed development. Occasional farm houses are present but none in the immediate vicinity of the study area. Contact period archaeology has been recorded at Hondeklipbaai where coastal shell middens contained historical material likely pertaining to indigenous people being used to load copper ore onto ships in the bay in the 19th century.

The survey of the proposed development site revealed a large number of archaeological sites including deflated Early Stone Age (ESA) and Middle Stone Age (MSA) artefact scatters (one with bone), Late Stone Age (LSA) shell scatters and in situ shell middens.

5.12 Social Characteristics of the Study Area and Surrounds⁹

5.12.1. Population

Despite having the largest surface area, the Northern Cape was home to only about 1 096 731 people (or 2.17% of the national population) in 2011. The population density was estimated at ~2.27 persons per km², while ~83% of the provincial population was estimated to live in urban areas, of which the most significant the major towns of Kimberley and Upington.

The Namakwa District Municipality was one of the less populous District Municipalities in the Northern Cape Province, and was home to an estimated 108 111 people in 2001. Census 2001 data indicates that the Coloured population group was by far the most dominant (~84%), followed by White (~12%) and Black African (~4%). Afrikaans was spoken by an overwhelming ~96% of the population as first language.

The Nama Khoi Local Municipality (NKLM) had a population of 44 611 (and 11 563 households) in 2001. This represented ~41% of the District Municipality's population – a fact at least part attributable to the presence of the town of Springbok (~11 000 in 2001) in the NKLM area. The most recent estimates for the NKLM indicate a population of ~54 644 (15 707 households) for 2007. No information in the population for Kleinsee could be obtained. However, it is estimated that the town has a population of 300-400. More accurate information will be obtained during the assessment phase of the EIA.

5.21.2. In-migration trends

Census 2001 data indicated net out-migration of the Northern Cape Province population, compared to 1996. Out-migration was significant in specifically the 20 – 24 cohort of the Northern Cape Province's population, probably driven by the search for better career and job opportunities, and tertiary education. Urbanisation of the rural Northern Cape Province population was observed as another significant trend (increasing from 75.2% in 1996 to 82.7% in 2001).

Information contained in the Draft 2011/2012 Nama Khoi Local Municipality IDP indicates that the Nama Khoi Local Municipality's municipal population has been growing dramatically from around 1995 onwards. In this regard, it is estimated that the population has increased by 22.5% over the 12-year period 1995-2007,

⁹ Information presented in this section is largely at Provincial and Municipal levels, and is largely based on data compiled from Census 2001, StatsSA's Community Survey (2007) and various Census 2001-based projections.

while the number of households had increased by 35.8%. It may be assumed that much of this growth was the result of migration into the Nama Khoi Local Municipality area, probably in large part from surrounding municipalities within the Namakwa District Municipality.

5.12.3. Education

An estimated 15.1% of the Northern Cape population had no education at all, while 71.3% had only a primary or secondary education (2001). The respective rates were 20% and 62.7% in 1996, thus indicating a significant improvement over the relevant five year period. It is assumed that these figures are broadly representative of the Nama Khoi Local Municipality and Kleinsee study areas as well.

5.12.4. Employment levels

Census 2001 data indicates that of the economically active population in the Northern Cape, 55.5% were employed while 26.1% were formally unemployed. Of significance, a third of the total population was younger than 15 years old, and approximately 45% of the potential labour force was younger than 30 years. At the same time, unemployment was the highest among the youth, with unemployment rates of 54% and 47% in the 15 - 19 and 20 - 24 year-old age groups. No statistics for the Nama Khoi Local Municipality or Kleinsee areas could be obtained.

5.12.5. Income and economic development

In terms of economic importance, the Northern Cape's share of the country's Gross Domestic Product (GDP) in 2002 was 2%, the lowest contribution of the nine provinces. However, although the Northern Cape Province has the smallest economy of the nine provinces, Gross Domestic Product of the Region (GDPR) per capita is higher than the national average. In terms of economic activities, the economy of Northern Cape is heavily dependent on the primary sectors of the economy, which in 2002 made up 31.0% of GDPR. The largest sector is mining which has declined in contribution to the GDPR from 25.8% in 1996 to 23.7% in 2002. Agriculture, on the other hand, increased in its contribution from 6.2% to 7.3%. Large scale irrigation agriculture operations are based along the Gariiep, Harts and Vaal rivers.

Very limited processing and beneficiation of mining and agricultural output currently takes place in the province. This is reflected in the fact that manufacturing contributed only 4.2% towards GDPR in 2002. All the industries in the secondary sector have decreased in their contribution to the GDPR, with

electricity and water sector showing the greatest decrease of 0.7% and the construction industry making the lowest contribution of 1.9% to the GDP of the Northern Cape. At the same time the contribution to regional GDP by industries in the tertiary sector increased, with the exception of the wholesale and retail industry, which decreased by 1.1%.

The main economic activities within the Northern Cape Province include:

- » Commercial agriculture, which is the dominant land-use activity in the Northern Cape. The sector contributed 5.8% to the Northern Cape GDP per region in 2007 (~R1.3 billion), and employed approximately 19.5% of the total formally employed individuals.
- » Mining. Namaqualand mining has been in decline since the 1980's, when the large copper mines in Nababeep and O'Kiep started closing down. Similarly, DBC has stopped all mining activities at Kleinsee. A subsidiary of Trans-Hex appears likely to take over a large number of DBC farms in the Kleinsee area, and Trans Hex is looking to continue mining in the area. Kleinsee Heavy Minerals is also currently proposing the mining of heavy mineral sands on a site between Kleinsee and Koiingnaas. However, the scale of the proposed mining activities is expected to be considerably smaller than the previous DBC operations.
- » Tourism. The Northern Cape Province captured a mere 0.7% of South Africa's total tourism revenue in 2008. In terms of total foreign visitors, 1.3% visited the Northern Cape in 2008. The Northern Cape tourism industry is however experiencing modest growth (2.9% in 2007). The Northern Cape Province tourism sector is estimated to contribute 6% to provincial GGP. The Northern Cape has an average annual growth of 17% in national visitors and 25% annual growth in international visitors.

Table 5.1: Summary of the Environmental and Social characteristics of Project Blue Solar Energy Facility

Environmental Characteristics	Project Blue Solar Energy Facility
Land Use	» Mining and Grazing land (stock farming)
Land Capability	» The agricultural potential of the site is low due to soil and climatic constraints. The presence of the lime and dorbank horizons require significant physical preparation before crop production can be considered.
Climate	» Arid
Topography	» The study area occurs on land that ranges in elevation from 0m a.s.l. (along the coast) to about 575m a.s.l. (at the top of hills in the north). » The area lies on undulating and hilly terrain with a distinct “ridge” that forms the western boundary of the site. » This is not the highest part of the site and the altitude varies between 80 and 220 m above mean sea level.
Hydrology, Riparian Zones and Watercourses	» Small ephemeral drainage lines that drain into the non-perennial Buffels River (approximately 3 km from the Buffels River)
Land Types	Land Types Af17 <u>Soils:</u> Mainly eutrophic and lime containing red deep sandy soils with limited occurrences of yellow brown and bleached soils. Rock outcrops occur occasionally, especially in valley bottom positions. <u>Land capability and land use:</u> Exclusively extensive grazing and wilderness area due to severe climate constraints. Soil erosion is a risk due to low vegetation cover and the occasional heavy rainfall event. <u>Agricultural potential:</u> Very low potential due to the low rainfall (less than 100 mm per year).
Agricultural Potential	Low
Vegetation types	» Namaqualand Strandveld
Heritage and Palaeontology	Early Stone Age (ESA) and Middle Stone Age (MSA) artefact scatters (one with bone), Late Stone Age (LSA) shell scatters and in situ shell middens
Social Characteristics	» Low levels of education and skills (more than 50% having only primary school or no education) » Low incomes with high dependency on social grants » High levels of unemployment (relative to national levels) » Out-migration of youth for employment elsewhere » Disparity between the rich and the poor » HIV/AIDS and alcohol abuse are key health concerns » Petty crime linked to alcohol and substance abuse is prevalent

Environmental Characteristics	Project Blue Solar Energy Facility
	<ul style="list-style-type: none">» Dominant extensive agricultural sector» Potential for growth in tourism, which is currently struggling» Good roads network with a lack of public transport in rural areas» Some communities struggle with access to basic services

ASSESSMENT OF IMPACTS

CHAPTER 6

This chapter serves to assess the significance of the positive and negative environmental impacts (direct, indirect, and cumulative) expected to be associated with the development of the proposed Project Blue Solar Energy Facility and associated infrastructure (refer to Figure 6.1). This assessment has considered the construction of a 65 MW facility and all related and ancillary infrastructure, including:

- » Arrays of photovoltaic (PV) panels.
- » Mounting structures for the solar panels to be rammed steel piles or piles with pre-manufactured concrete footings.
- » Cabling between the structures, to be laid underground where practical.
- » Central inverter/transformer stations to collect all energy generated from the PV panels. The inverter's role is to convert direct current (DC) electricity to alternating current (AC) electricity at grid frequency.
- » An on-site substation (150m x 150m) and power line (up to 220kV) to evacuate the power from the facility into the Eskom Gromis Substation grid
- » Internal access roads (4-6 m wide roads).
- » Associated buildings including a workshop area for maintenance, storage, and control facility with basic services such as water and electricity.

Project Blue Solar Energy Facility is proposed to comprise PV panels with a generating capacity of up to 65MW. The proposed development site is ~360 ha in extent and located on the following farm portions: Portion 03 of the Farm Predikant Vlei 190, Portion 03 of the Farm Roode Vlei 189 and Portion 04 of the Farm Dikgat 195. These farm portions are majority-owned by De Beers Consolidated Mines, and lie north of the mining town of Kleinsee.

Environmental impacts associated with the proposed project are expected to be associated with the construction, operation and decommissioning of the facility. The significance of impacts associated with a particular solar energy facility is dependent on site-specific factors, and therefore impacts can be expected to vary significantly from site to site.

- » *Pre-Construction and Construction* – will include preconstruction surveys; site preparation; establishment of the access road, electricity generation infrastructure, power line servitudes, construction camps, laydown areas, transportation of components/construction equipment to site; and undertaking site rehabilitation and establishment and implementation of a stormwater management plan.

- » *Operation* – will include operation of the facility and the generation of electricity.
- » *Decommissioning* – depending on the economic viability of the plant, the length of the operational phase may be extended. Alternatively decommissioning will include site preparation; disassembling of the components of the facility; clearance of the site and rehabilitation. Note that impacts associated with decommissioning are expected to be similar to construction. Therefore, these impacts are not considered separately within this chapter.

The proposed solar facility was originally proposed as a fourth phase of a renewable energy facility which also includes wind technology. These projects have subsequently been separated, with the wind energy facility having received authorisation in August 2014. The specialist studies contained within Appendix E-J consider all phases of the larger renewable energy project.

6.1. Conclusions from the Scoping Phase

The full extent of the project development site (i.e. Portion 03 of the Farm Predikant Vlei 190, Portion 03 of the Farm Roode Vlei 189 and Portion 04 of the Farm Dikgat 195) was evaluated within the Scoping phase of the EIA process. The purpose of this was to provide an indication of any potentially high sensitivity or no-go areas from an environmental perspective, thereby informing the location of the development footprint.

No environmental fatal flaws or no go areas have been identified to be associated with the site at this stage in the EIA process. However, issues of potential environmental significance were identified through the scoping phase. These issues include:

- » Potential impacts on fauna and flora of conservation concern
- » Potential impacts on drainage lines (classified as watercourses)
- » Potential erosion impacts
- » Potential visual impacts
- » Potential impacts on heritage sites
- » Potential social impacts

These issues require further investigation and assessment in the EIA Phase of the process. Through this assessment, the proposed development site will be surveyed and localised environmental sensitivities identified. A sensitivity map of the proposed development site will be developed and will inform the final placement of infrastructure within the broader site. In order to assess potential impacts within sensitive areas, the preliminary layout for the solar energy facility was considered in this EIA phase.



Figure 6.1: Layout of the proposed Project Blue Solar Energy Facility

6.2. Assessment of the Potential Impacts associated with the Construction and Operation Phases

The sections which follow provide a summary of the findings of the assessment of potential impacts associated with the construction and operation of the proposed Project Blue Solar Energy Facility on a development footprint of ~130ha on the identified Portion 03 of the Farm Predikant Vlei 190, Portion 03 of the Farm Roode Vlei 189 and Portion 04 of the Farm Dikgat 195 (covering an area of 360 ha in extent). The assessment of potential issues presented in this chapter has involved key input from specialist consultants, the public and the project developer. Issues were assessed in terms of the criteria detailed in Chapter 4. The nature of the potential impact is discussed, and the significance is calculated with and without the implementation of mitigation measures. Recommendations are made regarding mitigation/ enhancement and management measures for potentially significant impacts and the possibility of residual and cumulative impacts are noted. Cumulative impacts for Project Blue Solar Energy Facility are assessed in further detail in Chapter 7, as well as within the specialist studies contained in **Appendix E-J**.

6.2.1. Potential Impacts on Vegetation

The Project Blue area occurs entirely within one vegetation type, i.e. Namaqualand Strandveld (Mucina *et al.* 2006). The proposed site does not fall within any Critical Biodiversity Area (CBA) but a small portion falls within the Ecological Support Area (ESA) (refer to Figure 6.2) as the proposed site is located approximately 3 km from the Buffels River.

Impacts assessed are restricted to those impacts that would affect vegetation communities, their habitats and their constituent plant species. The impacts could also affect ecological processes and consequently ecosystem function. The impacts identified are:

- » Impacts on **localised special habitats** associated with exposure of silcretes, quartzite or granite-gneiss close to the coast.
- » Impact on **species of conservation concern**.
- » Impact on plant communities through **fragmentation** that would lead to loss of constituent species and negatively impact the cohesiveness of the communities.
- » **Loss of habitat** due to degradation of plant communities.
- » **Loss of ecosystem function** due to changes in such factors as hydrological regime, increased edge effect, disturbance of successional processes, disturbance of pollination processes and possible invasion by alien plant species.



Figure 6.2: Ecological sensitivity map for the proposed project Blue Solar Energy Facility marginally impacting on an ESA (red arrow).

The greatest risk to the vegetation and flora would be during the construction phase of the solar energy when the following activities would be required:

- » Construction of access roads.
- » Clearing of vegetation for the PV panels and construction of lay-down areas and the on-site substation.
- » Trenches for cables and power-lines, or if overhead, the requirement for construction of pylons.
- » Operation of machinery and vehicles which could result in undesirable soil compaction.
- » Possible fuel and chemical (cement) contamination.

Maintenance of the solar energy facility (operational phase) would pose lower risks to the vegetation. Only the access roads and immediate area around the solar field would need to be accessed, leaving the remaining area within the footprint relatively undisturbed.

Impact tables summarising the significance of impacts on flora associated with the solar energy facility

Nature: Loss of Namaqualand Strandveld due to construction and operation of the Project Blue solar energy facility (GN 544, 18 June 2010 activity 10(i); GN 544, 18 June 2010 activity 11(x)(xi); GN 544, 18 June 2010 activity 18(i); GN 545, 18 June 2010 activity 1; GN 545, 18 June 2010 activity 15 and GN 546, 18 June 2010 activity 14(a)i)		
	Without mitigation	With mitigation
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Medium (6)	Low (4)
Probability	Definite (5)	Probable (3)
Significance	Medium (60)	Low (30)
Status	Negative	Negative
Reversibility	Partially reversible	Partially reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		
<ul style="list-style-type: none"> » Clearing should be restricted to dermaccated areas » keep to existing roads as much as possible 		
Cumulative impacts:		
<ul style="list-style-type: none"> » Contribution to loss of Namaqualand Strandveld vegetation. 		
Residual impacts:		
<ul style="list-style-type: none"> » Low negative. 		

Nature: Loss of Namaqualand Strandveld due to construction and operation of internal roads and underground cables(GN 544, 18 June 2010 activity 10(i); GN 545, 18 June 2010 activity 1; GN 545, 18 June 2010 activity 15 and GN 546, 18 June 2010 activity 14(a)i)

The internal access roads would require that new roads of 4 - 6 m width be built. This would have a Medium Negative impact. The overall impact without mitigation would be Medium Negative and with mitigation Low negative.

	Without mitigation	With mitigation
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Medium (6)	Low (4)
Probability	Definite (5)	Probable (3)
Significance	Medium (60)	Low (30)
Status	Negative	Negative
Reversibility	Partially reversible	Partially reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

- » Mitigation measures that should be implemented are restoration actions to promote re-vegetation of disturbed areas. A restoration specialist should be employed to ensure that the task is carried out correctly, with local species, to prevent the introduction of weeds and alien invasive plant species.

Cumulative impacts:

- » Contribution to loss of Namaqualand Strandveld vegetation.

Residual impacts:

- » Low negative.

Nature: Loss of Namaqualand Strandveld due to construction and operation of overhead transmission lines(GN 544, 18 June 2010 activity 10(i); GN 545, 18 June 2010 activity 15 and GN 546, 18 June 2010 activity 14(a)i)

An overhead transmission line will be required to link the solar facility to the Gromis Sub-station via an on-site substation. A road would be required to construct and maintain the transmission line. The impact on the Namaqualand Strandveld vegetation would be mainly associated with the road and not the transmission line itself except for limited disturbance at the sites of the poles.

The impact of construction of the proposed overhead power-line would be linked to the impact of the road and is therefore Medium Negative. Mitigation would involve restoration as for the road and if successfully applied would reduce the impact to Low Negative.

	Without mitigation	With mitigation
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Medium (6)	Low (4)
Probability	Definite (5)	Probable (3)

Significance	Medium (60)	Low (30)
Status	Negative	Negative
Reversibility	Partially reversible	Partially reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:		
<ul style="list-style-type: none"> » Mitigation measures that should be implemented are restoration actions to promote re-vegetation of disturbed areas. A restoration specialist should be employed to ensure that the task is carried out correctly, with local species, to prevent the introduction of weeds and alien invasive plant species. 		
Cumulative impacts:		
<ul style="list-style-type: none"> » Contribution to loss of Namaqualand Strandveld vegetation. 		
Residual impacts:		
<ul style="list-style-type: none"> » Low negative. 		

Implications for project implementation

- » The area within which the Project Blue Solar Energy Facility is proposed is expected to be of medium to low risk in terms of impact on flora (***Loss of Namaqualand Strandveld***).
- » It is recommended that the placement of PV panels, roads, underground cables and over-head power-lines be planned in vegetation of low sensitivity (least threatened) as far as possible and that impacts on the ESA are minimised.

6.2.2. Potential Impacts on Terrestrial Fauna and Habitats

The PV Facility is located within the Red Dune habitat in the eastern part of the site. This area was assessed as being of moderate faunal sensitivity (refer to Figure 6.3). Development within this area is not likely to result in any long-term negative impacts provided that standard mitigation measures are implemented. Wind erosion is however highlighted as a particular risk on account of the loose sand in this area which could become mobilized if the protective vegetation is removed.

Potential ecological impacts resulting from the development of the PV facility would stem from a variety of different activities and risk factors associated with the construction and operational phases of the project including the following:

Construction Phase

- » Vegetation clearing & site preparation
- » Operation of heavy machinery at the site
- » Human presence

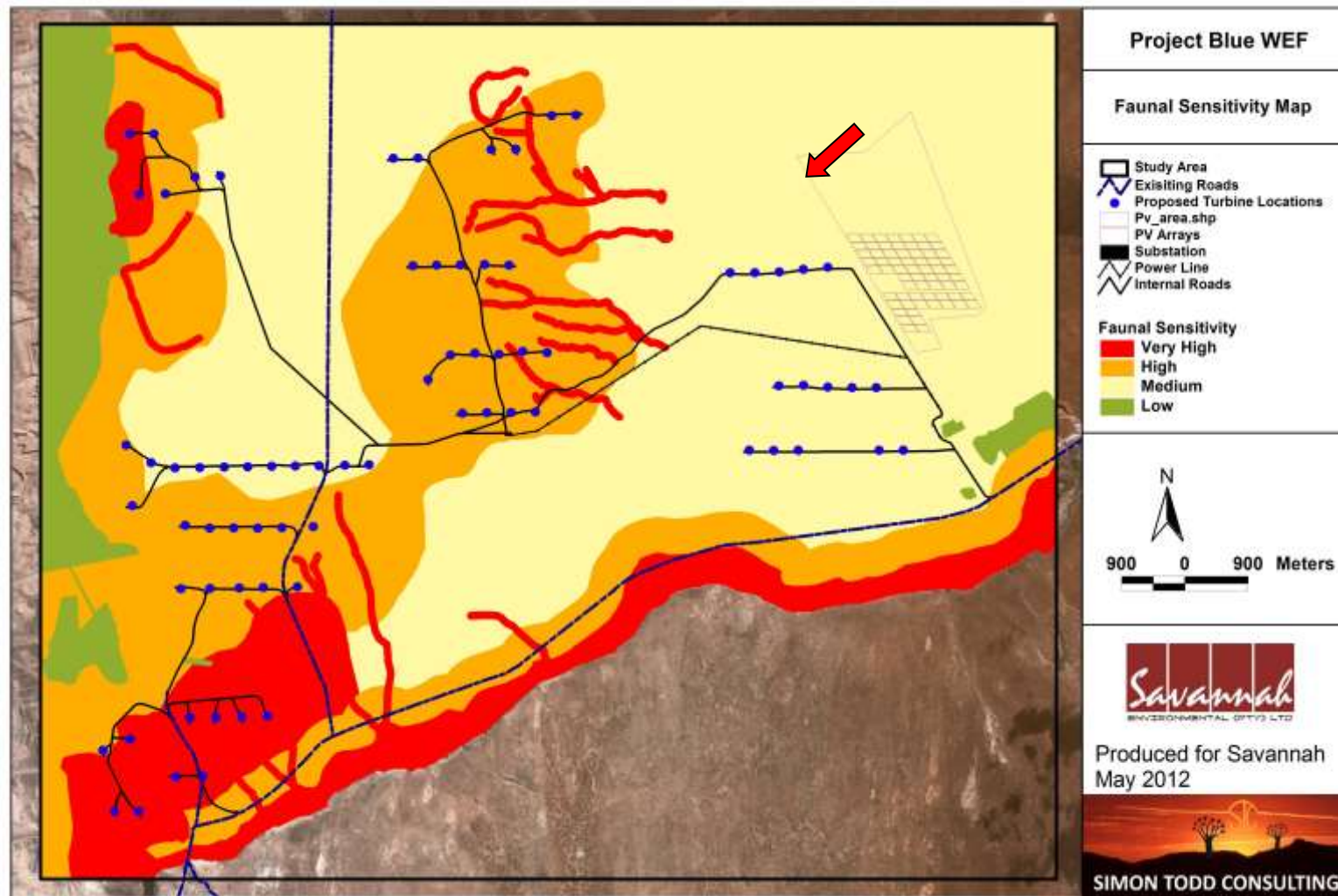


Figure 6.3: Ecological Sensitivity map of the proposed Project Blue Solar Energy Facility site (red arrow)

Operational Phase

- » Site maintenance activities
- » Human presence

The above activities are likely to manifest themselves as the following faunal impacts:

- » Loss of habitat for fauna
- » Reduced landscape connectivity for fauna
- » Direct faunal impacts
- » Increased soil erosion risk

Impact tables summarising the significance of impacts on Terrestrial Fauna and Habitats associated with the solar energy facility

Nature: Habitat loss for fauna - Transformation and loss of habitat will have a negative effect on resident fauna. (GN 544, 18 June 2010 activity 10(i); GN 545, 18 June 2010 activity 1; GN 545, 18 June 2010 activity 15 and GN 546, 18 June 2010 activity 14(a)i)

The development of the PV facility will result in the loss of habitat for resident fauna. This includes at least two listed species, Grant's Golden Mole *Eremitalpa granti* and the Namaqua Dwarf Adder *Bitis schneideri*. The receiving environment is however extensive and homogenous and this impact of therefore likely to be largely local in nature. The extent of habitat loss would also depend on the management of the vegetation beneath the panels. If the site is cleared and hardened, then the extent of habitat loss would be more extensive than if some vegetation is allowed to persist within the development area. Although this impact cannot be fully mitigated it is not likely to be of high significance given the relatively low sensitivity of the receiving environment.

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Medium (5)	Low (3)
Probability	Definite (5)	Highly Probable (4)
Significance	Medium (50)	Low (32)
Status	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	To a small degree	

Mitigation:

- » Vegetation clearing should be kept to a minimum.
- » Where possible some vegetation should be kept within the development area to maintain connectivity for smaller fauna.

Cumulative impacts:

- » There is already quite a lot of transformation in the area as a result of diamond mining activities and the development would contribute to cumulative habitat loss in the area. The extent of the development is however small when considered at the landscape scale.

Residual impacts:

- » Some habitat loss is an inevitable consequence of the development and cannot be fully mitigated.

Nature: Reduced landscape connectivity - Roads and other transformed areas will represent barriers to movement for some species (*GN 544, 18 June 2010 activity 10(i); GN 545, 18 June 2010 activity 1; GN 545, 18 June 2010 activity 15 and GN 546, 18 June 2010 activity 14(a)i*).

The development area and hardened access roads are likely to reduce the connectivity of the area for some fauna. The risk of predation for small mammals and reptiles in open areas is high and so some species would avoid crossing roads and other cleared areas. However, as the area is semi-arid, plant cover is already quite low or patchy and so most small mammals and reptiles are well adapted to open areas and this impact would probably be quite small for most species. Subterranean species are potentially more severely affected as their ability to move underground relies to a large extent on the presence of soft sand and these species would not be able to traverse hardened roads which require deep foundations. Subterranean species would have to cross roads above-ground where they would be exposed to predation. The presence of roads at the site would therefore tend to fragment populations of vulnerable species. If the site was fenced, it would potentially also impact larger mammals. However, the extent of the site is relatively small and larger mammals would easily find alternative paths around the site if necessary.

	Without mitigation	With mitigation
Extent	Local (2)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Medium (4)	Low (3)
Probability	Probable (3)	Probable (3)
Significance	Medium (30)	Low (24)
Status	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	To some degree	

Mitigation:

- » Hardened surfaces should be kept to a minimum
- » Fencing around the facility should allow for the passage of smaller vertebrates such as tortoises.
- » No electric fencing should be within 20 cm of the ground.

Cumulative impacts:

- » Although there is already some transformation in the area which contributes to reduced connectivity, the landscape within the vicinity of the PV development area is largely intact and the contribution to cumulative impacts is small.

Residual impacts:

- » Due to the soft sands at the site, hardened roads will in all likelihood be necessary to access the site and short of removing the roads after construction, there is little that can be done to mitigate this impact.

Nature: Direct Faunal Impacts - Fauna will be directly impacted by the development as a result of construction activities and human presence at the site (GN 544, 18 June 2010 activity 10(i); GN 545, 18 June 2010 activity 1; GN 545, 18 June 2010 activity 15 and GN 546, 18 June 2010 activity 14(a)i).

Some smaller animals would not be able to move away from the site sufficiently quickly during construction and would be killed by vehicles and earth-moving machinery. In addition, the presence of a large work force on the site would pose a risk to species such as snakes, tortoises and mammals which would be vulnerable to poaching for food, trade or killed out of fear and superstition.

	Without mitigation	With mitigation
Extent	Local (2)	Local (1)
Duration	Short-term (4)	Short-term (4)
Magnitude	Medium (5)	Medium-Low (3)
Probability	Highly Probable (4)	Probable (3)
Significance	Medium (44)	Low (24)
Status	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	To some extent	

Mitigation:

- » Any fauna directly threatened by the construction activities should be removed to a safe location by the ECO or other suitably qualified person.
- » The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the construction site.
- » Fires should only be allowed within fire-safe demarcated areas.
- » No fuelwood collection should be allowed on-site.
- » No dogs should be allowed on site.
- » If the site must be lit at night for security purposes, this should be done with low-UV type lights (such as most LEDs), which do not attract insects.
- » All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.
- » No unauthorized persons should be allowed onto the site.
- » All construction vehicles should adhere to a low speed limit to avoid collisions with susceptible species such as snakes and tortoises.

Cumulative impacts:

- » The potential for cumulative impacts is low as there are no other developments currently underway in the area.

Residual impacts:

- » Residual impacts for fauna can be mitigated to a large degree, although some mortality of a few immobile species can be expected.

Nature: Increased erosion risk - Increased erosion risk as a result of soil disturbance and loss of vegetation cover. (Associated with the development as well as access roads) (GN 545, 18 June 2010 activity 15 and GN 546, 18 June 2010 activity 14(a)i)

The development of the site would create a lot of soil disturbance, which would leave the site highly susceptible to wind erosion. Due to the low slope of the PV area and the high infiltration capacity of the soil, water erosion at the site is not likely to be an issue. The area does however receive strong winds which will mobilize any loose sand at the site. Sand movement can result in degradation of the affected areas as it smothers plants and once initiated can become self-sustaining. Measures to reduce sand movement should therefore be implemented at the site.

	Without mitigation	With mitigation
Extent	Local (2)	Local (1)
Duration	Long-term (4)	Short-term (2)
Magnitude	Medium (5)	Low (3)
Probability	Highly Probable (4)	Probable (3)
Significance	Medium (44)	Low (18)
Status	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:

- » Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance.
- » All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques.

Cumulative impacts:

- » Higher sediment loads in rivers and streams will affect in-stream vegetation and biota

Residual impacts:

- » If erosion at the site is controlled, then there will be no residual impact

Implications for project implementation

- » The PV facility is located within an area that has a generally low faunal sensitivity. Although there are some listed fauna which are likely to occur in this area, impacts on these species are likely to be local in nature and not of broader significance.
- » The habitat surrounding the PV facility is largely intact and the development would not contribute significantly to habitat loss or the disruption of landscape connectivity at the broad scale.
- » Wind erosion is highlighted as one of the major risks that would be associated with the development and would need to be specifically managed.

6.2.3. Potential Impacts on Geology, Soils and Agricultural Potential

Due to the low agricultural potential of the site as well as the low rainfall the impacts on soils and agriculture is expected to be low – provided that adequate storm water management and erosion prevention measures are implemented. These measures should be included in the layout and engineering designs of the development. The erodibility of the soils on the site is associated with the low sparse vegetation cover, sandy topsoils and restricting subsoil layers. In the mining areas the erodibility is a major challenge due to the presence of excessive NaCl in the newly established soils and storm water emanating from the site should be mitigated and controlled.

Impact tables summarising the significance of impacts on geology, soils and agricultural potential associated with the solar energy facility

Nature: Construction of Solar Panels and Stands(GN 544, 18 June 2010 activity 10(i); GN 545, 18 June 2010 activity 1; GN 545, 18 June 2010 activity 15 and GN 546, 18 June 2010 activity 14(a)i)		
	Without mitigation	With mitigation
Extent	Local (1)	N/A
Duration	Permanent (5)	N/A
Magnitude	Minor (2)	N/A
Probability	Probable (4)	N/A
Significance	Moderate (32)	N/A
Status	Negative	N/A
Reversibility	Irreversible	
Irreplaceable loss of resources?	Yes	
Can impacts be mitigated?	No	
Mitigation:		
» Limit footprint to the immediate development area.		
Cumulative impacts:		
» Soil erosion may arise owing to increased surface water runoff. Adequate management and erosion control measures should be implemented.		
Residual impacts:		
» Limited is activity is managed.		

Nature: Construction of buildings and other infrastructure with the associated disturbance of soils and existing land use (GN 544, 18 June 2010 activity 10(i); GN 545, 18 June 2010 activity 1; GN 545, 18 June 2010 activity 15 and GN 546, 18 June 2010 activity 14(a)i)		
	Without mitigation	With mitigation
Extent	Local (1)	N/A
Duration	Permanent (5)	N/A
Magnitude	Minor (2)	N/A
Probability	Probable (4)	N/A
Significance	Moderate (32)	N/A

Status	Negative	N/A
Reversibility	Irreversible	
Irreplaceable loss of resources?	Yes	
Can impacts be mitigated?	No	
Mitigation:		
» Limit footprint to the immediate development area.		
Cumulative impacts:		
» The cumulative impact of this activity will be small as it is constructed on land with low agricultural potential.		
Residual impacts:		
» Limited due to low agricultural potential		

Nature: construction of roads with the associated disturbance of soils and existing land use (GN 544, 18 June 2010 activity 10(i); GN 545, 18 June 2010 activity 1; GN 545, 18 June 2010 activity 15 and GN 546, 18 June 2010 activity 14(a)i)

	Without mitigation	With mitigation
Extent	Local (1)	N/A
Duration	Permanent (5)	N/A
Magnitude	Minor (2)	N/A
Probability	Probable (4)	N/A
Significance	Moderate (32)	N/A
Status	Negative	N/A
Reversibility	Irreversible	
Irreplaceable loss of resources?	Yes	
Can impacts be mitigated?	No	
Mitigation:		
» Limit footprint to the immediate development area and keep to existing roads as far as possible.		
Cumulative impacts:		
» The cumulative impact of this activity will be small as it is constructed on land with low agricultural potential.		
Residual impacts:		
» Limited due to low agricultural potential		

Nature: Impact of vehicle operation on site (GN 544, 18 June 2010 activity 10(i); GN 545, 18 June 2010 activity 1; GN 545, 18 June 2010 activity 15 and GN 546, 18 June 2010 activity 14(a)i)

Vehicle movement will be restricted to the construction site and established roads. Vehicle impacts in this sense are restricted to spillages of lubricants and petroleum products.

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (4)	Improbable (2)

Significance	Low (20)	Low (10)
Status	Negative	Negative
Reversibility	Reversible	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	
Mitigation:		
<ul style="list-style-type: none"> » Limit footprint to the immediate development area. » Maintain vehicles in designated areas only. » Prevent and address spillages. 		
Cumulative impacts:		
<ul style="list-style-type: none"> » The cumulative impact of this activity will be small if managed. 		
Residual impacts:		
<ul style="list-style-type: none"> » Limited if activity is managed. 		

Nature: Impact of dust generation on site(GN 544, 18 June 2010 activity 10(i); GN 545, 18 June 2010 activity 1; GN 545, 18 June 2010 activity 15 and GN 546, 18 June 2010 activity 14(a)i)

This activity entails the operation of vehicles on site and their associated dust generation. Generated dust can impact large areas depending on environmental and climatic conditions.

	Without mitigation	With mitigation
Extent	Local (2)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (4)	Improbable (2)
Significance	Low (24)	Low (12)
Status	Negative	Negative
Reversibility	Reversible	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	
Mitigation:		
<ul style="list-style-type: none"> » Limit vehicle movement to absolute minimum. » Construct proper roads for access. » Implement appropriate dust control measures. 		
Cumulative impacts:		
<ul style="list-style-type: none"> » The cumulative impact of this activity will be small if managed but can have widespread impacts if ignored. 		
Residual impacts:		
<ul style="list-style-type: none"> » Limited if activity is managed. 		

Nature: Loss of agricultural potential and land capability owing to the development(GN 544, 18 June 2010 activity 10(i); GN 545, 18 June 2010 activity 1; GN 545, 18 June 2010 activity 15 and GN 546, 18 June 2010 activity 14(a)i)		
	Without mitigation	With mitigation
Extent	Site (1)	N/A
Duration	Permanent (5)	N/A
Magnitude	Low (2)	N/A
Probability	Highly probable (4)	N/A
Significance	32 (Low)	N/A
Status	Negative	N/A
Reversibility	Medium	
Irreplaceable loss of resources?	Yes	
Can impacts be mitigated?	No. The loss of agricultural land is a long term loss and there are no mitigation measures that can be put in place to combat this loss.	
Mitigation:		
» N/A		
Cumulative impacts:		
» The cumulative impact of this activity will be small as it is constructed on land with low agricultural potential.		
Residual impacts:		
» The loss of agricultural land is a long term loss. This loss extends to the post-construction phase. The agricultural potential is very low though.		

Implications for project implementation

- » The impacts on soils are small in comparison to historical mining impacts in the study area.
- » The impacts should be limited to the immediate construction sites and rehabilitation measures should be implemented in line with those to be implemented by the diamond mine.
- » Regarding the construction of solar panels and stands, and associated infrastructure the following recommendations are made:
 - * Limit physical impacts to as small a footprint as possible.
 - * Site management has to be implemented with the appointment of a suitable environmental control officer (ECO) to oversee the process, address problems and recommend and implement corrective measures.
 - * Implement site specific erosion and water control measures to prevent excessive surface runoff from the site (solar turbines and roads).
 - * Plan the road and site layout in such a way as to make maximal use of existing roads to keep natural units as intact as possible.
 - * Prevent dust generation and vehicle associated pollution and spillages.
- » With effective implementation of mitigating measures (as outlined in the **EMPr in Appendix K**) the impacts identified can be reduced to a low level.

6.2.4. Potential Visual Impacts

The combined results of the visual exposure, viewer incidence / perception and visual distance of the proposed solar energy facility is displayed in Figure 6.6. Here the weighted impact and the likely areas of impact have been indicated as a visual impact index. Values have been assigned for each potential visual impact per data category and merged in order to calculate the visual impact index.

An area with short distance, high frequency of visual exposure to the proposed facility, a high viewer incidence and a predominantly negative perception would therefore have a higher value (greater impact) on the index. This helps in focussing the attention to the critical areas of potential impact when evaluating the issues related to the visual impact.

The visual impact index for the PV facility is further described as follows.

- » The visual impact index map indicates a core zone of moderate visual exposure within a 3 km radius of the proposed facility. Visual exposure within this zone is, however, fragmented with areas having no visual exposure of the PV plant development area.
- » There are no permanent residents in this area. A section of the R355 falls within this zone, but has no visual exposure of the PV plant. Based on the absence of affected visual receptors within this zone, it is anticipated that there will be no visual impact occurring within this zone.
- » The extent of potential visual impact remains high between the 3 km and 6 km radii, becoming moderate towards the outer edge of this zone. Visual impacts within this zone are likely to be low, but as in the case of the above mentioned zone, there are no visual receptors that will be affected. It is therefore anticipated that there will be no visual impact occurring within this zone.
- » Between 6 km and 12 km, the extent of potential visual impact is reduced, with visual clutter in the foreground taking effect. Visual exposure of the PV plant within this zone is also fragmented, with only short sections of road at two or three locations that could possibly be effected. Visual impacts within this zone are likely to be very low.
- » Remaining impacts beyond the 12 km radius are expected to be negligible.

It must be noted that any visibility of the solar plant will include views of wind turbines as well, which is expected to provide some visual absorption capacity, thereby reducing the visual impact of the PV plant.

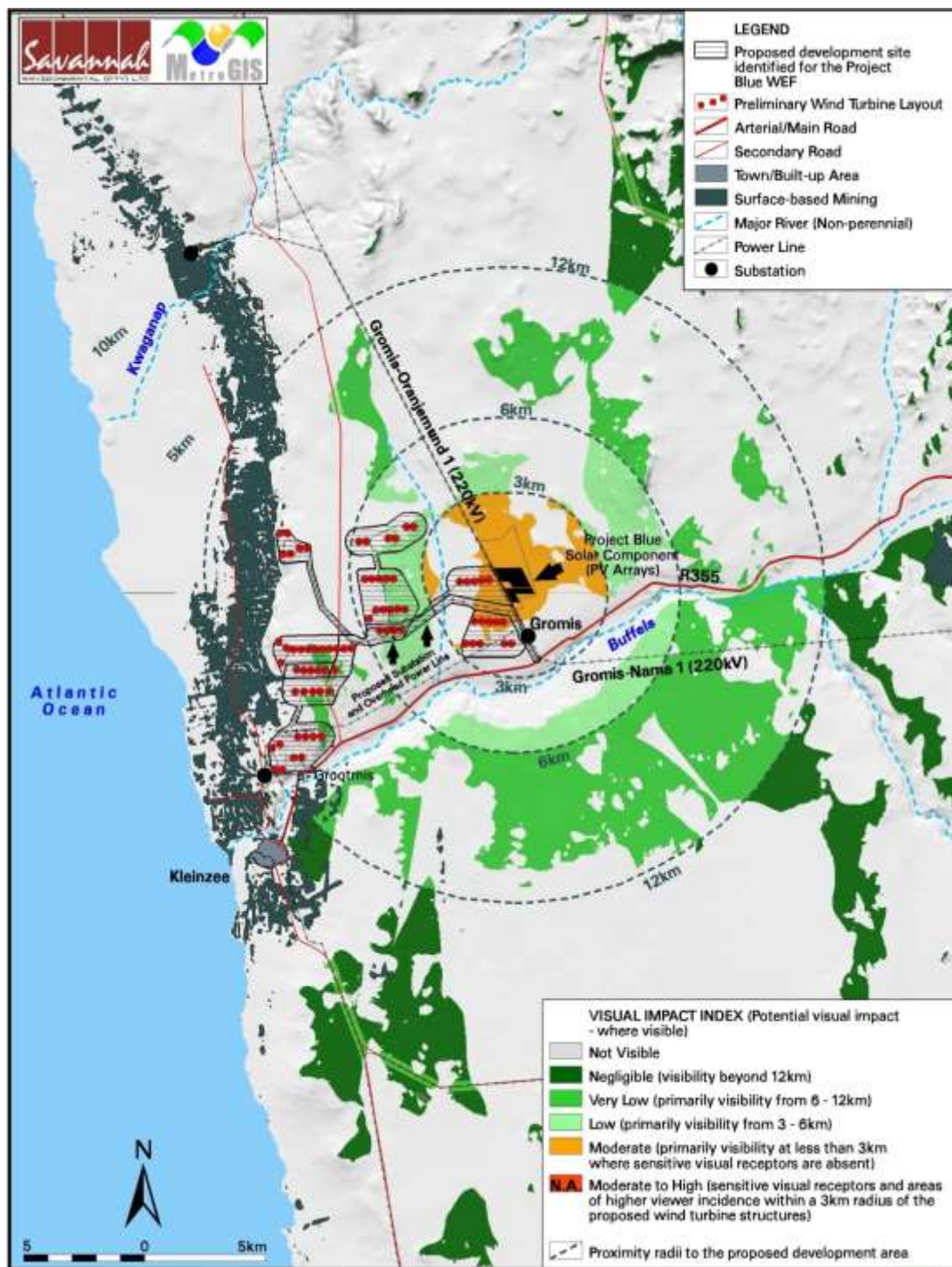


Figure 6.6: Visual impact index of the proposed Solar Energy Facility

Impact tables summarising the significance of visual impacts associated with the solar energy facility

Nature of Impact: Potential visual impact of construction on visual receptors in close proximity to the proposed facility. (GN 544, 18 June 2010 activity 10(i); GN 545, 18 June 2010 activity 1; GN 545, 18 June 2010 activity 15 and GN 546, 18 June 2010 activity 14(a)i)

During construction, there will be a noticeable increase in heavy vehicles utilising the roads to the development site that may cause, at the very least, a visual nuisance to other road users in the area. The clearing of vegetation during construction is unavoidable. Given the large footprint of development, it is likely that large tracks of land will be affected. The rehabilitation of vegetation in this region is difficult, given the hot, dry climatic conditions of this region.

	No mitigation	Mitigation considered
Extent	Local (4)	Local (4)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly Probable (4)	Probable (3)
Significance	Moderate (56)	Low (30)
Status	Negative	Negative
Reversibility	Recoverable	Recoverable
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

- » Ensure that vegetation is not unnecessarily cleared or removed during the construction period.
- » Reduce the construction period through careful logistical planning and productive implementation of resources.
- » Plan the placement of lay-down areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible.
- » Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.
- » Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.
- » Reduce and control construction dust through the use of approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent).
- » Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting.
- » Rehabilitate all disturbed areas, construction areas, roads, slopes etc immediately after the completion of construction works.

Cumulative impacts:

In context of the existing rural character and relative low activity rate, the construction phase of the Solar Energy Facility will contribute to a regional increase in heavy vehicles on the roads in the region, with constructions activity distinctly noticeable.

Residual impacts:

None.

Nature of Impact: Potential visual impact on users of arterial and secondary roads in close proximity to the proposed facility(GN 544, 18 June 2010 activity 10(i); GN 545, 18 June 2010 activity 1; GN 545, 18 June 2010 activity 15 and GN 546, 18 June 2010 activity 14(a)i)

Visual impacts on the R355 arterial road, being the major access route to Kleinsee, as well as the secondary road from the north, are expected to be of low significance within a radius of 5 km from the facility. The duration of visual impact within this zone, at an average speed of 90km/h, will be about 10 minutes.

	No mitigation	Mitigation considered
Extent	Local (4)	N/a
Duration	Long term (4)	N/a
Magnitude	Moderate (6)	N/a
Probability	Probable (3)	N/a
Significance	Medium (42)	N/a
Status	Negative	N/a
Reversibility	Recoverable	N/a
Irreplaceable loss of resources?	No	N/a
Can impacts be mitigated?	No	

Mitigation / Management:

Planning:

- » Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint.

Operations:

- » Maintain the general appearance of the facility as a whole.

Decommissioning:

- » Remove infrastructure not required for the post-decommissioning use of the site.
- » Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications.
- » Monitor rehabilitated areas post-decommissioning and implement remedial actions.

Cumulative impacts:

The construction of PV panels together with the associated infrastructure will increase the cumulative visual impact of industrial type infrastructure within the region. This is relevant in light of the power line infrastructure already present in the area.

Residual impacts:

The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.

Nature of Impact: Potential visual impact of ancillary infrastructure (i.e. the substation, the overhead power line, the internal access roads and the office / workshop) on observers in close proximity to the facility(GN 544, 18 June 2010 activity 10(i); GN 545, 18 June 2010 activity 1; GN 545, 18 June 2010 activity 15 and GN 546, 18 June 2010 activity 14(a)i)

Ancillary infrastructure associated with the solar energy facility includes the substations, the overhead power line, the internal access roads, administration buildings and workshop,

which may be visible to observers in close proximity to the facility. These will be located within the facility footprint. The roads have the potential of manifesting as landscape scarring. Other infrastructure has the potential of creating visual clutter, contributing to cumulative impacts, therefore having the potential of visual impact within the viewshed areas. No dedicated viewsheds have been generated for the ancillary infrastructure, as the range of visual exposure will fall within that of the panels

	No mitigation	Mitigation considered
Extent	Local (4)	Local (4)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	V Improbable (1)
Significance	Low (24)	Low (12)
Status	Negative	Negative
Reversibility	Recoverable	Recoverable
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation / Management:

Planning:

- » Plan internal roads in such a way and in such a location that clearing of vegetation is minimised. Consolidate existing infrastructure as much as possible, and make use of already disturbed areas rather than pristine sites wherever possible.
- » Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint.

Construction:

- » Rehabilitation of all construction areas.
- » Ensure that vegetation is not cleared unnecessarily to make way for access roads and ancillary buildings.

Operation:

- » Maintenance of roads to avoid erosion and suppress dust.

Decommissioning:

- » Removal of infrastructure and roads not required for post decommissioning use and rehabilitation of the footprint areas.
- » Monitor rehabilitated areas post-decommissioning and implement remedial actions.

Cumulative impacts:

The construction of the substation, overhead power line, internal roads and buildings, will increase the cumulative visual impact of industrial type infrastructure within the region. This is relevant in light of existing roads and power lines already present in the area.

Residual impacts:

The visual impact will be removed after decommissioning, provided the access roads are removed and rehabilitated. Failing this, the visual impact will remain.

Nature of Impact: Potential visual impact of the proposed facility on visual character and sense of place of the region (GN 544, 18 June 2010 activity 10(i); GN 545, 18 June 2010 activity 1; GN 545, 18 June 2010 activity 15 and GN 546, 18 June 2010 activity 14(a)i)

Sense of place refers to a unique experience of an environment by a user, based on his or her cognitive experience of the place. Visual criteria, specifically the visual character of an

area (informed by a combination of aspects such as topography, level of development, vegetation, noteworthy features, cultural / historical features, etc.), play a significant role. 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.

Specific aspects contributing to the sense of place of this region include the rural and undeveloped character of the area. A sense of remoteness is evident when travelling through the area. Approaching Kleinsee and the mined areas, this sense of place is altered. .

Given the vastness of this region, where this particular sense of place is experienced widely, any change to it close to a disturbed area is likely to be of low significance.

	No mitigation	Mitigation considered
Extent	Regional (3)	N/a
Duration	Long term (4)	N/a
Magnitude	Low (4)	N/a
Probability	Improbable (2)	N/a
Significance	Low (22)	N/a
Status	Negative	N/a
Reversibility	Recoverable	N/a
Irreplaceable loss of resources?	No	N/a
Can impacts be mitigated?	No	

Mitigation / Management:

Planning:

- » Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint.

Operations:

- » Maintain the general appearance of the facility as a whole.

Decommissioning:

- » Remove infrastructure not required for the post-decommissioning use of the site.
- » Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications.
- » Monitor rehabilitated areas post-decommissioning and implement remedial actions.

Cumulative impacts:

Residual impacts:

The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.

Implications for project implementation

- » The construction and operation of the proposed Project Blue Solar Energy Facility and its associated infrastructure, will have a visual impact on the study area, specifically within 5km of the proposed facility.
- » The anticipated visual impacts listed above (i.e. post mitigation impacts) range from moderate to low, and none are considered to be fatal flaws for the proposed solar energy facility.

- » Mitigation measures as proposed must be implemented.

6.2.5. Potential Heritage Impacts

The assessment of the solar facility impacts is limited to archaeology and palaeontology since impacts to the landscape are considered to be insignificant. Mitigation would be easy to accomplish, though should the present road alignment be retained then it will be a time-consuming exercise.

Impact tables summarising the significance of impacts on heritage sites associated with the solar energy facility

Nature: Impacts to heritage resources(GN 544, 18 June 2010 activity 10(i); GN 545, 18 June 2010 activity 1; GN 545, 18 June 2010 activity 15 and GN 546, 18 June 2010 activity 14(a)i)		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Minor (2)	Small (0)
Probability	Definite (5)	Improbable (2)
Significance	Medium (40)	Low (12)
Status	Negative	Negative
Reversibility	No	
Irreplaceable loss of resources?	Yes	
Can impacts be mitigated?	Yes	
Mitigation:		
» Archaeological excavation and sampling		
Cumulative impacts:		
» There are probably hundreds of thousands of archaeological sites in the Namaqualand Sandveld and loss (with mitigation) of some will thus not be significant.		
Residual impacts:		
» Loss of heritage sites.		

Implications for project implementation

- » Impacts to archaeological resources can generally be easily mitigated, although in some cases this would be time-consuming due to the extensive numbers of sites or occurrences to be impacted.
- » In general, high to medium significance impacts for archaeology will be reduced to low through mitigation
- » It is concluded that the proposed Project Blue Solar Energy Facility should be allowed to proceed.
- » Prior to construction a final walk-down survey must be carried out in order to examine any areas not yet checked and any infrastructure positions that have

been changed or added subsequent to the Phase 4 survey. Archaeological mitigation as required must then be carried out.

- » If any unmarked pre-colonial burials are intersected during the construction phase of the project then these should be reported to SAHRA or an archaeologist so that appropriate action can be taken.

6.2.6. Potential Social Impacts

Impacts associated with the Construction Phase

The key social issues associated with the construction phase are the following:

Potential positive impacts

- » Creation of employment and business opportunities, and opportunity for skills development and on-site training.

Potential negative impacts

- » Impacts associated with the presence of construction workers on local communities;
- » Increased risks to stock, crops, grazing and farming infrastructure associated with the presence of construction workers;
- » Impact of heavy vehicles on local roads;
- » Loss of agricultural land associated with construction related activities.

Impact tables summarising the significance of social impacts associated with the construction of the solar energy facility

Nature: Creation of local employment and business opportunities during the construction phase associated with proposed solar energy facility (<i>GN 544, 18 June 2010 activity 10(i) and GN 545, 18 June 2010 activity 1</i>)		
	Without Mitigation	With Enhancement
Extent	Local – Regional (2) (Rated as 2 due to potential opportunities for local communities and businesses)	Local – Regional (3) (Rated as 3 due to potential opportunities for local communities and businesses)
Duration	Short term (2)	Short term (2)
Magnitude	Low (4)	Low (4)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (32)	Medium (36)
Status	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	N/A	N/A
Can impact be enhanced?	Yes	

Enhancement measures:

Employment

- » Where reasonable and practical, WWK should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories.
- » Prior to commencement of the construction phase, WWK should meet with representatives from the NKLM to establish the existence of skills and unemployment databases for the relevant municipal areas. If such databases exist, they should be made available to the appointed contractors.
- » The local authorities, community representatives and organisations on the interested and affected party database should be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures which WWK intends to implement during the construction phase.
- » Where feasible, training and skills development programmes for locals should be initiated prior to the initiation of the construction phase.

Business

- » WWK should develop a database of local companies, specifically companies that qualify as BBBEE companies, which qualify as potential service providers (e.g. construction companies, catering companies, waste collection companies, security companies etc.) prior to the commencement of the tender process for construction contractors. These companies should be notified of the tender process and invited to bid for project-related work;
- » Where possible, WWK should assist local BBBEE companies to complete and submit the required tender forms and associated information;
- » The NKLM, in conjunction with representatives from the local hospitality and retail industries, should identify strategies aimed at maximising the potential benefits associated with the project.

Note that while preference to local employees and companies is recommended, it is recognised that a competitive tender process may not guarantee the employment of local labour for the construction phase.

Cumulative impacts:

Opportunity to up-grade and improve skills levels in the area. However, due to relatively small number of local employment opportunities and limited skills range, this benefit is likely to be limited.

Residual impacts:

Improved pool of skills and experience in the local area. However, due to relatively small number of local employment and skills-transfer opportunities this benefit is likely to be limited.

Nature: Potential impacts on family structures and social networks associated with the presence of construction workers during construction the solar energy facility (*GN 544, 18 June 2010 activity 10(i) and GN 545, 18 June 2010 activity 1*)

	Without Mitigation	With Mitigation
Extent	Local (3) (Rated as 3 due to potential severity of	Local (1) (Rated as 1 due to potential severity of

	impact on local communities)	impact on local communities)
Duration	Short term for community as a whole (2) Long term-permanent for individuals who may be affected by STDs etc. (5)	Short term for community as a whole (2) Long term-permanent for individuals who may be affected by STDs etc. (5)
Magnitude	Low for the community as a whole (4) High-Very High for specific individuals who may be affected by STDs etc. (10)	Low for community as a whole (4) High-Very High for specific individuals who may be affected by STDs etc. (10)
Probability	Probable (3)	Probable (3)
Significance	Low for the community as a whole (27) Moderate-High for specific individuals who may be affected by STDs etc. (54)	Low for the community as a whole (21) Moderate-High for specific individuals who may be affected by STDs etc. (48)
Status	Negative	Negative
Reversibility	No in case of HIV	No in case of HIV
Irreplaceable loss of resources?	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for their livelihoods	
Can impact be mitigated?	Yes, to some degree. However, the risk cannot be eliminated	
Mitigation:		
<ul style="list-style-type: none"> » Where reasonable and practical, WWK should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. » WWK should liaise with the NKLM to ensure that that recommended mitigation measures are implemented. » WWK and the contractor(s) should, in consultation with representatives from the MF, develop a code of conduct for the construction phase. The code should identify which types of behaviour and activities are not acceptable. Construction workers in breach of the code should be dismissed. All dismissals must comply with the South African labour legislation. » WWK and the contractor should implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase. » The movement of construction workers on and off the site should be closely managed and monitored by the contractors. In this regard the contractors should be responsible for making the necessary arrangements for transporting workers to and from site over weekends or after hours. 		

- » The contractors should make the necessary arrangements for allowing workers from outside the area to return home over weekends and/ or on a regular basis. This would reduce the risk posed to local family structures and social networks.
- » With the exception of security personnel, no construction workers should be accommodated on the site overnight.

Cumulative impacts:

Impacts on family and community relations that may, in some cases, persist for a long period of time. Where unplanned / unwanted pregnancies occur, or members of the community are infected by an STD, specifically HIV, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.

Residual impacts:

Impacts on family and community relations that may, in some cases, persist for a long period of time. Where unplanned / unwanted pregnancies occur, or members of the community are infected by an STD, specifically HIV, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.

Nature: Potential loss of livestock, poaching and damage to farm infrastructure associated with the presence of construction workers on site (*GN 544, 18 June 2010 activity 10(i) and GN 545, 18 June 2010 activity 1*)

	Without Mitigation	With Mitigation
Extent	Local (4) (Rated as 4 due to potential severity of impact on local farmers)	Local (2)
Duration	Medium term (3)	Medium term (3)
Magnitude	Moderate (6) (Due to reliance on agriculture and livestock for maintaining livelihoods)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Medium (39)	Low (27)
Status	Negative	Negative
Reversibility	Yes, compensation paid for stock losses etc.	Yes, compensation paid for stock losses etc.
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	

Mitigation:

- » WWK in consultation with the NKLM and local farmers should develop a Code of Conduct for construction workers. The Code of Conduct should be signed by WWK and all relevant contractors prior to the commencement of any on-site construction activities.
- » WWK should hold contractors liable for compensating farmers and communities in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers. This should be contained in the Code of Conduct, to be signed

<p>between WWK, the contractors and neighbouring landowners. The agreement should also cover losses and costs associated with any fires caused by construction workers or construction related activities (see below).</p> <ul style="list-style-type: none"> » A designated Environmental Control Officer (ECO) should be appointed to monitor the conduct of staff. Affected landowners should have on-going access to the ECO. » The EMPr must outline procedures for managing and storing waste (including arrangements for plastic waste etc.) on site. » Contractors must ensure that all workers are informed of the conditions contained on the Code of Conduct at the outset of the construction phase. The consequences of stock theft, poaching and trespassing on adjacent farms should be emphasised. » Contractors must ensure that workers who are found guilty of stealing livestock, poaching and/or damaging farm infrastructure are dismissed and formally charged. This should be contained in the Code of Conduct. All dismissals must be in accordance with South African labour legislation. » WWK should enter into legally binding arrangements with regard to compensation with all relevant property owners prior to the start of construction.
<p>Cumulative impacts: None, provided that losses are adequately compensated for.</p>
<p>Residual impacts: None, provided that losses are adequately compensated for.</p>

Nature: Potential loss of livestock, crops and houses, damage to farm infrastructure and threat to human life associated with increased incidence of veld fires (*GN 544, 18 June 2010 activity 10(i) and GN 545, 18 June 2010 activity 1*)

	Without Mitigation	With Mitigation
Extent	Local (2)	Local (1)
Duration	Short term (2)	Short term (2)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Low (24)	Low (21)
Status	Negative	Negative
Reversibility	Yes, compensation paid for stock losses etc.	Yes, compensation paid for stock losses etc.
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	

Mitigation:

Despite the low risk of veld fires, WWK should enter into an agreement with the affected landowners whereby the company will compensate for damages proven to be attributed to activities associated with the solar energy facility. This includes losses associated veld fires. In addition, the potential increased risk of veld fires can be mitigated. The detailed mitigation measures are outlined in the EMPr for the construction and operation phases. The aspects that should be covered include:

- » Contractor to ensure that open fires on the site for cooking or heating are not allowed except in designated areas.
- » Contractor to ensure that construction related activities that pose a potential fire risk,

such as welding, are properly managed and are confined to areas where the risk of fires has been reduced. Measures to reduce the risk of fires include clearing working areas and avoiding working in high wind conditions when the risk of fires is greater. In this regard special care should be taken during the high risk dry, windy summer months.

- » Contractor to provide adequate fire fighting equipment on-site.
- » Contractor to provide fire-fighting training to selected construction staff.
- » As per the conditions of the Code of Conduct, in the advent of a fire being caused by construction workers and or construction activities, the appointed contractors must compensate farmers for any damage caused to their farms. The contractor should also compensate the fire fighting costs borne by farmers and local authorities.

In addition the landowner should also ensure that they join the local fire protection agency.

Cumulative impacts:

No, provided losses are compensated for.

Residual impacts:

No, provided losses are compensated for.

Nature: Potential impacts to road surfaces and road safety associated with the movement of construction related traffic to and from the site (*GN 544, 18 June 2010 activity 10(i) and GN 545, 18 June 2010 activity 1*)

	Without Mitigation	With Mitigation
Extent	Local (3) (Rated as 3 due to potential severity of impact on local farmers)	Local (2)
Duration	Short term (2)	Short term (2)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Low (27)	Low (24)
Status	Negative	Negative
Reversibility	Yes	
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	

Mitigation:

- » Movement of heavy vehicle traffic should, where possible, be carefully planned to minimize the impact on tourist related traffic during the peak tourist season periods (Easter weekend, flower season (August-September) and December holidays).
- » Movement of construction traffic should be limited to weekdays. In addition, the movement of heavy vehicles on the local roads, specifically the R355 and Kommagas gravel road should not be permitted after 13h00 on Friday afternoons and before 09h00 on Monday mornings as these are times that are likely to impact on weekend visitors to the area.
- » The contractor should inform local farmers and representatives from the NKLM and Tourism Sector of dates and times when abnormal loads will be undertaken.
- » The contractor should ensure that damage caused to roads by construction related

<p>activities, including heavy vehicles, is repaired before the completion of the construction phase. The costs associated with the repair must be borne by the developer.</p> <p>» All vehicles must be road-worthy and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits.</p>
<p>Cumulative impacts:</p> <p>If damage to roads is not repaired then this will impact on the farming activities in the area and also result in higher maintenance costs for vehicles of local farmers and other road users. The costs will be borne by road users who were not responsible for the damage.</p>
<p>Residual impacts:</p> <p>If damage to roads is not repaired then this will impact on the farming activities in the area and also result in higher maintenance costs for vehicles of local farmers and other road users.</p>

<p>Nature: Loss of farmland and natural vegetation (<i>GN 544, 18 June 2010 activity 10(i) and GN 545, 18 June 2010 activity 1</i>)</p>		
	Without Mitigation	With Mitigation
Extent	Local (2)	Local (1)
Duration	Long term-permanent if disturbed areas are not rehabilitated (5)	Short term if damaged areas are rehabilitated (1)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Medium (33)	Low (18)
Status	Negative	Negative
Reversibility	Yes, but long period required	Yes, but long period required
Irreplaceable loss of resources?	No. Affected land can be restored, provided appropriate rehabilitation is implemented. Due to the aridity of the area, effective rehabilitation may however take long to achieve, and may prove costly.	
Can impact be mitigated?	Yes, provided efficient site rehabilitation is carried out.	
<p>Mitigation:</p> <p>» The footprint associated with the construction related activities (access roads, turning circles, construction platforms, workshop etc.) should be minimised.</p> <p>» An Environmental Control Officer (ECO) should be appointed to monitor the entire duration of the construction phase.</p> <p>» All areas disturbed by construction related activities, such as access roads, construction platforms, workshop area etc., should be rehabilitated at the end of the construction phase.</p> <p>» The implementation of a rehabilitation programme should be included in the terms of reference for the contractor/s appointed to establish the solar energy facility. The specifications for the rehabilitation programme should be drawn up by a suitably qualified specialist.</p>		

- » The implementation of the Rehabilitation Programme should be monitored by the ECO;
- » •Compensation should be paid to any farmers that suffer a permanent loss of land due to the establishment of the solar energy facility. Compensation should be paid by WWK and based on accepted land values for the area;
- » WWK should investigate the option of establishing an Environmental Rehabilitation Trust Fund to cover the costs of decommissioning and rehabilitation of disturbed areas. The Trust Fund should be funded by a percentage of the revenue generated from the sale of energy to the national grid over the 2 year operational life of the facility. The rationale for the establishment of a Rehabilitation Trust Fund is linked to the experiences with the mining sector in South Africa and failure of many mining companies to allocate sufficient funds during the operational phase to cover the costs of rehabilitation and closure.
- » WWK should consult with the affected property owner/s with regard to the timing of the construction phase in order to enable them to plan his farming activities.

Cumulative impacts:

Overall loss of farmland could impact on the livelihoods of the affected farmers, their families and the workers on the farms and their families. However, disturbed areas can be rehabilitated. In addition, carrying capacity of the area is low.

Residual impacts:

Overall loss of farmland could impact on the livelihoods of the affected farmers, their families and the workers on the farms and their families.

Impacts associated with the Operation Phase

The following key social issues are of relevance to the operational phase:

Potential positive impacts

- » Creation of employment and business opportunities. The operational phase will also create opportunities for skills development and training;
- » Benefits associated with the establishment of a Community Trust;
- » The establishment of renewable energy infrastructure.

Potential negative impacts

- » The visual impacts and associated impact on sense of place and the character of the landscape;
- » Potential impact on tourism.

Impact tables summarising the significance of social impacts associated with the operation of the solar energy facility

Nature: Creation of employment and business opportunities associated with the operational phase of the solar energy facility (GN 544, 18 June 2010 activity 10(i) and GN 545, 18 June 2010 activity 1)

	Without Mitigation	With Enhancement
Extent	Local (1)	Local (2)

Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	Low (21)	Low (24)
Status	Positive	Positive
Reversibility	N/A	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	
Enhancement:		
<p>The enhancement measures listed above to enhance local employment and business opportunities during the construction phase, also apply to the operational phase. In addition:</p> <ul style="list-style-type: none"> » WWK should implement a training and skills development programme for locals during the first 5 years of the operational phase. The aim of the programme should be to maximise the number of people from local communities and the broader NDM and NKLM area employed during the operational phase of the project. 		
Cumulative impacts:		
<p>Creation of permanent employment and skills and development opportunities for members from the local community and creation of additional business and economic opportunities in the area</p>		
Residual impacts:		
<p>Creation of permanent employment and skills and development opportunities for members from the local community and creation of additional business and economic opportunities in the area</p>		

Nature: Benefits associated with establishment of a community trust (*GN 544, 18 June 2010 activity 10(i) and GN 545, 18 June 2010 activity 1*)

	Without Mitigation	With Enhancement¹⁰
Extent	Local (2)	Local and Regional (4)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Definite (5)
Significance	Medium (30)	High (70)
Status	Positive	Positive
Reversibility	N/A	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	
Enhancement:		
<p>In order to maximise the benefits and minimise the potential for corruption and misappropriation of funds the following measures should be implemented:</p> <ul style="list-style-type: none"> » Clear criteria for identifying and funding community projects and initiatives in the area should be identified. The criteria should be aimed at maximising the benefits for the community as a whole and not individuals within the community. 		

¹⁰ Enhancement assumes effective management of the community trust

» Strict financial management controls, including annual audits, should be instituted to manage the funds generated for the Community Trust from the proposed solar energy facility.

Cumulative impacts:

Promotion of social and economic development and improvement in the overall well-being of the community

Residual impacts:

Promotion of social and economic development and improvement in the overall well-being of the community

Nature: Development of infrastructure to generate clean, renewable energy (GN 544, 18 June 2010 activity 10(i) and GN 545, 18 June 2010 activity 1)

	Without Mitigation	With Enhancement
Extent	Local, Regional and National (4)	Local, Regional and National (4)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	Medium (56)	Medium (56)
Status	Positive	Positive
Reversibility	Yes	
Irreplaceable loss of resources?	Yes, impact of climate change on ecosystems	
Can impact be mitigated?	Yes	

Enhancement:

The establishment of the solar energy facility is a mitigation measure in itself. In order to maximize the benefits of the proposed project WWK should:

- » Use the project to promote and increase the contribution of renewable energy to the national energy supply;
- » Implement a skills development and training programme aimed at maximizing the number of employment opportunities for local community members;
- » Investigate the opportunities for establishing a Community Trust that would benefit local, disadvantaged and vulnerable communities.

Cumulative impacts:

Reduce carbon emissions via the use of renewable energy and associated benefits in terms of global warming and climate change.

Residual impacts:

Reduce carbon emissions via the use of renewable energy and associated benefits in terms of global warming and climate change.

Nature: Potential negative impact of the solar energy facility on local tourism (<i>GN 544, 18 June 2010 activity 10(i) and GN 545, 18 June 2010 activity 1</i>)		
	Without Mitigation	With Mitigation/ Enhancement
Extent	Local–Regional (1)	Local–Regional (1)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Low (27)	Low (27)
Status	Negative Positive	Negative Positive
Reversibility	Yes, facility can be removed	
Irreplaceable loss of resources?	No, facility can be removed	
Can impact be mitigated or enhanced?	No	
Enhancement: » The recommendations contained in the VIA should be implemented.		
Cumulative impacts: The solar energy facility has the potential to impact on the experience of tourist and the tourism potential of the area in general in both a negative and positive manner		
Residual impacts: The solar energy facility has the potential to impact on the experience of tourist and the tourism potential of the area in general in both a negative and positive manner.		

Implications for project implementation

- » From a policy and planning perspective, the proposed solar energy facility is strongly supported at a national and local level. The development of a green economy is supported at provincial, District municipality and local municipality levels. This includes local energy generation from renewable sources, as well as eco/ conservation tourism development. Transformation of the Kleinsee economy away from historic mining activities has been identified as a key development priority for Kleinsee. The rehabilitation/ utilisation of disturbed coastal areas have been identified as a further challenge. The proposed Project Blue solar energy facility has the potential to contribute to meeting both of these policy objectives.
- » The solar energy facility will create employment and business opportunities for locals during both the construction and operational phase of the project.
- » The establishment of a Community Trust creates an opportunity to support local economic development in the area.
- » The proposed development represents an investment in clean, renewable energy infrastructure, which, given the challenges created by climate change, represents a positive social benefit for society as a whole.

- » The potential benefits will increase if all Phases of the facility (wind and solar) are developed.

6.3. Assessment of the No Go Alternative

South Africa currently relies on coal-powered energy to meet more than 90% of its energy needs. As a result South Africa is one of the highest per capita producers of carbon emissions in the world and Eskom, as an energy utility, has been identified as the world's second largest producer carbon emissions. The national government has set targets for renewables substitution. As the site experiences high irradiation levels and optimal grid connection opportunities are available, the No-Development option would represent a lost opportunity for South Africa to supplement its current energy needs with clean, renewable energy. Given South Africa's position as one of the highest per capita producer of carbon emissions in the world, this would represent a negative social cost. The proposed Project Blue solar energy facility would contribute 65MW to South Africa's energy. A significant number of renewable energy projects have been proposed in other parts of South Africa. Foregoing the proposed Project Blue solar energy facility development is therefore unlikely to impact negatively on South Africa's ability to achieve its stated renewable energy targets.

In addition the Northern Cape grid will be deprived of an opportunity to benefit from the additional generated power being evacuated directly into the Province's grid. The greater farm portions are not being farmed intensively due to climate and agricultural constraints and it is unlikely that the farm will become productive from this perspective in the long-term. In addition, it has been confirmed by de Beers that the property is not part of current or future mining plans. The loss of the land to this project is therefore not considered significant.

At a local level, the No-Development option would also result in a loss in employment opportunities associated with both the construction and operational phase. In addition, the benefits associated with the establishment of a Community Trust funded by revenue generated from the sale of energy from the solar energy facility would be forfeited. The revenue from the proposed solar energy facility can be used to support a number of social and economic initiatives in the area. These local benefits would be forgone if the proposed solar energy facility is not developed in the proposed area. Given the closure of the Kleinsee mine and the limited economic opportunities in the area this would represent a negative social cost for the local community.

Nature: Implementation of the no development option

The no-development option would result in the lost opportunity for South Africa to supplement its current energy needs with clean, renewable energy. The No-Development

option would also result in the loss of the benefits to the local community and economy associated with the creation of employment opportunities and the establishment of a Community Trust.

	Without Mitigation	With Mitigation
Extent	Local, Regional and National (3)	Local, Regional and National (4)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Medium (6)
Probability	Probable (3)	Highly Probable (4)
Significance	Moderate (33)	Moderate (56)
Status	Negative	Positive
Reversibility	Yes	
Irreplaceable loss of resources?	Yes, impact of climate change on ecosystems	
Can impact be mitigated?	Yes	
Enhancement: The proposed solar energy facility should be developed and the mitigation and enhancement measures identified in the EIA should be implemented.		
Cumulative impacts: Reduce carbon emissions via the use of renewable energy and associated benefits in terms of global warming and climate change.		
Residual impacts: Reduce carbon emissions via the use of renewable energy and associated benefits in terms of global warming and climate change.		

The No-Development option is not preferred.

ASSESSMENT OF CUMULATIVE IMPACTS

CHAPTER 7

Cumulative impacts in relation to an activity are defined in the Environmental Impact Assessment Regulations (Government Notice R543) as meaning “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”.

There has been a substantial increase in renewable energy developments recently in South Africa as legislation is evolving to facilitate the introduction of Independent Power Producers (IPPs) and renewable energy into the electricity generation mix. Due to the recent substantial increase in interest in renewable energy developments in South Africa, it is important to follow a precautionary approach in accordance with NEMA to ensure that the potential for cumulative impacts are considered and avoided where possible.

The Department of Energy has, under the REIPPP Programme released a request for proposals (RfP) to contribute towards Government’s renewable energy target of 3725 MW (1450 MW of which has been allocated to solar PV energy) and to stimulate the industry in South Africa. The bid selection process will consider the suggested tariff as well as socio-economic development opportunities provided by the project and the bidder.

There is a legislated requirement to assess cumulative impacts associated with a proposed development. This chapter looks at whether the proposed project’s potential impacts become more significant when considered in combination with the other known or proposed renewable energy projects within the area.

7.1 Approach Taken to Assess Cumulative Impacts

A cumulative impact, in relation to an activity, refers 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 undertaking in the area¹.

Table 7.1 provides details of other known renewable energy applications in the vicinity of the Project Blue Solar Facility. These projects were identified by CSIR using the Department of Environmental Affairs Geographic Information System digital data (CSIR, 2013).

¹ Definition as provided by DEA in the EIA Regulations.

Significant cumulative impacts that could occur due to the development of the solar energy facility and its associated infrastructure in proximity to each other include impacts such as:

- » Loss of vegetation and impacts on ecology
- » Soil and agricultural potential impacts
- » Heritage impacts
- » Visual impacts
- » Social impacts

The section below explores potential cumulative impacts of other renewable projects within the immediate vicinity (i.e. within 40km) of the proposed Project Blue Solar Energy Facility. The discussion and associated conclusions must be understood in the context of the uncertainty associated with the proposed developments and the qualitative nature of the assessment due to the limited information available on what is planned for these facilities.

Table 7.1: Proposed renewable energy projects within Project Blue Solar Energy development site and surrounding areas

Project	Applicant/ Developer	DEA Ref. No	Location	Status	Distance from Project Blue Solar Energy Facility
1. Nigramoep PV Solar Energy Facility on a site near Nababeep, Northern Cape	K2011102649 (SA) Pty Ltd	14/12/16/3/3/1/416	Nigramoep 136	EIA process underway	37 km
2. Proposed establishment of the Kannikwa Vlake wind farm	TPE Energy Development Ltd	12/12/20/1807	Kannikwa Vlake 157	Environmental Authorisation issued	25 km
3. Project Blue Wind Energy Facility	WWK Development	12/12/20/2331/1 12/12/20/2331/2 12/12/20/2331/3	Portion 02 of Dikgat 195; Portion 04 of Dikgat 195; Portion 05 of Dikgat 195; Portion 07 of Dikgat 195; Portion 09 of Dikgat 195; Kleinzee 193; Portion 01 Predikant Vlei 190; Portion 03 of Predikant Vlei 190; Portion 04 Predikant Vlei 190; Dreyers Pan 192	<u>Environmental Authorisation issued</u>	0-3 km
4. Eskom Kleinsee Wind Energy Facility	Eskom Holdings SoC Limited	12/12/20/2212	RE of Brazil 329 RE of Goraap 323, RE of Honde Vlei 325, RE of Kannabieduin 324, Portion 4 of Rooivlei 327	EIA process underway	12km

There are four other renewable projects within a 40 km radius of the Project Blue Solar Energy Facility site (refer to Figure 7.2). The potential for cumulative impacts as a result of similar developments planned to be developed around the renewable energy Kleinsee, is considered below.

7.3.1 Loss of vegetation and impacts on ecology

At least three other renewable energy facilities are planned for the Kleinsee area, Northern Namaqualand. These facilities would also be located in Namaqualand Strandveld (at least in part). All these facilities would therefore contribute to the cumulative loss of Namaqualand Strandveld. However, this vegetation type is widespread and relatively uniform over a large area of many thousands of hectares in Namaqualand. Cumulative impact of the proposed Project Blue renewable energy would consequently be **Low Negative**.

7.3.2 Cumulative impacts on soil and agricultural potential

The overall loss of agricultural land in the region due to other similar developments is expected to be of **low significance** due to the limited agricultural potential of the area. Due to the limited crop production in the wider study area, and the fact that grazing can continue on the farm in areas not affected by the proposed facility, the development of multiple renewable energy facilities within the region of Kleinsee will not affect food security in the region.

7.3.3 Cumulative impacts on heritage and palaeontology

Cumulative impacts in terms of archaeological and paleontological contexts are once-off permanent destructive events. Infrastructure development may lead to spatially extended impacts in the vicinity, hence the need to demarcate areas for zero to low impact. Cumulative negative impacts on heritage and paleontological resources are expected be **low - medium significance** due to the fact that the potential for the loss of or discovery of heritage artefacts in the region will also increase with the increased numbers of similar developments in the area.

7.3.4 Cumulative Visual Impacts

The visual cumulative impact of Project Blue Solar Energy Facility in relation to other renewable project beyond 40 km radius is not of concern due to the remoteness of the area within which the facility is proposed. The cumulative visual impact is therefore expected to be **low**.

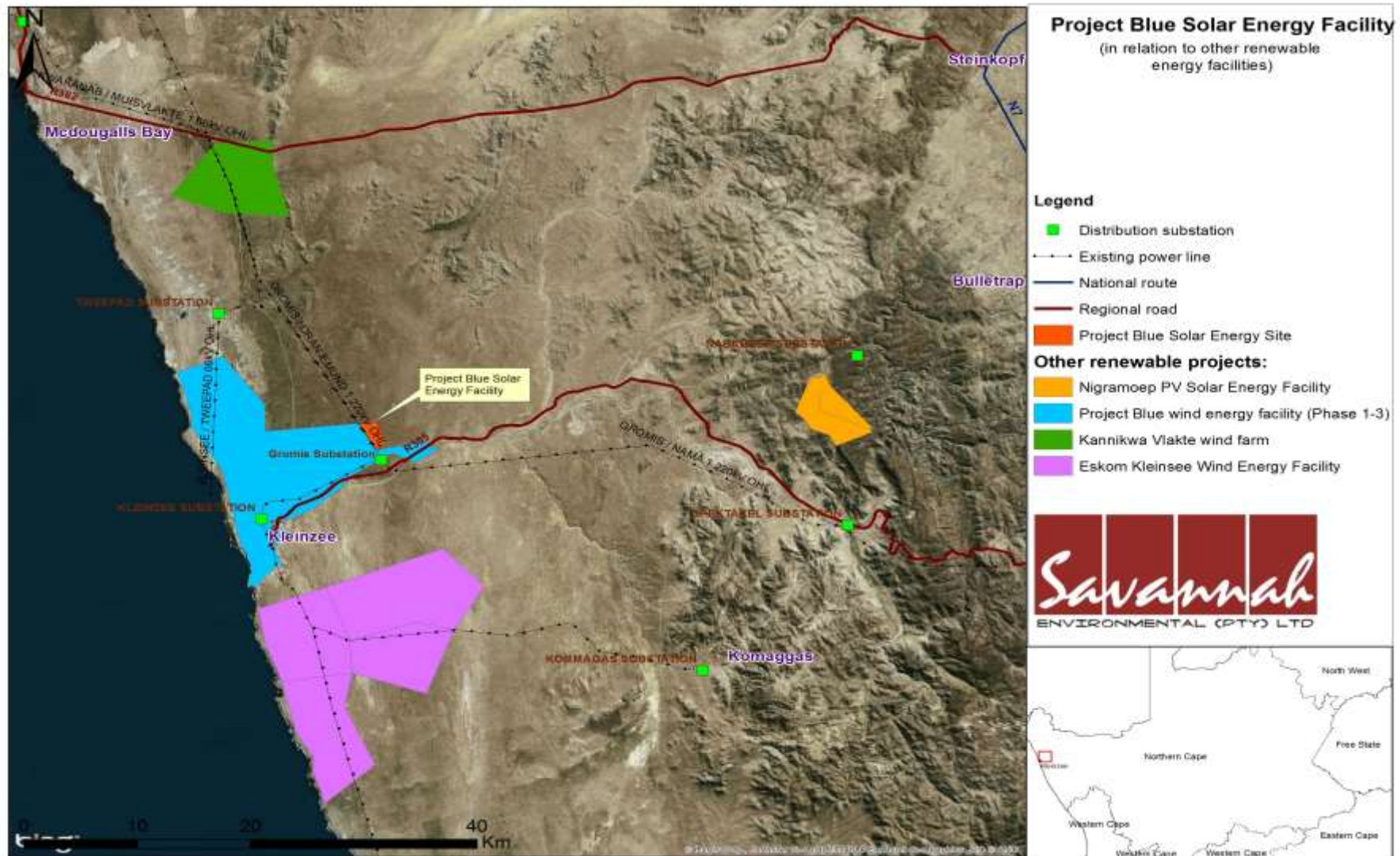


Figure 7.2: Map showing the proximity of other renewable energy facility projects to the Project Blue Solar Energy Facility in order to understand the potential for cumulative impacts

7.3.5 Cumulative Impacts on the Social and Economic Environment

Benefits to the local, regional and national economy through employment and procurement of services could be substantial should many of the renewable energy facilities proceed. This benefit will increase significantly should critical mass be reached that allows local companies to develop the necessary skills to support construction and maintenance activities and that allows for components of the renewable energy facilities to be manufactured in South Africa. Furthermore at municipal level, the cumulative impact could be positive and could incentivise operation and maintenance companies to centralise and expand their activities towards education and training and more closely to the projects.

The cumulative impact in terms of loss of agricultural land is unlikely to be significant due to the limited land take and in most cases agricultural activities would be allowed to proceed on the remaining portions of the sites not affected by the solar facilities. Property prices in these areas are likely to increase as a result of the added value that energy generation offers. However, once the renewable energy sector is saturated, property prices that are dependent on the sense of place value rather than on the agricultural potential may be compromised due to the changes in landscape and sense of place. **Cumulative positive social and economic** impacts and **negative social impacts** (visual, sense of place, noise and disturbance during construction) will be of **moderate significance**.

7.4. Conclusion regarding Cumulative Impacts of Project Blue Solar Energy Facility

Cumulative impacts and benefits on various environmental and social receptors will occur to varying degrees with the development of several renewable energy facilities in South Africa. The degree of significance of these cumulative impacts is difficult to predict without detailed studies based on more comprehensive data/information on each of the receptors and the site specific developments. This however, is beyond the scope of this study.

The alignment of renewable energy developments with South Africa's Integrated Resource Plan (IRP) and the global drive to move away from the use of non-renewable energy resources and to reduce greenhouse gas emissions is undoubtedly positive. The economic benefits of renewable energy developments at a local, regional and national level have the potential to be significant.

It is also important to note that it is unlikely that all proposed renewable energy facilities located in the 25km radius will be built in the short to medium term (i.e. 5 years) due to capacity constraints on the Eskom grid and the limits placed on

renewable energy targets by the DoE. This will reduce the potential for cumulative impacts within this period. Considering the findings of the specialist assessments undertaken for the project, the cumulative impacts for the proposed Project Blue Solar Energy Facility will be of **low to moderate** significance in the region and **low to moderate** within the Project Blue Solar Energy Facility. Positive impacts from a social perspective are expected to be of **moderate-high significance**, specifically for the local communities of Kleinsee.

CONCLUSIONS AND RECOMMENDATIONS

CHAPTER 8

WWK Development (Pty) Ltd is proposing to establish a commercial photovoltaic solar energy facility on Portion 03 of the Farm Predikant Vlei 190, Portion 03 of the Farm Roode Vlei 189 and Portion 04 of the Farm Dikgat 195 north of Kleinsee, Northern Cape Province. The site is located within the Nama Khoi Local Municipality. The purpose of the proposed facility is to add new capacity for generation of power from renewable energy to the national electricity supply (which is short of generation capacity to meet current and expected demand), and to aid in achieving the goal of a 30% share of all new power generation being derived from independent power producers (IPPs), as targeted by the Department of Energy (DoE).

Globally there is increasing pressure on countries to increase their share of renewable energy generation due to concerns such as climate change and exploitation of non-renewable resources. In order to meet the long-term goal of a sustainable renewable energy industry, a goal of 17,8GW of renewables by 2030 has been set by the Department of Energy (DoE) within the Integrated Resource Plan (IRP) 2010. This energy will be produced mainly from wind, solar, biomass, and small-scale hydro (with wind and solar comprising the bulk of the power generation capacity). This amounts to ~42% of all new power generation being derived from renewable energy forms by 2030. In addition, the need for renewable energy development, specifically solar facilities, has been identified as an opportunity in the Northern Cape Spatial Development Framework (SDF).

In response to the need at a National and Provincial level, WWK Development, as an IPP, is proposing the establishment of a 65 MW photovoltaic solar energy facility and associated infrastructure for the purpose of commercial electricity generation. The proposed facility will require a development footprint area of approximately 130 ha (within a larger site of 360 ha in extent), and will be comprised of the following primary elements (refer to Figure 8.1):

- » Arrays of photovoltaic (PV) panels.
- » Mounting structures for the solar panels to be rammed steel piles or piles with pre-manufactured concrete footings.
- » Cabling between the structures, to be lain underground where practical.
- » Central inverter/transformer stations to collect all energy generated from the PV panels. The inverter's role is to convert direct current (DC) electricity to alternating current (AC) electricity at grid frequency.
- » An on-site substation (150m x 150m) and power line (up to 220kV) to evacuate the power from the facility into the Eskom Gromis Substation grid
- » Internal access roads (4-6 m wide roads).

- » Associated buildings including a workshop area for maintenance, storage, and control facility with basic services such as water and electricity

An EIA process, as defined in the NEMA EIA Regulations, is a systematic process of identifying, assessing, and reporting environmental impacts associated with an activity. The EIA process forms part of the planning of a project and informs the final design of a development. In terms of the EIA Regulations published in terms of Section 24(5) of the National Environmental Management Act (NEMA, Act No. 107 of 1998), WWK Development requires authorisation from the National Department of Environmental Affairs (DEA) (in consultation with the Northern Cape Department of Environmental and Nature Conservation (DENC)) for the establishment of Project Blue Solar Energy Facility. In terms of sections 24 and 24D of NEMA, as read with the EIA Regulations of GNR543, GNR544, GNR545; and GNR546, a Scoping and an EIA Phase have been undertaken for the proposed project. As part of this EIA process comprehensive, independent environmental studies have been undertaken in accordance with the EIA Regulations. The following key phases have been undertaken to date in the EIA Process.

- » *Notification Phase* - organs of state, stakeholders, and interested and affected parties (I&APs) were notified of the proposed project through adverts placed in a local and regional newspapers, site notices, and stakeholder letters. Details of registered parties have been included within an I&AP database for the project.
- » *Scoping Phase* – identification of potential issues associated with the proposed project and environmental sensitivities (i.e. over the broader project development site), as well as definition of the extent of studies required within the EIA Phase were defined.
- » *EIA Phase* – potentially significant biophysical and social impacts¹² and identified feasible alternatives put forward as part of the project have been comprehensively assessed through specialist investigations. Appropriate mitigation measures have been recommended as part of a draft Environmental Management Programme (EMPr) (refer to Appendix K).

The Conclusions and Recommendations of this EIA for Project Blue Solar Energy Facility are the result of the assessment of identified impacts by specialists, and the parallel process of public participation. The public consultation process has been extensive and every effort has been made to include representatives of all stakeholders in the study area.

A summary of the recommendations and conclusions for the proposed Project Blue Solar Energy Facility project is provided in this Chapter.

¹² Direct, indirect, cumulative that may be either positive or negative.

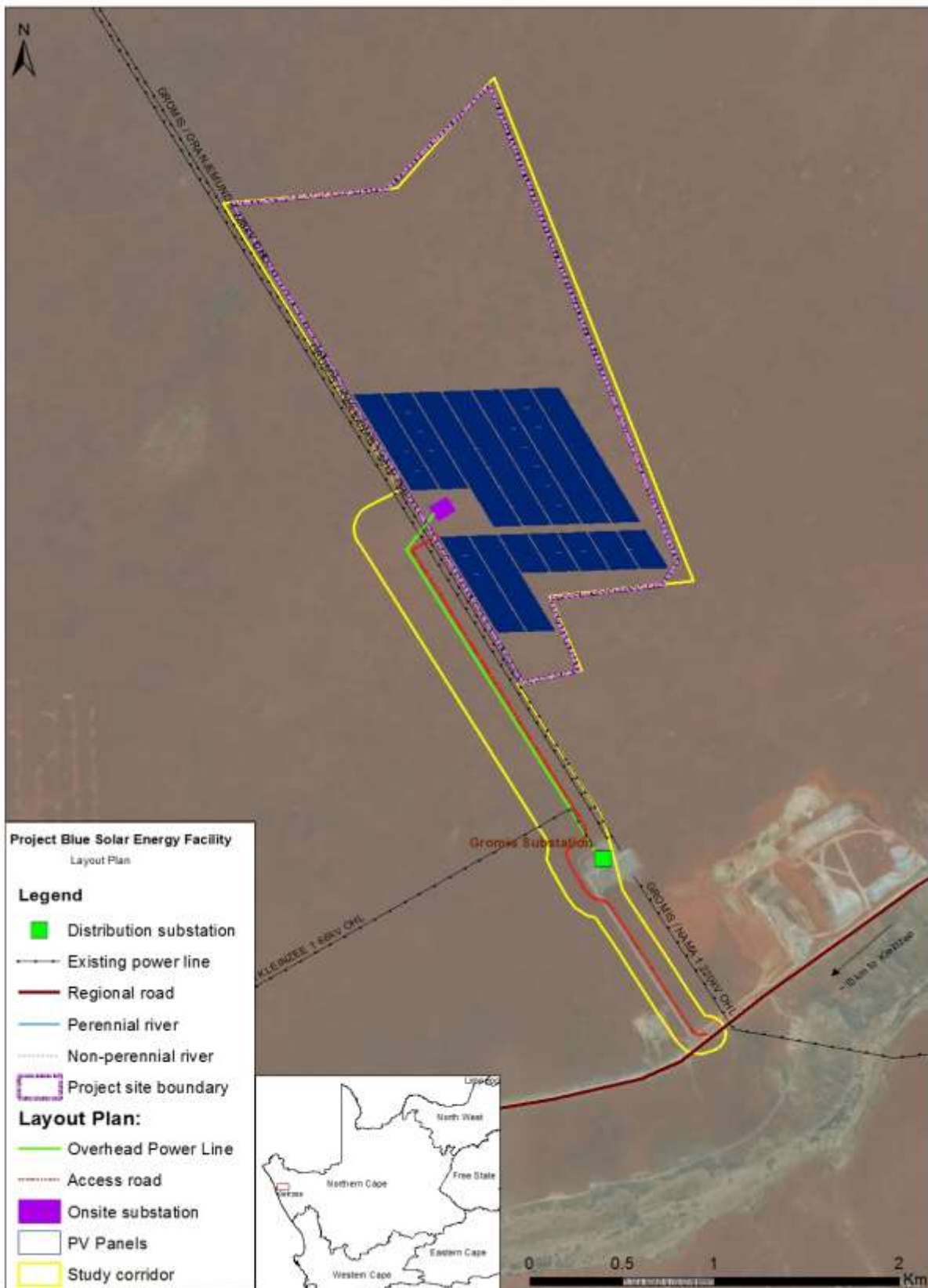


Figure 8.1: Map illustrating the location and layout of the development footprint for Project Blue Solar Energy Facility and associated infrastructure

8.1. Summary of Conclusions and Recommendations relevant to the Project Blue Solar Energy Facility and Associated Infrastructure

The preceding chapters of this report together with the specialist studies contained within **Appendices E-J** provide a detailed assessment of the potential impacts that may result from the proposed project. This chapter concludes the EIA Report for Project Blue Solar Energy Facility by providing a summary of the conclusions of the assessment of the proposed site for the development of the PV solar energy facility. In so doing, it draws on the information gathered as part of the EIA process and the knowledge gained by the environmental specialist consultants and presents an informed opinion of the environmental impacts associated with the proposed project.

From the conclusions of the detailed EIA studies undertaken, sensitive areas within the development footprint area were identified and flagged for consideration and avoidance by the facility layout (refer to Figure 8.2). Potential impacts which could occur as a result of the proposed project are summarised in the sections which follow.

The most significant environmental impacts identified and assessed to be associated with the proposed Project Blue Solar Energy Facility include:

- » Impacts on ecology occurring on the site.

Other impacts which could have an impact on the environment include:

- » Impacts on the local soils, land capability and agricultural potential of the site.
- » Visual impacts mainly due to the solar panels and partly due to other associated infrastructure (power line, access road etc.).
- » Impacts on heritage and paleontological resources.
- » Social and economic impacts.
- » Impacts associated with the power line.



Figure 8.2: Environmental Sensitivity map of the proposed Project Blue Solar Energy Facility

8.1.1. Impacts on Ecology

According to Mucina & Rutherford (2006) the site falls almost entirely within the Namaqualand Strandveld vegetation unit. This vegetation type occupies the valleys and flat areas between the granitic rocky hills of the Namaqualand escarpment from Steinkopf in the north to Bitterfontein in the south. Namaqualand Strandveld consisting of open, low to mid-high succulent shrubland on red, sandy soil. Perennial geophytes such as *Boophone disticha* (gifbol). The ecological sensitivity assessment identified those parts of the site that have low conservation value. From an ecology perspective, it is not expected that the development will compromise the survival of any specific flora or terrestrial vertebrate species on the study area or beyond if mitigation measures are fully implemented. The most significant impacts are expected to be on ecosystem health and functionality, which should remain relatively intact if all mitigation recommendations are implemented.

8.1.2. Impact on Soils, Land Capability and Agricultural Potential

The soils are mainly eutrophic and lime containing red deep sandy soils with limited occurrences of yellow brown soils are prone to wind erosion due to the sandy texture of the soil. It is, therefore, important that there should be strict adherence to the Environmental Management Programme and good soil management measures regarding the management of stormwater runoff and water erosion control should be implemented during all phases of the project. With the implementation of good soil management measures the impact of the PV Facility on soils can be managed to an acceptable level, without significant erosion issues during the lifespan of the facility.

The study area has limited agricultural potential. The significance of agricultural impacts is influenced by the fact that the site has extremely limited agricultural potential. The site is used only for grazing of sheep and goat. No agriculturally sensitive areas occur within the proposed Project Blue Solar Energy Facility footprint. The major limitations to agriculture are the aridity and lack of access to water, as well as the very sandy soils with limited water and nutrient holding capacity, and in some places limited soil depth. The development will have **low to medium** negative impacts on agricultural resources and productivity. The conclusion of this assessment is that from an agricultural impact perspective the development can proceed as proposed, subject to the recommended mitigation measures provided being implemented.

8.1.3. Visual Impacts

The visual surroundings of the proposed Project Blue solar Energy site, especially within a 3km radius, will be visually impacted upon for the anticipated operational lifespan of the facility (i.e. 20 - 30 years). There are no major urban developments near (within 12km of) the proposed Project Blue Solar Energy Facility development site, but additional viewer incidence (and expected negative viewer perception) will be concentrated within the homesteads and farm residences within the study area at 12km, located primarily along the Buffels River.

During the decommissioning or post-closure phase of the project, all of the infrastructure will be removed, recycled or re-used off-site. The residual visual impacts of the site are expected to include scarring of the landscape in the areas affected by infrastructure. With the implementation of appropriate management measures such as rehabilitation of disturbed areas and planting of vegetation and visual screening methods at receptors / key viewpoints, this scarring and visual impact could be reduced and removed in the long-term.

The anticipated visual impacts identified through the EIA process (post mitigation measures) are on average expected to be of low to moderate significance. The Project Blue Solar development is therefore not considered to be fatally flawed from a visual perspective.

8.1.4. Impacts on Heritage and Paleontological Resources

There were no heritage sensitive areas identified on the Project Blue Solar Energy Facility.

The impact of the project on **heritage resource** is rated as **low significance**. However, a preconstruction walk-through survey by an archaeologist is recommended to be undertaken for the PV facility and associated infrastructure. Should substantial archaeological or paleontological (fossils) remains or graves be exposed during construction, SAHRA should be alerted as soon as possible such that appropriate action (e.g. recording, sampling or collection) can be taken by a professional archaeologist or palaeontologist. It is recommended that a close examination of all excavations be made while they are occurring during construction within the Gordonian Formation sands.

8.1.5. Social and Economic Impacts

The proposed project could have negative and positive **social and economic impacts** of **low (negative) and high (positive) significance** for post

mitigation and enhancement respectively. Project Blue Solar Energy 65MW facility will provide opportunities for employment and skills development in the local area during both the construction and operational phases. Another potential spin-off from the development is the stimulation of the local economy, including development of industries specifically to provide services and goods for solar facilities, and general retail businesses and accommodation. Potential negative impacts include the threats to public safety from construction and traffic activity, potential increased crime and health risks such as HIV/Aids particularly during construction and if people move into the area hoping to secure jobs. Social dissent is also possible if people perceive that recruitment processes are unfair and biased. Other impacts on the social environment include impacts associated with traffic and infrastructure (such as local roads). It is important that potential negative effects are managed as per the recommended mitigation measures to prevent these from developing into unacceptable cumulative impacts. Positive impacts of job creation and stimulation of the local economy can be progressed and cumulatively contribute to a desired outcome if enhancements measures (as contained in the socio-economic specialist study and draft EMPr) are implemented.

8.2. Assessment of Potential Cumulative Impacts

Cumulative impacts and benefits on various environmental and social receptors will occur to varying degrees with the development of several renewable energy facilities in South Africa. The degree of significance of these cumulative impacts is difficult to predict without detailed studies based on more comprehensive data/information on each of the receptors and the site-specific developments. This however, is beyond the scope of this study. The alignment of renewable energy developments with South Africa's IRP and the global drive to move away from the use of non-renewable energy resources and to reduce greenhouse gas emissions is undoubtedly positive. The economic benefits of renewable energy developments at a local, regional and national level have the potential to be significant.

The proposed Project Blue Solar Energy facility falls within the identified geographical areas most suitable for the rollout of the development of renewable energy projects, as identified in the preliminary maps published for the demarcation of Renewable Energy Development Zones (REDZ). This implies that projects of the same nature will be consolidated in one area creating a node, and ultimately aiming to reduce the potential for cumulative impacts associated with such developments when spatially fragmented. It is also important to note that it is unlikely that all proposed renewable energy facilities located in the 40km radius (as detailed in chapter 7) will be constructed in the short to medium term (i.e. 5 years) due to capacity constraints on the Eskom grid and the limits placed on

renewable energy targets by the DoE. This will reduce the potential for cumulative impacts within this period. Considering the findings of the specialist assessments undertaken for the project, the cumulative impacts for the proposed Project Blue Solar Energy facility will be of **low to moderate** significance in the region and **low to moderate** within the Project Blue project site. Positive impacts relate to those on the social environment, and are expected to be of **moderate to high significance**, specifically for the local communities.

8.3. Environmental Costs of the Project versus Benefits of the Project

Environmental (natural environment, economic and social) costs can be expected to arise as a result of the project proceeding. This could include:

- » Direct loss of biodiversity, flora, fauna and soils due to the clearing of land for the construction and utilisation of land for the PV project (which is limited to the development footprint of 130 hectares). The cost of loss of biodiversity has been minimised on the Project Blue Solar Energy site through the careful location of the development to avoid key areas supporting biodiversity of particularly high conservation importance as far as possible.
- » Visual impacts associated with the PV panels and power line. The cost of loss of visual quality to the area is reduced due to the area already being visually impacted to some extent by power lines and mining activities. In addition, the area is largely devoid of sensitive receptors due to the remoteness of the site, thereby contributing to the limited visual impacts expected.
- » Change in land-use and loss of land available for grazing on the development footprint. The cost in this regard is expected to be limited due to the low agricultural potential and carrying capacity of the property, and the fact that grazing could continue on portions of the property not affected by the proposed development.

These costs are expected to occur at a local and site level and are considered acceptable provided the mitigation measures as outlined in this EIA and the EMP are implemented.

Benefits of the project include the following:

- » The project will result in important economic benefits at the local and regional scale through job creation, procurement of materials and provision of services and other associated downstream economic development. These will persist during the preconstruction/ construction and operational phases of the project. This is considered to be particularly beneficial at a local scale due to the current limited number of job opportunities and economic development within the area.

- » The project contributes towards the Provincial and Local goals for the development of renewable energy (specifically solar developments) as outlined in the respective SDFs and IDPs.
- » The project is located within a proposed REDZ area and is therefore in line with the current proposed planning in this regard.
- » The project serves to diversify the economy and electricity generation mix of South Africa by addition of solar energy to the mix.
- » South Africa's per capita greenhouse gas emissions are amongst the highest in the world due to reliance on fossil fuels. The proposed project will contribute to South Africa achieving goals for implementation of non-renewable energy and 'green' energy. Greenhouse gas emission load is estimated to reduce by 0.86% for a 500MW coal-fired power station compared to a similar MW PV project, on a like for like basis.

The benefits of the project are expected to occur at a national, regional and local level. As the economic costs to the environment have been largely limited through the appropriate placement of infrastructure on the site within low sensitivity areas, the expected benefits of the project will partially offset the localised environmental costs of the project.

8.4. Overall Conclusion (Impact Statement)

The principles of NEMA have been considered in this assessment through the implementation of the principle of sustainable development where appropriate mitigation measures have been recommended for impacts which cannot be avoided. In addition, the successful implementation and appropriate management of this proposed project will aid in achieving the principles of minimisation of pollution and environmental degradation at a national scale.

The EIA process has been undertaken in accordance with the requirements of the EIA Regulations and all effort has been made to involve interested and affected parties, stakeholders and relevant Organs of State such that an informed decision regarding the project can be made by the Regulating Authority. The general objectives of Integrated Environmental Management have been taken into account for this EIA report by means of identifying, predicting and evaluating the actual and potential impacts on the biophysical environment, socio-economic conditions and cultural heritage component. The risks, consequences, alternatives as well as options for mitigation of activities have also been considered with a view to minimise negative impacts, maximise benefits, and promote compliance with the principles of sustainable environmental management.

The technical viability of establishing a solar energy facility with a net generating capacity of 65 MW on a site located on Portion 03 of the Farm Predikant Vlei 190, Portion 03 of the Farm Roode Vlei 189 and Portion 04 of the Farm Dikgat 195 has been established by WWK Development (Pty) Ltd. The positive implications of establishing the Project Blue Solar Energy facility on the identified site include the following:

- » The potential to harness and utilise solar energy resources within the Northern Cape Province.
- » The project will assist the South African government at a national, provincial and local level in reaching their set targets for renewable energy.
- » The project will assist the South African government in the implementation of its green growth strategy and job creation targets.
- » The project will assist the district and local municipalities in reducing levels of unemployment through the creation of jobs, skills development opportunities and support of local business.
- » The National electricity grid in the Northern Cape Province will benefit from the additional generated power.
- » The project will contribute towards the promotion of clean, renewable energy in South Africa.
- » Project blue Solar Energy site is appropriately located for easy access via:
 - * "Kleinsee pad": R355, via Springbok (~97 km). This constitutes the most direct route to Kleinsee from the N7, and the only proclaimed public road to Kleinsee. The segment from Springbok to Buffelsrivier is tarred and provides sole access to the study area communities from Springbok. The segment from Buffelsrivier to Kleinsee is untarred and the road in a relatively bad state;
 - * "Rooipad": Buffelsrivier-Kommagas Road off the R355, linking up with the KDBC Koiingnaas-Kleinsee road south of Kleinsee. The segment from Buffelsrivier to Kommagas is tarred; the portion from Kommagas to the De Beers Consolidated Koingnaas road is a De Beers Consolidated owned gravel road. This Kommagas Road ("rooipad" due to red soils) is preferred by Kleinsee residents and Kleinsee farmers for accessing Springbok;
 - * "Hondekliipbaai pad": Combination of (mainly gravel) roads from Garies (off the N7), via Hondelikpbaai and Koingnaas. This constitutes the most direct road link to the harbours of Cape Town and Saldanha via the N7. Garies is located approximately 176 km south-east of Kleinsee (by road). The De Beers Consolidated owned Kleinsee-Koingnaas segment is the only tarred segment at present. The remainder of the road is essentially only safely negotiable by 4x4 or truck. Tarring of the Garies-Hondeklipbaai segment is envisaged by

the Kamiesberg Local Municipality SDF in the medium to long term, but no funds appear to have been allocated.

- » Gramis-Oranjemund 1 220kV power line runs parallel the proposed site, the project proximity to the national grid connection reduces some of the impacts related to building longer power line to connect to the grid.

The findings of the specialist studies undertaken within this EIA to assess both the benefits and potential negative impacts anticipated as a result of the proposed project conclude that there are **no environmental fatal flaws** that should prevent the proposed project from proceeding, provided that the recommended mitigation and management measures are implemented. The significance levels of the majority of identified negative impacts have been reduced to acceptable levels by implementing the mitigation measures recommended by the specialist team during the EIA process, and this specifically included the consideration of the facility layout in relation to site-specific sensitivities identified. The avoidance of areas of sensitivity is illustrated by the facility layout drawing overlain on the sensitivity map included as Figure 8.2. The project has all environmental constraints, and is considered to meet the requirements of sustainable development. Environmental specifications for the management of potential impacts are detailed within the draft Environmental Management Programme (EMPr) for the Project Blue Solar Energy facility included within **Appendix K**.

With reference to the information available at this planning approval stage in the project cycle, the **confidence** in the environmental assessment undertaken is regarded as **acceptable** provided all measures are taken to protect and preserve surrounding environment.

8.5. Overall Recommendation

Based on the nature and extent of the proposed project, the local level of disturbance predicted as a result of the construction and operation of the facility and associated infrastructure, the findings of the EIA, and the understanding of the significance level of potential environmental impacts, it is the opinion of the EIA project team that the impacts associated with the development of the Project Blue Solar Energy project can be mitigated to an acceptable level. In terms of this conclusion, the EIA project team support the decision for environmental authorisation.

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

- » The draft Environmental Management Programme (EMPr) as contained within Appendix K of this report should form part of the contract with the Contractors

appointed to construct and maintain the proposed solar energy facility, and will be used to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for all life cycle phases of the proposed project is considered to be the main key in achieving the appropriate environmental management standards as detailed for this project.

- » Following the final design of the facility, a final layout indicating all relevant infrastructure and affected areas (permanent and temporary) must be submitted to DEA for review and approval prior to commencing with construction.
- » If any protected plant or tree species will be removed/destroyed by the developer, a collection/destruction permit to be obtained from Northern Cape Department of Environment and Nature Conservation and/or DAFF for the protected species found on site as well from the provincial permitting authority.
- » A detailed Invasive Plant Management Plan will have to be in place prior to commencement of activity and be diligently followed and updated throughout the project cycle up to the decommissioning phase.
- » Access roads to the development should follow existing tracks as far as possible. Where new access routes will be necessary, suitable erosion control measures must be implemented.
- » All infrastructures, including access roads and other on-site infrastructure must be planned so that the clearing of vegetation is minimised.
- » Site rehabilitation of temporary laydown and construction areas to be undertaken immediately after construction.
- » Once the facility has exhausted its life span, the main facility and all associated infrastructure not required for the post rehabilitation use of the site should be removed and all disturbed areas appropriately rehabilitated. An ecologist should be consulted to provide input into rehabilitation specifications.
- » Develop an emergency maintenance plan to deal with any event of contamination, pollution, or spillages during construction and operation.
- » Compile a comprehensive storm-water management method statement, as part of the final design of the project and implement during construction and operation.
- » All rehabilitated areas should be monitored for at least a year following decommissioning, and remedial actions implemented as and when required.
- » An independent Environmental Control Officer (ECO) must be appointed by the project developer prior to the commencement of any authorised activities.
- » Applications for all other relevant and required permits required to be obtained by the developer and must be submitted to the relevant regulating authorities.