

REPORT N° 47579-01

BIO THERM ENAMANDLA SOLAR FACILITY - SITE 5

SOCIO-ECONOMIC IMPACT ASSESSMENT

PUBLIC

FEBRUARY 2017

BIO THERM ENAMANDLA SOLAR FACILITY - SITE 5

SOCIO-ECONOMIC IMPACT ASSESSMENT

BioTherm Energy (Pty) Ltd

Type of document (version)
Public

Project no: 47579
Date: February 2017

—
WSP | Parsons Brinckerhoff
WSP House, Block A
1 on Langford, Langford Road, Westville

Tel: +27 31 240 8860
Fax: +27 31 240 8861
www.wspgroup.com
www.pbworld.com

QUALITY MANAGEMENT

ISSUE/REVISION	FIRST ISSUE	REVISION 1	REVISION 2	REVISION 3
Remarks	Draft			
Date	February 2017			
Prepared by	Hilary Konigkramer			
Signature				
Checked by	Danielle Sanderson			
Signature				
Authorised by	Hilary Konigkramer			
Signature				
Project number	47479			
Report number	01			
File reference	W/000 New Projects/47479			

PRODUCTION TEAM

CLIENT

BioTherm Energy (Pty) Ltd

Irene Bezuidenhout

WSP | PARSONS BRINCKERHOFF

Director

Hilary Konigkramer

Senior Consultant

Danielle Sanderson

Assistant Consultant

Bathabile Msomi

TABLE OF CONTENTS

1	INTRODUCTION.....	1
1.1	SCOPE OF WORK	1
1.2	OBJECTIVES OF THE REPORT	1
1.3	LEGISLATIVE FRAMEWORK	4
1.4	STUDY APPROACH AND METHODOLOGY.....	4
1.5	ASSUMPTIONS AND LIMITATIONS OF THE STUDY.....	9
1.6	DECLARATION OF INDEPENDENCE.....	9
2	DESCRIPTION OF THE PROJECT.....	10
2.1	PROPOSED PROJECT DEVELOPMENT ACTIVITIES.....	12
2.2	PROJECT ALTERNATIVES	13
3	DESCRIPTION OF THE AFFECTED ENVIRONMENT	15
3.1	REGIONAL SOCIO-ECONOMIC OVERVIEW.....	15
3.2	LOCAL CONTEXT.....	16
3.3	LOCAL ECONOMIC ACTIVITIES	18
3.4	LOCAL COMMUNITIES.....	21
4	SOCIO-ECONOMIC POLICY AND PLANNING CONTEXT	23
4.1	NATIONAL POLICIES	23
4.2	PROVINCIAL POLICIES.....	23
4.3	DISTRICT AND LOCAL MUNICIPALITY POLICIES.....	24
5	FINDINGS	25
5.1	CONSTRUCTION PHASE	26
5.2	OPERATIONAL PHASE	29
5.3	DECOMMISSIONING PHASE.....	30
5.4	CUMULATIVE IMPACTS.....	31

5.5	NO-GO ALTERNATIVE IMPACTS	33
6	ASSESSMENT OF IMPACTS	33
7	MITIGATION AND MANAGEMENT MEASURES	36
8	STAKEHOLDER CONSULTATION	39
8.1	STAKEHOLDER CONSULTATION PROCESS	39
8.2	STAKEHOLDER COMMENTS AND RESPONSE	39
9	CONCLUSIONS	40

TABLES

TABLE 1: DETAILS OF THE PROPOSED PV FACILITY AND THE ASSOCIATED INFRASTRUCTURE.....	11
TABLE 2: ALTERNATIVES CONSIDERED IN EIA PHASE	14
TABLE 3: RENEWABLE ENERGY PROJECTS IN PROXIMITY TO THE PROPOSED PROJECT SITE	20
TABLE 4: DESCRIPTION OF LOCAL COMMUNITIES.....	21
TABLE 5: SUMMARY OF CONSTRUCTION PHASE IMPACTS.....	33
TABLE 6: SUMMARY OF OPERATIONAL PHASE IMPACTS.....	34
TABLE 7: SUMMARY OF DECOMMISSIONING PHASE IMPACTS.....	35
TABLE 8: SUMMARY OF CUMULATIVE IMPACTS.....	36
TABLE 9: MITIGATION AND MANAGEMENT MEASURES	37
TABLE 10: RESPONSES TO COMMENTS.....	39

FIGURES

FIGURE 1 REGIONAL LOCATION OF PROPOSED PROJECT	2
FIGURE 2 PROJECT LAYOUT	3
FIGURE 3 EXAMPLE OF A LARGE-SCALE PHOTOVOLTAIC POWER GENERATION FACILITY	10
FIGURE 4 POPULATION GROUPS AND LANGUAGES SPOKEN – NORTHERN CAPE	15
FIGURE 5 POPULATION PYRAMID – NORTHERN CAPE	16
FIGURE 6 POPULATION GROUPS AND LANGUAGES SPOKEN- KHÂI-MA LOCAL MUNICIPALITY	17
FIGURE 7 POPULATION GROUPS - KHÂI-MA LOCAL MUNICIPALITY.....	18

FIGURE 8 THE LOCATION OF THE EXISTING ENVIRONMENTAL AUTHORISATIONS WITHIN 65KM OF ENAMANDLA PV SITE 1	19
FIGURE 9 LOCAL CONTEXT OF THE PROPOSED PROJECT.....	22

APPENDICES

A P P E N D I X A	INTERVIEW QUESTIONS AND RESPONSES
A P P E N D I X B	CURRICULUM VITAE
A P P E N D I X C	DECLARATION OF INDEPENDENCE
A P P E N D I X D	CUMULATIVE ASSESSMENT
A P P E N D I X E	ASSESSMENT OF IMPACTS
APPENDIX E-1	CONSTRUCTION
APPENDIX E-2	OPERATION
APPENDIX E-3	DECOMMISSIONING
APPENDIX E-4	CUMULATIVE

1 INTRODUCTION

BioTherm Energy (Pty) Ltd (BioTherm) propose to develop a renewable energy complex within the Northern Cape. The proposed BioTherm renewable energy complex is to be located approximately 14 km south of the town of Aggeneys, between the towns of Pofadder and Springbok in the Northern Cape (**Figure 1**). The complex is proposed to comprise of two developments, namely the Letsoai and Enamandla developments. **Figure 2** provides an overview of the proposed solar complex. Each of these developments will encompass a number of smaller solar power developments and associated infrastructure, as listed below:

- à Letsoai – Two 150 MW Concentrated (central receiver) Solar Power (CSP) facilities;
- à Enamandla – Five 75 MW Photovoltaic (PV) facilities; and
- à Common infrastructure, which includes a 400kV transmission line, substation and water pipeline.

As part of this complex, BioTherm, proposed to develop a 75 MW PV facility, namely Enamandla PV Site 5 (the proposed project).

WSP | Parsons Brinckerhoff, Environment and Energy, Africa (WSP | Parsons Brinckerhoff) has been appointed to undertake a Social and Environmental Impact Assessment (SEIA) for the proposed project in order to apply for Environmental Authorisation (EA).

The SEIA is divided into two phases, firstly the Scoping Phase, and secondly and Environmental Impact Assessment (EIA) Phase. This report comprises the Socio-Economic Impact Assessment (SIA) in support of the EIA Phase of the SEIA.

1.1 SCOPE OF WORK

The scope of the SIA was to determine the potential positive and negative impacts of the proposed project, as well as the related infrastructure and alternatives, on the local and regional landscape. Direct, indirect and cumulative impacts of the proposed project in relation to current and proposed activities within the local area have been considered.

1.2 OBJECTIVES OF THE REPORT

The SIA Report has achieved the following objectives:

- à Development of a social profile for the proposed project area through the description of the socio-economic receiving environment that may be affected by the proposed activity;
- à Identification, description and assessment of the potential socio-economic impacts associated with the proposed facility; and
- à Provision of mitigation measures and recommendations to enhance the socio-economic sustainability of all phases of the proposed project



Figure 1 Regional location of proposed project

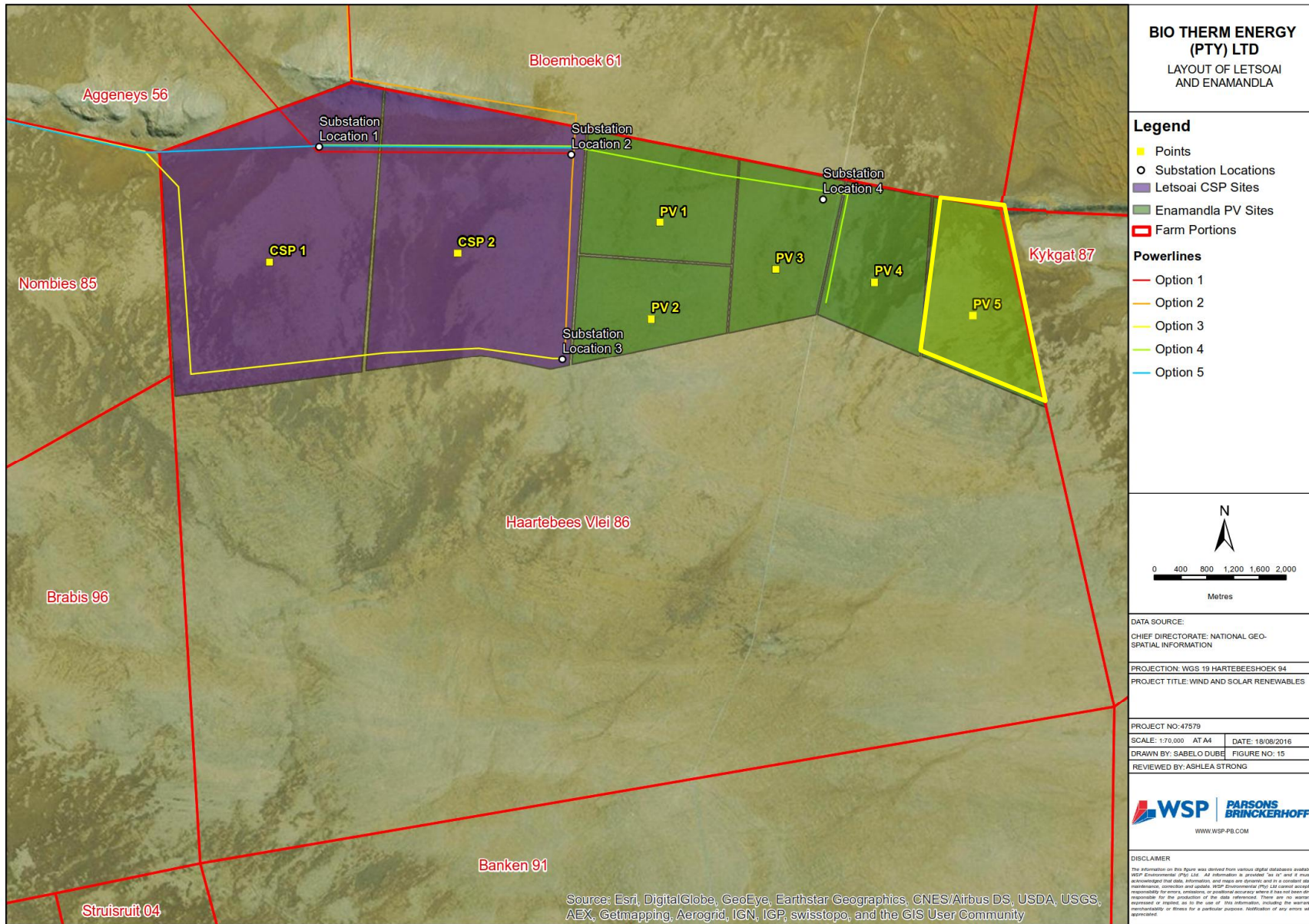


Figure 2 Project layout
BioTherm Enamandla Solar Facility - Site 5
BioTherm Energy (Pty) Ltd
Public

1.3 LEGISLATIVE FRAMEWORK

There is no legal framework which governs SIA processes in South Africa; however, a guideline for SIA is included in the *Western Cape Department of Environmental Affairs and Development Planning Guideline for Involving Social Assessment Specialists in EIA Processes* (Barbour, 2007).

The National Environmental Management Act, as amended (1998) 2014 EIA Regulations provides the general requirements for consultants compiling specialist reports or undertaking specialist processes. In summary, a specialist must:

- à Be independent
- à Have expertise in conducting the study, including knowledge of NEMA, the EIA Regulations and any relevant guidelines
- à Perform the work in an objective manner, even if the findings are not favourable to the applicant
- à Comply with all applicable legislation
- à Disclose to the applicant and competent authority all material information that may have the potential to influence:
 - < Any decision to be taken with respect of the application by the competent authority; or
 - < The objectivity of any report, plan or document to be prepared for submission to the competent authority.

1.4 STUDY APPROACH AND METHODOLOGY

APPROACH

The approach to the SIA has been to undertake a largely desktop based assessment. As no highly significant negative social impacts were identified in the Scoping Phase, and in consideration of the fact that the site is located in a sparsely populated area, a site visit was not considered essential.

A desktop review of available data and resources have formed the basis of the assessment, with limited primary data collection in the form of telephonic interviews with key individuals held in November 2016.

SCOPING PHASE - SCREENING STUDY

The socio-economic screening assessment undertaken during the Scoping Phase sought to obtain insights into the nature of the local social and economic environment, and the potential socio-economic issues that may arise from the proposed project. The following activities were conducted during the Socio-Economic Scoping Study:

- à Desktop Review;
- à Description of the socio-economic context of the project;
- à Identification of potential issues and impacts associated with all components and alternatives associated with the proposed project; and
- à Plan of Study for EIA Phase SIA study.

EIA PHASE – SOCIAL IMPACT ASSESSMENT

The Socio-Economic Scoping Report (dated October 2016) provided the terms of reference for the impact assessment phase. The SIA included the following activities:

- à Desktop Review:
 - < Review of relevant specialist reports in order to obtain an understanding of the broader impacts associated with the project which may have a bearing on the social landscape; and
 - < Review of outcomes of the Scoping Phase stakeholder engagement (including review of meeting minutes, comment and response reports) to obtain insight into the socio-economic issues and concerns raised by stakeholders.
- à Primary Data Collection:
 - < An interview (telephonic) with a key representative of the Khâi Ma Local Municipality, Mr Alfredo Green – Communication and Special Projects Manager, was held to obtain insights into the anticipated socio-economic impacts associated with the proposed project (**Appendix A**).

The interview sought to obtain responses to specific socio-economic questions and to obtain clarity on assumptions made in the Scoping Phase. The representative interviewed was identified through the EIA process, and was considered knowledgeable and able to represent the local context objectively, and thus meet the requirements of the SIA study.
- à Impact Assessment and Recommendations:
 - < Evaluation of potential impacts (as per impact assessment methodology outlined below) and identification of appropriate mitigation and management measures to enhance positive impacts and reduce negative impacts.

IMPACT ASSESSMENT METHODOLOGY

The EIA uses a methodological framework developed by WSP | Parsons Brinckerhoff to meet the combined requirements of international best practice and NEMA, 2014 EIA Regulations.

As required by the EIA Regulations, the determination and assessment of impacts will be based on the following criteria:

- à Nature of the Impact
- à Significance of the Impact
- à Consequence of the Impact
- à Extent of the impact
- à Duration of the Impact
- à Probability if the impact
- à Degree to which the impact:
 - < can be reversed;
 - < may cause irreplaceable loss of resources; and
 - < can be avoided, managed or mitigated.

Following international best practice, additional criteria have been included to determine the significant effects. These include the consideration of the following:

- à Magnitude: to what extent environmental resources are going to be affected;
- à Sensitivity of the resource or receptor (rated as high, medium and low) by considering the importance of the receiving environment (international, national, regional, district and local), rarity of the receiving environment, benefits or services provided by the environmental resources and perception of the resource or receptor); and

- à Severity of the impact, measured by the importance of the consequences of change (high, medium, low, negligible) by considering inter alia magnitude, duration, intensity, likelihood, frequency and reversibility of the change.

It should be noted that the definitions given are for guidance only, and not all the definitions will apply to all of the environmental receptors and resources being assessed. Impact significance was assessed with and without mitigation measures in place.

METHODOLOGY

Impacts are assessed in terms of the following criteria:

- à The **nature**, a description of what causes the effect, what will be affected and how it will be affected

NATURE OR TYPE OF IMPACT	DEFINITION
Beneficial / Positive	An impact that is considered to represent an improvement on the baseline or introduces a positive change.
Adverse / Negative	An impact that is considered to represent an adverse change from the baseline, or introduces a new undesirable factor.
Direct	Impacts that arise directly from activities that form an integral part of the Project (e.g. new infrastructure).
Indirect	Impacts that arise indirectly from activities not explicitly forming part of the Project (e.g. noise changes due to changes in road or rail traffic resulting from the operation of Project).
Secondary	Secondary or induced impacts caused by a change in the Project environment (e.g. employment opportunities created by the supply chain requirements).
Cumulative	Impacts are those impacts arising from the combination of multiple impacts from existing projects, the Project and/or future projects.

- à The physical **extent**, wherein it is indicated whether:

SCORE	DESCRIPTION
1	the impact will be limited to the site;
2	the impact will be limited to the local area;

SCORE DESCRIPTION

3	the impact will be limited to the region;
4	the impact will be national; or
5	the impact will be international;

à The **duration**, wherein it is indicated whether the lifetime of the impact will be:

SCORE DESCRIPTION

1	of a very short duration (0 to 1 years)
2	of a short duration (2 to 5 years)
3	medium term (5–15 years)
4	long term (> 15 years)
5	Permanent

à The **magnitude of impact on ecological processes**, quantified on a scale from 0-10, where a score is assigned:

SCORE DESCRIPTION

0	small and will have no effect on the environment.
2	minor and will not result in an impact on processes.
4	low and will cause a slight impact on processes.
6	moderate and will result in processes continuing but in a modified way.
8	high (processes are altered to the extent that they temporarily cease).

SCORE	DESCRIPTION
-------	-------------

10	very high and results in complete destruction of patterns and permanent cessation of processes.
----	---

- à The **probability of occurrence**, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale where:

SCORE	DESCRIPTION
-------	-------------

1	very improbable (probably will not happen).
2	improbable (some possibility, but low likelihood).
3	probable (distinct possibility).
4	highly probable (most likely).
5	definite (impact will occur regardless of any prevention measures).

- à 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;
- à the **status**, which is described as either positive, negative or neutral;
- à the degree to which the impact can be reversed;
- à the degree to which the impact may cause irreplaceable loss of resources; and
- à the *degree* to which the impact can be mitigated.

The **significance** is determined by combining the criteria in the following formula:

$$S = (E+D+M)*P$$

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The **significance weightings** for each potential impact are as follows:

OVERALL SCORE	SIGNIFICANCE RATING	DESCRIPTION
< 30 points	Low	where this impact would not have a direct influence on the decision to develop in the area
31-60 points	Medium	where the impact could influence the decision to develop in the area unless it is effectively mitigated
> 60 points	High	where the impact must have an influence on the decision process to develop in the area

The impact significance without mitigation measures will be assessed with the design controls in place. Impacts without mitigation measures in place are not representative of the project's actual extent of impact, and are included to facilitate understanding of how and why mitigation measures were identified. The residual impact is what remains following the application of mitigation and management measures, and is thus the final level of impact associated with the development of the Project. Residual impacts also serve as the focus of management and monitoring activities during Project implementation to verify that actual impacts are the same as those predicted in this EIA Report.

1.5 ASSUMPTIONS AND LIMITATIONS OF THE STUDY

The SIA was undertaken largely as a desktop assessment. The investigation is thus limited to the understanding to be gained through desktop review, feedback on stakeholder involvement in the Scoping Phase, limited interviews, feedback from the EIA project team, and review of other specialist studies related to the proposed project.

This approach may limit the specialists understanding of the nature of the site and surrounding communities, resulting in assumptions being drawn in this study related to the specialist's previous studies conducted in the Northern Cape and secondary information. Although the absence of first-hand experience and primary data collection by the social specialist was identified by the peer review process as a potential weakness of the SIA study, the competent authority has supported the desktop approach. This is likely to be due to the sparsely populated nature of the study area, and the limited socio-economic activities which could potentially be impacted.

1.6 DECLARATION OF INDEPENDENCE

Danielle Sanderson (Senior Consultant) is a qualified social scientist with a Masters of Social Science in Environmental Management obtained from the University of KwaZulu-Natal in 2006. She has over 8 years' experience in social assessments. Danielle undertook the socio-economic screening process and reporting.

Hilary Konigkramer (Director) is a qualified social scientist with a Bachelor of Social Science Honours in Environmental Management obtained from the University of Natal in 1998. She has over 15 years' experience as a consulting social and environmental scientist. Hilary provided guidance and review of the screening report and authored the SIA Report (this document).

Curriculum vitae of the above specialists are provided in **Appendix B**.

Both Danielle Sanderson and Hilary Konigkramer, responsible for undertaking the study and contributing to the production of the Draft SIA Report, are independent and do not have vested or financial interests in the proposed Enamandla PV Site 5 facility being approved or not. Declaration of Independence forms are attached in **Appendix C**.

2 DESCRIPTION OF THE PROJECT

The proposed project is located approximately 14 km south of Aggeneys (**Figure 1**). The proposed project will comprise a fixed tilt or tracking technology with a generating capacity of up to 75 MW.

Large-scale or utility-scale PV systems are designed for the supply of commercial power into the electricity grid (**Figure 3**). Large-scale PV plants differ from the smaller units and other decentralised solar power applications because they supply power at the utility level, rather than to local users. PV cells are made from semi-conductor materials that are able to release electrons when exposed to solar radiation. This is called the photo-electric effect. Several PV cells are grouped together through conductors to make up one module and modules can be connected together to produce power in large quantities.

A summary of the details of the PV facility and its associated infrastructure is included in **Table 1**.



Source: www.pv-magazine.com

Figure 3 Example of a large-scale photovoltaic power generation facility

Table 1: Details of the Proposed PV Facility and the Associated Infrastructure

INFRASTRUCTURE	DETAILS / DIMENSIONS		
Technology	Photovoltaic panels with either fixed axis mounting or single axis tracking solutions. Panels will be crystalline silicon or thin film technology		
Generation capacity	75 MW		
Total footprint	354 ha		
PV Panels	Number of panels	Approximately 281,000 to 274,000	
	Area	Approximately 2 m ² /panel	
	Dimensions	1956 mm x 992 mm x 40 mm	
	Height	4 – 6 m	
	Area of preferred PV array	Approximately 350 Ha	
	Foundation specifications	Concrete or rammed pile	
Operations and Maintenance building(s)	Footprint	Approximately 225 m ²	
Construction	Laydown	Approximately 5 ha	
	Cement Batching Plant	Gravel and sand will be stored in separate heaps whilst the cement will be contained in a silo. The actual mixing of the concrete will take place in the concrete truck. The footprint of the plant will be in the order of 0.25 ha. The maximum height of the cement silo will be 20 m. This will be a temporary structure during construction.	
Roads	Access Road	An existing road currently provides access to the site off the N14. It is proposed that this road may be upgraded.	
	Internal roads	Width	Approximately 5 m
		Length	To be confirmed based on the concept layout
Fencing	Type and height	Galvanized steel type at approximately 2 m high	
Sewage	Septic tanks (with portable toilets during the construction phase)		
Evacuation infrastructure	Internal substation	Switching stations, transformers	
	Common on-site substation	Footprint	2.25 ha
		Capacity	Up to 132 kV
	Powerlines	<ul style="list-style-type: none"> à Overhead on site 132kV powerline from internal substation to the common on-site substation à Overhead evacuated via the 275kV powerline to main off-site substation 	
		Width of the powerline servitude	31-36 m

INFRASTRUCTURE DETAILS / DIMENSIONS

	Powerline tower types and height	Tower (suspension / strain) / Steel monopole structure, which may be self-support or guyed suspension.
--	----------------------------------	--

2.1 PROPOSED PROJECT DEVELOPMENT ACTIVITIES

DESIGN AND PLANNING PHASE

The main activities during the design and planning phase of Enamandla PV Site 5 will include the following:

- à Undertaking the SEIA and obtaining EA.
- à Conducting a geotechnical survey to identify any geological and topographical constraints that may affect foundation requirements. In addition to this, the survey will also highlight the availability of onsite construction materials.
- à Prior to the finalisation of the design layout (including the solar array and associated infrastructure) a final site survey will be undertaken. The final layout will also take into consideration any environmental sensitivity identified during the EIA phase as well as any specific conditions outlined in the EA (once received).

CONSTRUCTION PHASE

The construction phase of the Enamandla PV Site 5 project, which is anticipated to span 12 to 18 months, is likely to create approximately 115 employment opportunities at the peak of the construction phase.

The main activities during the construction phase of the PV facility will include the following:

- à **Establishment of an access road to the site** – The PV site will be accessed along an existing road that connects to the N14. This road may require widening to ensure that it is suitable for use. At this stage it is proposed that the road will remain unsurfaced.
- à **Establishment of internal access roads** – Internal access roads will be constructed onsite. These roads will be between 4 m and 6 m in width. The length of these roads will be determined once the design layouts have been finalised. Currently it is proposed that the internal access roads will be unsurfaced and will remain in use during the operational phase.
- à **Site Preparation** – Site preparation includes the clearance of vegetation and any bulk earthworks that may be required.
- à **Transport of components and equipment to site** – All construction material (i.e. PV support structure materials), machinery and equipment (i.e. graders, excavators, trucks, cement mixers etc.) will be transported to site utilising the national, regional and local road network. Large components (such as substation transformers) may be defined as abnormal loads in terms of the Road Traffic Act (No. 29 of 1989). In such cases a permit may be required for the transportation of these loads on public roads.
- à **Establishment of a laydown area on site** – Construction materials, machinery and equipment will be kept at relevant laydown and/or storage areas. A 5 ha laydown area has been proposed for this project. The laydown area will also be utilised for the assembly of the PV panels. The laydown area will limit potential environmental impacts associated with the construction phase by limiting the extent of the activities to one designated area.

- à **Erection of PV Panels** – The PV panels will be arranged in arrays. The frames will be fixed onto vertical posts that will be driven into ground utilising the relevant foundation method identified during the geotechnical studies. The height of the structures will be between 4 m and 6 m.
- à **Construction of substation and inverters** – The facility output voltage will be stepped up from medium voltage to high voltage in the transformer. The 132kV powerline cables will be run underground in the facility (except where a technical assessment suggest that overhead lines are applicable) to a common on-site substation, before being evacuated via 275kV powerline to the main off-site substation.
- à **Establishment of ancillary infrastructure** – Ancillary infrastructure will include a workshop, storage areas, office and a temporary laydown area for contractor's equipment.
- à **Water requirements** – The PV project will require water for dust suppression, concrete batching and potable water during the construction phase. Approximately 17 m³ per day will be required during the construction phase. It is understood that this water will be available from Sedibeng Water.
- à **Undertake Site Rehabilitation** – The site will be rehabilitated once the construction phase is complete and all construction equipment and machinery have been removed from site.

OPERATIONAL PHASE

Enamandla PV Site 5 is anticipated to have a minimum life of 20 years. It will operate seven days a week during daylight hours. While Enamandla PV Site 5 is considered to be self-sufficient, maintenance and monitoring activities will be required. It is estimated that 7 m³ per day of water supplied by Sedibeng Water will be required for the cleaning of panels, maintenance and for potable water for permanent staff. During this period, approximately 97 employment opportunities are anticipated to be generated.

DECOMMISSIONING PHASE

Following the initial 20-year operational period of the proposed project, its continued economic viability will be investigated. If it is still deemed viable its life may be extended; if not, it will be decommissioned. If it is completely decommissioned, all the components will be disassembled, reused and recycled or disposed. The site will be returned to its current use i.e. agriculture (grazing).

2.2 PROJECT ALTERNATIVES

The proposed project site is on the Remaining Extent of the Farm Hartebeestvlei 86, located approximately 10 km south of the N14 Highway. The site is currently under extensive sheep grazing.

The proposed project site was selected based on the suitability for solar power generation. The placement of solar PV installation is dependent on several factors such as solar resource, climate, topography, grid connection, site access and water availability all of which are favourable at the proposed site location. No locational alternatives will be considered within this study.

The proposed project is situated within the broader project development area, which was subjected to the high level site selection process. The assessment criteria are homogenous throughout the project development area, therefore the assessment of site alternatives within the project development area was not deemed necessary.

The full details of the alternatives assessed in the EIA Phase are provided in the EIA Report. An overview is provided in in **Table 2**.

Table 2: Alternatives considered in EIA Phase

ALTERNATIVE	DESCRIPTION	
Site Alternatives	Development Area Selection	<p>No site alternatives were considered, however the site selection criteria included:</p> <ul style="list-style-type: none"> ■ Environment ■ Solar Resource ■ Grid Connection Suitability ■ Topography, the neighbouring competition and access ■ Strategic Planning Considerations
Technology Alternatives	Solar Power Generation Alternatives	<ul style="list-style-type: none"> ■ PV
Layout and Design Alternatives	Access Road Alternatives	<ul style="list-style-type: none"> ■ Main Access Road 1 ■ Main Access Road 2 ■ Internal Access Roads
	Internal Power Line Alternatives	<ul style="list-style-type: none"> ■ Steel / concrete monopole single circuit structure ■ Steel / concrete monopole double circuit structure ■ H-pole structure (usually wooden poles)
	Water Source Alternatives	<ul style="list-style-type: none"> ■ Alternative 1: Supply from Sedibeng Water / Vedanta Mining ■ Alternative 2: Abstraction directly from the Orange River
	Water Supply Pipeline Alternatives	<ul style="list-style-type: none"> ■ Pipeline from the Orange River past the town of Pella (north-northeast of the site) to the site. ■ Pipeline from a reservoir near the town of Aggeneys (north of the site) to the site.

THE “DO-NOTHING” ALTERNATIVE

The ‘do-nothing’ or “no-go” alternative is the option of not implementing the proposed project.

With an increasing demand in energy predicted and growing environmental concerns about fossil fuel based energy systems, the development of large-scale renewable energy supply schemes is strategically important for increasing the diversity of domestic energy supplies and avoiding energy imports in the country.

Without the implementation of this project, the use of renewable options for power supply will be compromised in the future. This has potentially significant negative impacts on environmental and social well-being.

The no-go option is a feasible option; however, this would prevent BioTherm from contributing to the significant environmental, social and economic benefits associated with the development of the renewables sector. Accordingly, the no-go option is not the preferred option.

3 DESCRIPTION OF THE AFFECTED ENVIRONMENT

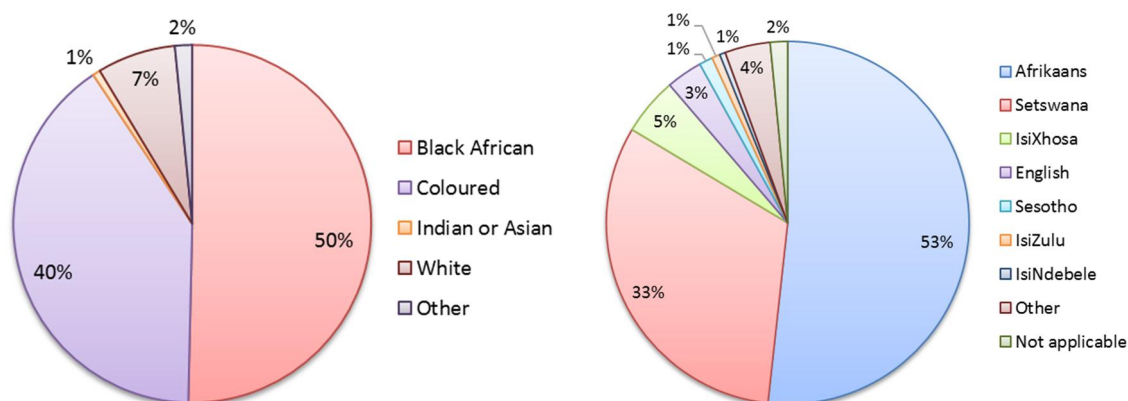
3.1 REGIONAL SOCIO-ECONOMIC OVERVIEW

The proposed project is located within Northern Cape Province (**Figure 1**). This is one of the largest provinces within South Africa's, taking up nearly a third of the country's land area (372 889 km²), but has the country's smallest population of approximately 1.1 million people (Statistics South Africa, 2012). The population density of the province is therefore very low (approximately 1 person per square kilometre) (Statistics South Africa, 2016). The population comprises predominantly Black African (50%) and Coloured (40%) population groups (**Figure 4**). The two main first languages spoken within the province are Afrikaans (53%) and Setswana (33%) (**Figure 4**).

The split between urban and rural populations is 76% and 24% respectively (Statistics South Africa, 2012). This indicates that the majority of the population lives in urban centres, which likely to be a result of sparse natural resources within the province.

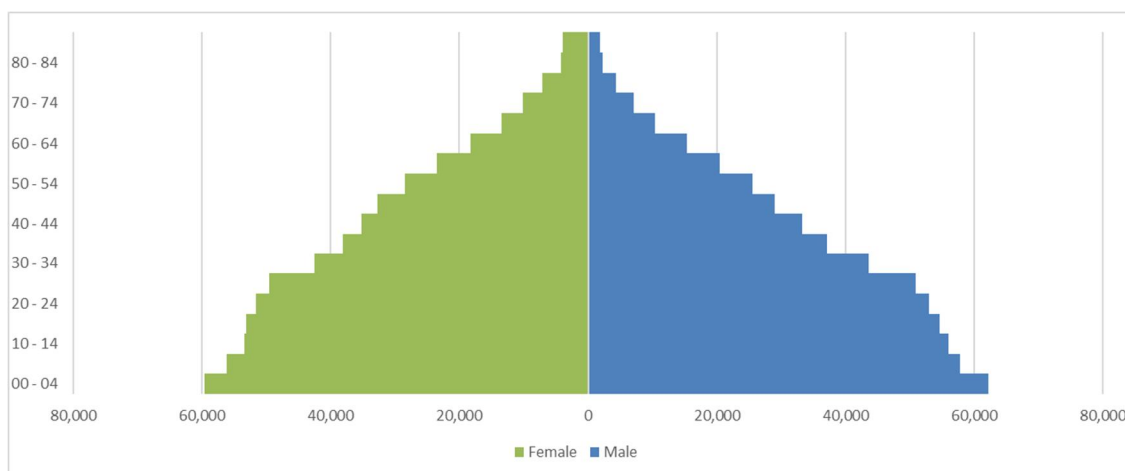
On a geographical basis, the province shares borders with Namibia in the north and stretches as far as the Atlantic Ocean in the west. The Northern Cape also shares borders with the Western Cape to the south, the Eastern Cape to the southeast, and the Free State and the North West Province to the east. The largest centres in the Northern Cape are Kimberley and Upington. Kimberley was founded on the mining industry, but most mineshafts in Kimberley have been closed, thus the traditional economic base of the city has been eroded, and there is a need to look for alternative activities to sustain its local economy. Upington's (population ~47000) local economy is based on services, agriculture and agro-industry, and long-term sustainability is not a particular issue. It is, however, an issue in the northern areas of the province where mining has taken over from extensive agriculture.

The current unemployment rate, as of the first quarter of 2016, is 27.8% (Statistics South Africa, 2016). The total dependency ratio is 55.7%, which is slightly higher than the national average which was 52.14% in 2015 (Indexmundi, 2016). **Figure 5** provides a population pyramid for the Northern Cape indicating a high population below the age of 35. The total percentage of people over the age of 20 years of age who do not have schooling is 24%, which is three times the national level of 8% (Statistics South Africa, 2016). The total number of people above the age of 20 that have a matric or higher is 30%, which is lower than the national level of 41% (Statistics South Africa, 2012).



Source: Statistics South Africa (2012)

Figure 4 Population groups and Languages spoken – Northern Cape



Source: Statistics South Africa (2012)

Figure 5 Population Pyramid – Northern Cape

The sparse, arid landscape is dominated by extensive sheep, goat, and cattle rearing, as well as mining (including diamonds, iron, titanium, zinc, lead, and copper). The Northern Cape mining industry makes up nearly 7% of South Africa's total mining value and contributes 23.4% to the province's total economy. Farmers in the province contribute to 6.1% to South African agriculture and 6.6% of the province's economy (Statistics South Africa, 2012). The Orange River provides a source of fertile land and water within the northern region of the province. The areas immediately adjacent to Orange River are therefore characterised by a concentration of vineyards and other intensive agricultural activities, producing products such as export-quality table grapes, wine, dried and preserved fruit. The Northern Cape is also home to the world's largest telescope, the Square Kilometre Array (SKA). The province has numerous parks and conservation areas. The Kgalagadi Transfrontier Park is Africa's first cross-border game park and one of the largest conservation areas in southern Africa.

The Namakwa District Municipality, in which the site is located, is one of five districts of the Northern Cape Province and comprises six local municipalities. Namibia forms the northern border and the Atlantic Ocean the western border. This municipality has the lowest population within the province, with just over 100 000 people spread over the municipality, and concentrated within small to medium-sized settlements and towns.

The local economy is natural resource-based, primarily dependant on extensive livestock farming. The mining sector, however, is the dominant economic sector (52% to Gross Domestic Product). Recent trends in the mining sector, however, show the sector to be in decline. Increasing levels of unemployment have resulted in increased pressure on the employed population and a high dependency on the State for support. A decline in employment opportunities in the mining sector emphasises the need to prioritise alternative sectors (Namakwa IDP, 2012).

3.2 LOCAL CONTEXT

The local context refers to the area surrounding the site contextualised within local municipality. The proposed project site is located within Ward 4 of the Khâi-Ma Local Municipality, which lies in the northern region of the Namakwa District Municipality, bordering on Namibia. The seat of local government is located in the town of Pofadder, and the four main economic sectors are livestock grazing, agriculture, mining and tourism (Khâi-Ma IDP, 2012).

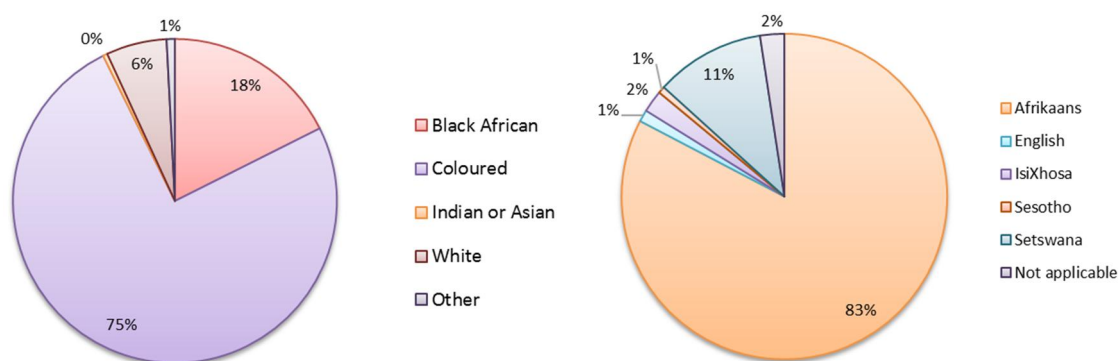
The Khâi-Ma Local Municipality covers an area of approximately 16 600 km², and has a population of approximately 12 500 people, resulting in a very low population density of less than 1 person per square kilometre (Statistics South Africa, 2012). The dominant population is coloured (75%),

followed by Black African (18%), as depicted in **Figure 6**. The main languages spoken are Afrikaans (83%) and English (11%), as shown in **Figure 6**. The dependency ratio is 46%, which is low compared to the National level of 52.14% in 2015 (Indexmundi, 2016), which could be explained by the proportionally high number of young adults (20 – 35 years) (**Figure 7**).

The municipality is characterised by vast tracts of flat, undeveloped and arid Karoo landscape, with scattered mountainous areas, and ephemeral rivers. The majority of the population live within urban areas (82.8%), with only 17.2% living in rural areas (Statistics South Africa, 2012). As a result, the local service levels are reasonable, with 89.6% of the households having access to electricity for lighting 84.3% for cooking and 50.8% for heating. Almost 70% of potable water is provided by the municipality and other water service providers, and 8.4% is sourced from boreholes.

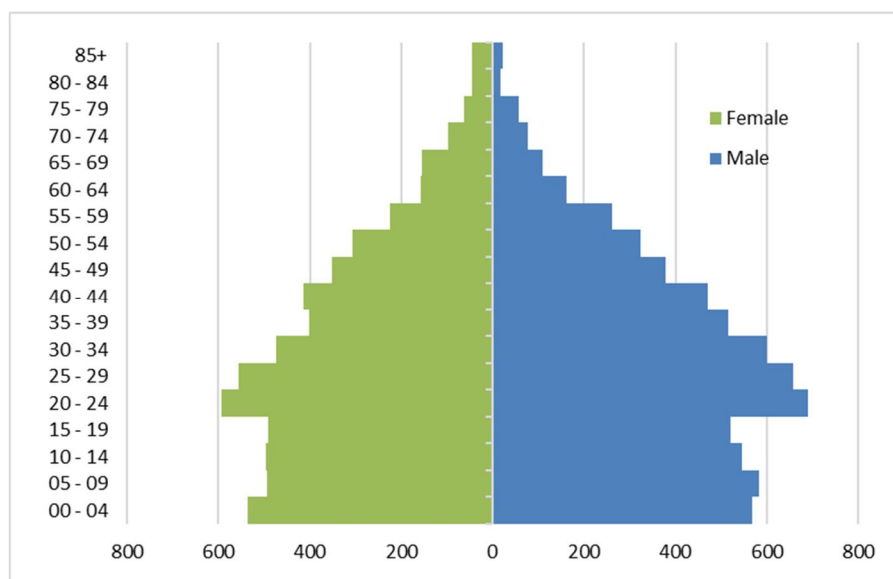
Forty-seven percent of the population over 20 years have a matric or higher education, which is marginally higher than the national level of 41%. Ten percent of people over 20 have had no schooling which is marginally higher the national level of 8%. This indicated a relatively high level of education within the local municipality.

The unemployment levels are high with 31.8% of the potential labour force being unemployed, compared to the current national unemployment rate of 25.4% (Statistics South Africa, 2016). The main economic sectors within the Khâi-Ma Local Municipality are mining, agriculture, tourism, and community and social services. The majority (77%) of employed persons fall within the formal sector, and 15% within the informal sector (Statistics South Africa, 2012).



Source: Statistics South Africa (2012)

Figure 6 Population groups and Languages spoken- Khâi-Ma Local Municipality



Source: Statistics South Africa (2012)

Figure 7 Population Groups - Khâi-Ma Local Municipality

3.3 LOCAL ECONOMIC ACTIVITIES

The main activity within the local area is mining. Approximately 14 km north of the site lies the town of Aggeneys, which is a mining town that was developed in support of the Black Mountain Mine (BMM), located in the same vicinity. This mine primarily produces zinc and lead, as well as copper and silver, and is the main source of employment within the local area. BMM employs approximately 1 300 people, 700 permanently and the remainder on a contract basis (ERM, 2013). BMM provides basic services (including free potable water) to the staff housed at Aggeneys, as well as water to surrounding the towns of Pofadder and Pella, and surrounding farmers (a total of 11 200 people) (ERM, 2013). In 2015, BMM commenced excavation on the Gamsberg Mine, located approximately 10 km northeast of the proposed project site. This mine is proposed to employ up to 3 200 people during the construction phase (highly skilled to low-skilled) over 30 months of construction, and approximately 100 people during the operational phase (ERM, 2013).

After mining, there are two other key local economic activities namely agriculture and tourism. Agricultural activities include intensive crop and fruit farming along the Orange River, and extensive sheep and goat farming. Tourism related activities are centred around the Orange River, the Namaqualand region (wildflowers, cultural and nature conservation tourism), and national wildlife reserves within the Northern Cape such as the Richtersveld and Kgalagadi National Parks.

Development in the area appears to be centred on renewable energy generation and associated infrastructure. Currently there are several proposed projects within a 100 km radius of the site, and one existing facility, as shown in **Figure 8** and described in **Table 3**.

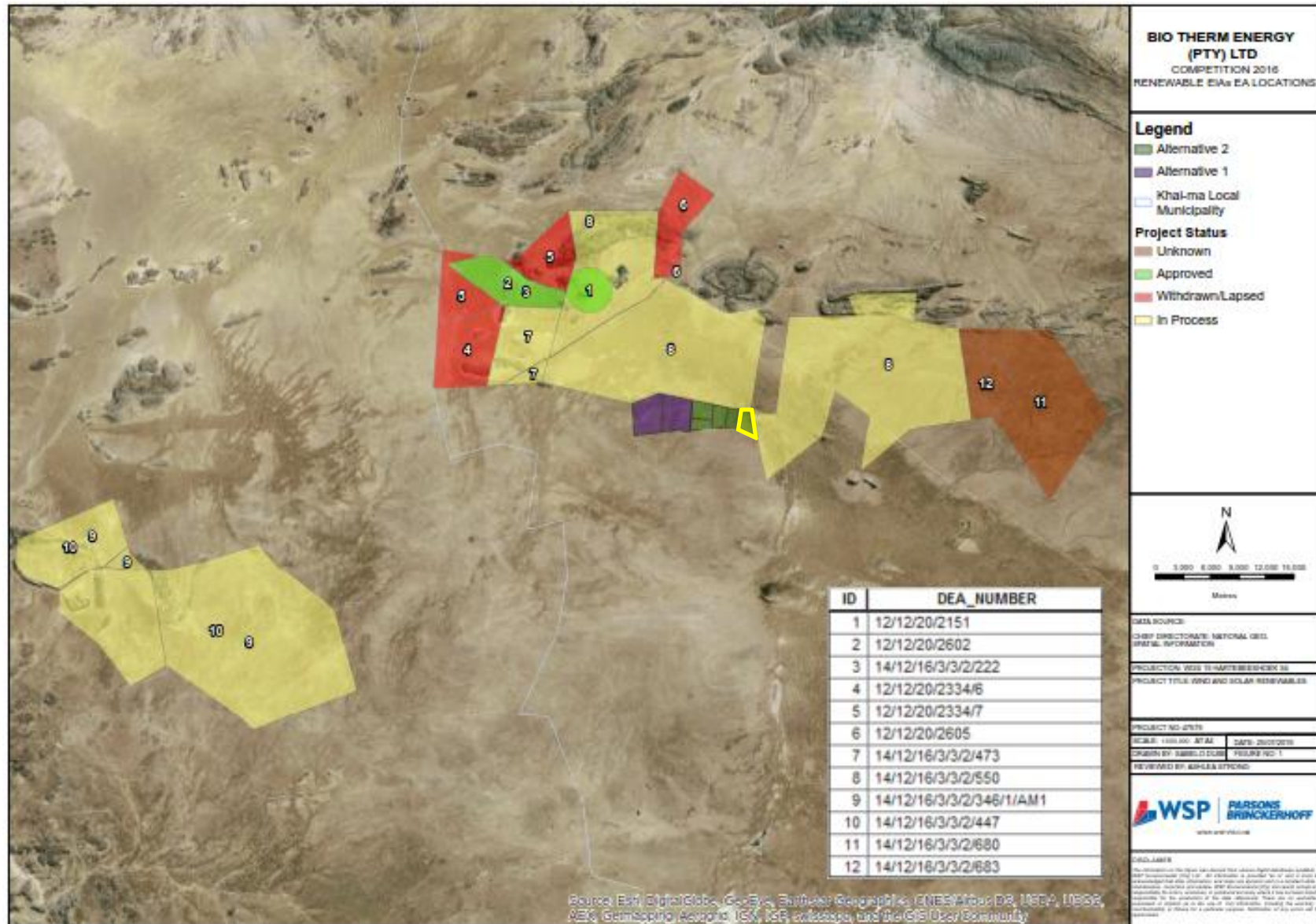


Figure 8 The Location of the Existing Environmental Authorisations within 65km of Enamandla PV Site 5

Table 3: Renewable energy projects in proximity to the proposed project site

DEA REFERENCE NUMBER	PROJECT TITLE	TECHNOLOGY	MEGAWATT	PROJECT STATUS
14/12/16/3/3/2/346/AM1	Construction of the Wind and Photovoltaic (PV) Energy Facilities, including the Construction of the Wind and PV Substations and Gridline Connections, near Springbok, within the Nama-Khoi Local Municipality, Northern Cape Province.	Onshore Wind and Solar PV	75	In Process
14/12/16/3/3/2/447	Construction of the Wind and Photovoltaic (PV) Energy Facilities, including the Construction of the Wind and PV Substations and Gridline Connections, Near Springbok, within the Nama-Khoi Local Municipality, Northern Cape Province.	Onshore Wind and Solar PV	1000	In Process
12/12/20/2334/7	Proposed Sato Energy Holdings Photovoltaic Project, Khâi Ma Local Municipality, Northern Cape.	Solar PV	75	Withdrawn / Lapsed
12/12/20/2602	The Proposed Boesmanland Solar Farm Portion 6 (A Portion Of Portion 2), Farm 62 Zuurwater, Aggeneys, Northern Cape Province.	Solar PV	75	Approved
12/12/20/2334/6	Proposed Sato Energy Holdings Photovoltaic Project, Khâi Ma Local Municipality, Northern Cape.	Solar PV	75	Withdrawn / Lapsed
14/12/16/3/3/2/473	75MW PV plant on the Farm Zuurwater No 62 in the Namakwa District, Northern Cape Province, Phase 4.	Solar PV	75	In Process
14/12/16/3/3/2/222	Proposed Boesmanland Solar Farm Portion 6 (A portion of portion 2) Farm 62 Zuurwater, Aggeneys, Northern Cape.	Solar PV	75	Approved
12/12/20/2334/7	Proposed Sato Energy Holdings Photovoltaic Project, Khâi Ma Local municipality, Northern Cape.	Solar PV	75	Withdrawn / Lapsed
14/12/16/3/3/2/550	Proposed Wind Energy Facility and Associated Infrastructure on Namies Wind Farm Pty Ltd, near Aggeneys, Northern Cape Province.	Onshore Wind	220	In Process
12/12/20/2151	The Proposed Construction of a Photovoltaic Power Generation Facility within the Black Mountain Mining Area near Aggeneys in the Northern Cape Province.	Solar PV	19	Approved
12/12/20/2605	Proposed Gamsberg Solar Energy Project on Portion 1 of Farm 57 Aroams near Upington, Khâi-Ma Municipality, Northern Cape.	Solar PV	Unknown	Withdrawn / Lapsed

DEA REFERENCE NUMBER	PROJECT TITLE	TECHNOLOGY	MEGAWATT	PROJECT STATUS
14/12/16/3/3/2/683	Proposed 75MW Korana Wind Energy Facility, near Poffader in the Northern Cape.	Onshore Wind	Unknown	Unknown
14/12/16/3/3/2/680	Proposed 140MW Khâi-Mai Wind Energy Facility near Pofadder.	Onshore Wind	Unknown	Unknown
12/12/20/2630	Construction of the 70MW Orlight SA Photovoltaic Solar Power Plant on portion 1 of the farm Aroams 57 RD near Aggeneys within the Khai-Ma Local Municipality, Northern Cape Province	Solar PV	Authorised for 70MW but only 40MW will be constructed.	Approved

3.4 LOCAL COMMUNITIES

The key centres within the Khâi-Ma Local Municipality are Pofadder, Aggeneys, Pella, Witbank and Onseepkans (**Figure 9**). The remote nature of the site from public services (i.e. local towns) means that there are few rural or farming settlements on or within the vicinity of the site. Scattered farming settlements are present north of the site along the Orange River near Pella, Witbank and Onseepkans, as well as to the northeast around Pofadder. **Table 4** provides a summary of these communities, and their relative distance from the proposed project site.

Table 4: Description of local communities

TOWN	DESCRIPTION	DISTANCE & DIRECTION FROM SITE
Aggeneys	The small town of Aggeneys is located adjacent to the BMM. The town was developed in the 1970s to accommodate mine staff, and comprises residential housing, a police station, basic retail and a private airstrip. The population is estimated at 2 053 with approx. 666 households (Khâi-Ma IDP, 2011).	14 km northeast
Pella	Pella is a small town, located at the base of the Pella Mountains on the Orange River, with a population of approximately 2 500 people (Statistics South Africa, 2012). The town supports the local farming and the Aggeneys mining communities.	40 km northeast
Pofadder	The town is situated along the N14, and is an agricultural centre for the surrounding farming community. The town has approximately 808 households and estimated population of 2919 people (Khâi-Ma IDP, 2011)	50 km northeast
Witbank	Witbank is a hamlet of approximately 80 households. Although little information is available about the settlement, it is likely to support the local agricultural sector.	60 km north, northwest
Onseepkans	Onseepkans is a small, scattered settlement located on the Orange River. The community comprises farming settlements (farm houses and staff accommodation) and is a border post between South Africa and Namibia.	80 km northeast

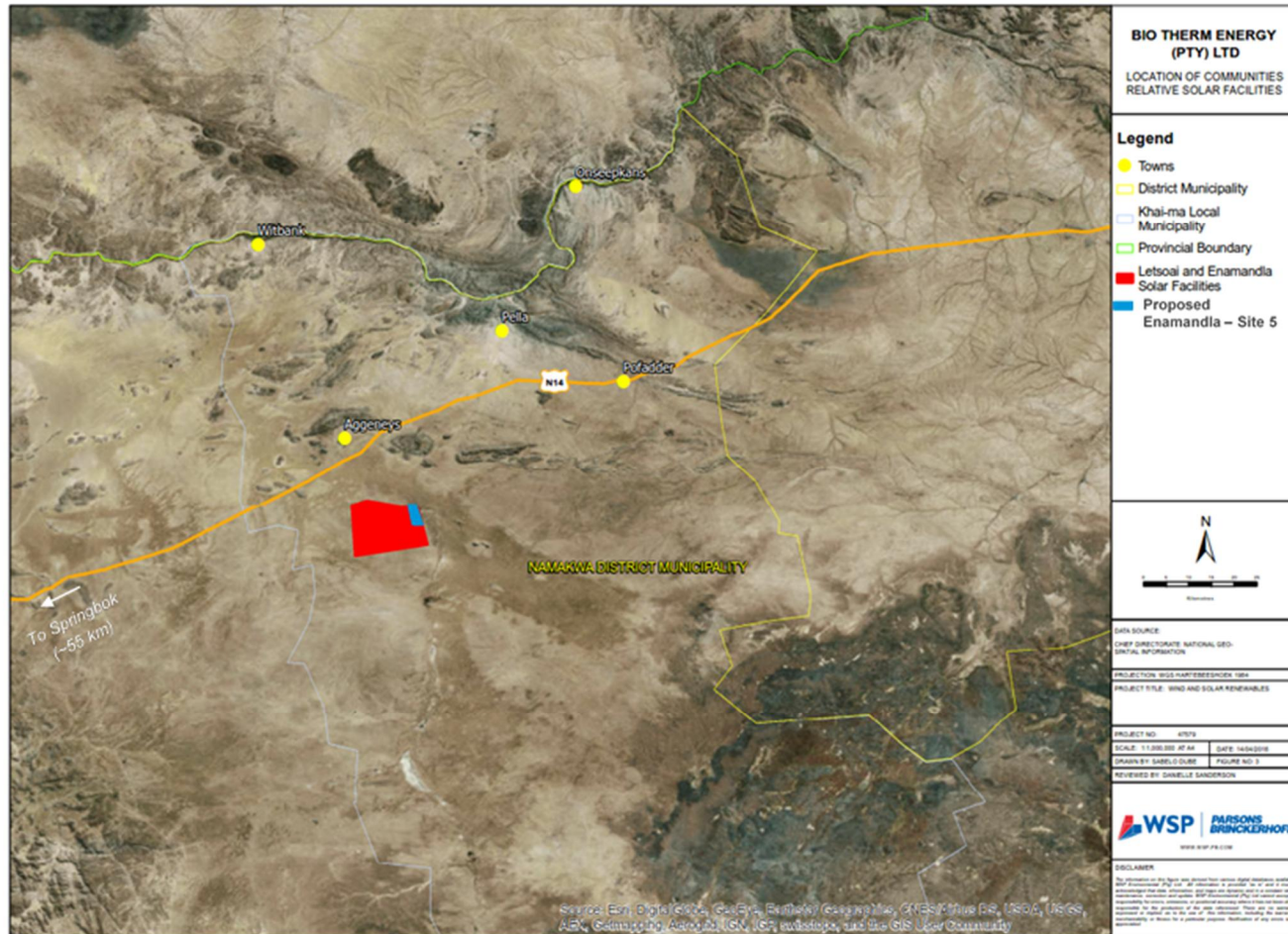


Figure 9 Local context of the proposed project

4 SOCIO-ECONOMIC POLICY AND PLANNING CONTEXT

4.1 NATIONAL POLICIES

The current energy policy in South Africa is guided by the Integrated Resource Plan (IRP) for Electricity 2010-2030, under the Electricity Regulation Act of 2006. The IRP aims to diversify energy supply in South Africa and in addition to all existing and committed power plants. The implementation of renewable energy in South Africa has been driven by the following policy and legislation:

- à The 1998 White Paper on Energy Policy,
- à The 2003 White Paper on Renewable Energy,
- à National Energy Act (34 of 2008),
- à The 2011 National Climate Change Response White Paper Policy;
- à New Growth Path Framework (2010); and
- à National Infrastructure Plan (2012).

These policies indicate government's goal to diversify the energy supply and move away from the tradition of fossil-fired power generation. Government also seeks to take advantage of the possibilities relating to the Green Economy in creating new industries and much needed jobs.

4.2 PROVINCIAL POLICIES

The Northern Cape Provincial Growth and Development Strategy (2004 – 2024) (NCPGDS) provide a framework for development in the Province. The main objectives for development planning in the Province are:

- à Promoting growth, diversification and transformation of the provincial economy;
- à Poverty eradication through social development; and
- à Enhancing Infrastructure for economic growth and social development.

The key sectors, identified for the promotion of growth and development, are:

- à Agriculture and agro-processing;
- à Finishing and mariculture;
- à Mining and mineral processing;
- à Manufacturing;
- à Tourism;
- à Knowledge economy (tertiary market); and
- à Energy.

The proposed project will improve infrastructure for economic growth and social development and also result in the employment generation.

4.3 DISTRICT AND LOCAL MUNICIPALITY POLICIES

The IDPs developed by the Namakwa District Municipality and Khâi-Ma Local Municipality provide socio-economic context to the proposed project, and highlight the potential social and economic requirements and opportunities within the region.

NAMAKWA DISTRICT MUNICIPALITY INTEGRATED DEVELOPMENT PLAN

The key strategic objectives of the Namakwa District Municipality contained within the Draft IDP 2015-2016 (based on Vision 2014) (Namakwa District Municipality, 2015) relevant to this study are as follows:

- à Ensuring the delivery of basic services which include water, sanitation, electricity and waste management;
- à Creation of a thousand job opportunities by 2014 through the community public works programme, as part of 4.5 million Expanded Public Works Programme jobs to be reached by 2014;
- à Ensure sustainable economic and social transformation in the District; and
- à A society with a renewed sense of identity and confident in their skills and knowledge.

Economic development within the municipality's IDP aims to promote the living conditions and economic development of local communities. A key focus area is the optimal utilisation of natural resources in various sectors and this includes renewable energy.

KHÂI-MA LOCAL MUNICIPALITY INTEGRATED DEVELOPMENT PLAN (2011)

The role of the local municipality is to implement national and regional policies in order to achieve development goals. The key priorities for the Khâi-Ma Local Municipality within the 2012 to 2017 IDP include the following (Khâi-Ma Local Municipality, 2012):

- à Provide sustainable services to the inhabitants and to maintain existing resources;
- à Develop the Local Municipality as an institution through transformation and capacity building;
- à Promote LED through poverty alleviation, job creation, empowerment of the previous disadvantage people with capacity building in business skills and establish a climate for investment.

The Khâi-Ma Local Municipality has identified the following threats to growth and development within the municipality:

- à Social Issues in communities, including unemployment, drug and alcohol abuse, crime, and HIV/AIDS¹;
- à Constraints that directly impact the growth of the economic sector, including poor infrastructure;
- à Reluctance of investors to develop outside of the main economic centres of Springbok and Upington; and
- à Low levels of skills development.

Khâi-Ma Local Municipality has rich mineral deposits and unexploited tourism potential, which can contribute to the expansion of the local economy. The IDP also identifies spatial strategies for the development of renewable energy. The renewable energy sector has the potential to provide socio-

¹ Human Immunodeficiency Virus Infection and Acquired Immune Deficiency Syndrome

economic benefits by increasing investments and job opportunities to the local area. The proposed project will contribute positively to the LED of the Khâi-Ma Local Municipality.

5 FINDINGS

The nature of the local and regional landscape in which the proposed project is located is a sparsely populated and arid, with little infrastructure and limited development opportunities. In addition, there are no communities located on, or within the immediate vicinity of the proposed project site. The closest community is located 14 km north of the proposed project, and up to 4 km from the proposed linear infrastructure. As a result, the potential socio-economic impacts of the proposed project have been identified on a local level, with site-specific observations where relevant.

The screening assessment did not identify any fatal flaws in terms of the socio-economic environment for any of the proposed sites or alternatives. A number of socio-economic benefits and opportunities are recognised as being key impacts of the proposed project. The following key potential socio-economic impacts identified during the Scoping Phase have been brought through to the SIA for further consideration and assessment:

Construction Phase	<ul style="list-style-type: none"> à Increase in employment opportunities à Increased economic development opportunities à Disruption through influx of job seekers à Increase in communicable diseases and reduced public health à Change in sense of place à Nuisance from noise, dust and traffic disturbances à Increase risk to neighbouring land users à Increased risk of veld fires
Operational Phase	<ul style="list-style-type: none"> à Increased employment and business opportunities à Increased economic development opportunities à Change in sense of place à Access to water resources
Decommissioning Phase	<ul style="list-style-type: none"> à Loss of permanent employment à Gain of short term employment à Increase risk to neighbouring land users à Increased risk of veld fires à Nuisance from dust, noise and traffic
Cumulative	<ul style="list-style-type: none"> à Increased local economic development opportunities à Increased pressure on local service provision à Change in sense of place à Change to employment patterns à Access to water resources

It is necessary that the no-go alternative is considered i.e. the implications should the proposed Enamandla PV Site 5 facility not go ahead. The anticipated impacts associated with No-Go alternative have been considered. The following impacts have been identified and are discussed in this chapter:

- à Loss of employment and local economic development opportunities; and
- à Maintenance of the existing landscape and sense of place.

5.1 CONSTRUCTION PHASE

INCREASE IN EMPLOYMENT OPPORTUNITIES

It is anticipated that the construction phase for the Enamandla PV Site 5, which will span a 12 to 18-month period, will generate approximately 54 new skilled employment opportunities and approximately 62 new unskilled employment opportunities. This is the total peak number of employment opportunities of 115, which will not be full time over the entire construction phase, but rather the maximum total number. It is anticipated that 70% of these will opportunities accrue to historically disadvantaged individuals.

Due to the specialised nature of some of the construction activities, and the low level of skills development, it is most likely that the skilled labour required during the construction phase will need to be sourced from outside of the Khâi-Ma Local Municipality. The construction phase will, however, also generate a significant number of unskilled employment opportunities. The majority of the employment opportunities are likely to be associated with contractors appointed to construct the proposed facility and associated infrastructure. As contractors tend to use their own staff, the potential for direct employment opportunities for locals during the construction phase may be limited. Members of the local community are likely to benefit from the low skilled employment opportunities. The high unemployment rate (31.8%) indicates that the generation of local employment opportunities will have an impact on the local population, and it will be possible to source unskilled labour from the population living within the towns within the Khâi-Ma Local Municipality.

The potential benefits in terms of short-term employment are therefore likely to be recognised at both a local, regional and national level. The proposed project has the potential to provide a significant number of unskilled employment opportunities within the local municipal area. In line with the REIPPP requirements, the intention is to employ local labour. Provision of employment opportunities to approximately 81 historically disadvantaged individuals has the potential to significantly impact numerous households and extended family units in respect of household income, education and other downstream social impacts.

Employment for previously disadvantaged people could contribute to social upliftment and poverty alleviation. Local opportunities will contribute to the development goals of the Khâi-Ma Local Municipality.

INCREASED ECONOMIC DEVELOPMENT OPPORTUNITIES

The proposed project has the potential to generate positive socio-economic outcomes through the provision of Local Economic Development (LED) opportunities. Local content is a primary focus of the Department of Energy's (DoE) Renewable Energy Independent Power Producer Procurement Programme (REIPPP) which emphasises the need to promote job growth, domestic industrialisation, community development, and black economic empowerment.

Construction phase LED opportunities can be identified and implemented on a national, regional and local levels as follows:

- à Ensuring participation of South African entities in the project.
- à Sourcing of materials locally as far as possible (steel, aluminium, etc.).
- à Manufacturing of primary components locally (i.e. mountings for solar panels).
- à Utilising local service providers as far as possible (i.e. transportation, accommodation, catering, vehicle repairs, etc.).

The total capital expenditure for the construction phase of the Enamandla PV Site 5 is estimated at R1.7 billion. This expenditure will generate business opportunities for the local, regional and

national economy. Larger-scale manufacturing and specialised services for the proposed project are likely to be sourced from a regional and national level, however there are likely to be opportunities for local contractors and engineering companies at a local and regional level.

The project offers a business focus within a rural environment that would not ordinarily be realised. The proposed project has the potential to stimulate economic development within the local area if local social and economic development opportunities are prioritised. The local service industry is most likely to benefit from the proposed project. The opportunities for the local service sector include accommodation, catering, cleaning, transport, security etc. The nearest town of Aggeneys could provide services such as accommodation and cleaning services. Other local towns that could also be positively impacted include Pofadder, as the key local centre and Springbok, as a regional centre.

DISRUPTION DUE TO INFLUX OF JOB SEEKERS

The construction phase may lead to the influx of skilled and unskilled employment seekers from outside the immediate area. This could lead to social conflict over the resources and employment opportunities. This in-migration may have an impact on the Khâi-Ma Local Municipality and their ability to service additional people within the municipal area.

Khâi-Ma Local Municipality representative, Mr Alfredo Green, stated that development projects do result in an influx of people into the small towns. People come from as far as the Eastern Cape and Mpumalanga looking for employment. It is very difficult to manage the influx of job seekers and this poses a number of challenges for the local municipality such as the establishment of informal settlements and provision of basic services (*pers comm*, A Green, 2016).

INCREASE IN COMMUNICABLE DISEASES AND REDUCED PUBLIC HEALTH

Skilled labour requirements are likely to be sourced from outside the local municipality. This skilled labour force of approximately 68 individuals will need to be housed during the construction period. Anticipated housing arrangements have not yet been defined by the project proponent. It is likely that skilled labour will be housed in nearby towns (within a 60 – 80km radius of the site) or alternatively within the development footprint.

It is anticipated that unskilled labour will be largely contractor staff, with additional labour requirements sourced from within the local municipality, as far as possible. Temporary housing and service provision for the unskilled labour force have not been defined by the project proponent. As the majority of the population within the local municipality live within urban areas, and due to the fact that the site is located within a rural context some distance from urban centres, it is considered likely that unskilled labour will be temporarily housed within close proximity to the development site, within the farm boundary.

Temporary housing of both skilled and unskilled labour could result in a number of short-and long-term localised social issues, such as increased prostitution, and drug and alcohol abuse. The presence of an outside labour force, as well as the influx of job seekers, could potentially negatively affect local public health, due to a higher likelihood of a spread of communicable diseases such as Tuberculosis (TB), as well as HIV/AIDS and other sexually transmitted diseases. HIV/AIDS is known to be a significant issue within the Northern Cape (Department of Health, 2012).

Khâi-Ma Local Municipality representative, Mr Alfredo Green, confirmed that the municipality has experienced significant increase in the spread of communicable diseases and reduced public health as a result of past development projects. Mr Green states that the percentage of the population affected by HIV/AIDS and TB increased drastically as a result of a recent development in the local municipal area (*pers comm* A Green, 2016).

CHANGE IN SENSE OF PLACE

The sense of place is a social construct of individuals and communities and their interaction within the landscape in which they live and work, creating a unique identity for a geographical area. The site of the proposed project is located within a predominantly flat, desert landscape, with a sparse, scattered population and limited agricultural and mining activities. The change in the nature of the site as a result of the construction activities of the proposed project, as well as presence of construction staff, is likely to change the local sense of place. This local change is likely to have a direct impact on the closest town of Aggeneys through economic development and a potential increase in population. The other settlements within the local area (namely, Pofadder and Pella) may be affected indirectly.

NUISANCE FROM NOISE, DUST AND TRAFFIC DISTURBANCES

The construction of the proposed project is likely to result in a number of localised disturbances that may indirectly affect local activities, such as farming (on neighbouring sites) and tourism (passing through the area). These may include the generation of dust, noise and traffic associated with the construction of the proposal solar facility and associated infrastructure such as the establishment of the water pipeline. The closest community, Aggeneys, is located 9 km north of the N14 Highway, and therefore between 4 km from the preferred pipeline route and 14 km from the proposed solar development. The impacts of the construction activities may, therefore, affect this community through increased traffic and activities in the local area. There are no other known sensitive receptors, such as tourism establishments or farming communities within close proximity to the proposed project site.

The Traffic Impact Assessment specialist study has assessed that anticipated construction phase impacts associated with site clearing activities and traffic movements. Appropriate mitigation measures have been identified to manage potential traffic impacts. The Environmental Management Programme (EMPr) will include mitigation measures to reduce dust and noise generation during the construction phase in order to adequately mitigate the potential nuisance to social receptors.

INCREASED RISK TO NEIGHBOURING LAND USERS

There is the potential for increased risk to neighbouring land users, particularly farmers, as the presence of labour force could result in petty theft of stock and damage to infrastructure. Theft and damage in infrastructure could result in economic losses for neighbouring farmers and land users, and could extend to greater community issues such as mistrust and conflict. This may occur in areas surrounding the proposed project site (solar facility and water pipeline route) and areas near to where labour is housed (if different).

The accommodation of labour during the construction phase has not yet been defined by the project proponent. It is likely that labour will be accommodated within the broader development or farm footprint thereby potentially affecting surrounding farmers. Past development projects within the Khâi-Ma Local Municipality have not resulted in an increased risk to neighbouring land owners or users (*pers comm* A Green, 2016).

INCREASED RISK OF VELD FIRES

Construction phase activities could result in veld fires which may impact neighbouring farmers and pose a threat to livestock. This is particularly relevant considering the arid climate and the reliance on grazing land in the development area. This risk would be increased should labour be temporarily housed within the development footprint. This may impact on the livelihoods of neighbouring farmers through the potential loss of grazing, stock and infrastructure.

5.2 OPERATIONAL PHASE

INCREASED EMPLOYMENT OPPORTUNITIES

It is anticipated that the operational phase for the Enamandla PV Site 5 will generate a total of 97 new employment opportunities over a minimum operational period of 20 years. Of the total of 97 new employment opportunities, 68 new skilled opportunities and 29 unskilled opportunities will be generated. The expected current value of the employment opportunities for the Enamandla PV Site 5 during the first 10 years is estimated at R 91.6 million of which 70% is anticipated to accrue to historically disadvantaged individuals.

Professional, technical and management employment is likely to be sourced from outside the Northern Cape, due to the specialised nature of this development. Unskilled employees are likely to be sourced from the local municipality area.

The potential benefits in terms of long term employment are therefore likely to be recognised at both a local, regional and national level. Whilst the operational employment opportunities are limited to 68 skilled and 29 unskilled individuals, these opportunities have the potential to uplift a small number of households and family units.

INCREASED ECONOMIC DEVELOPMENT OPPORTUNITIES

The proposed project has the potential to generate positive socio-economic outcomes through the provision of LED opportunities during the operational phase. Local content is a primary focus of the DoE's REIPPP which emphasises the need to promote job growth, domestic industrialisation, community development, and black economic empowerment.

The total capital expenditure for the operational phase of the Enamandla PV Site 5 is estimated at R1.7 billion.

Operational phase LED opportunities can be identified and implemented on a national, regional and local levels as follows:

- à Ensuring participation of South African entities in the project.
- à Utilising local service providers as far as possible (i.e. security, transportation, accommodation, catering, fuel provision and vehicle repairs, cleaning, etc.).
- à Sourcing of specialised services regionally and nationally as far as possible.
- à Investing in social and economic upliftment projects in the local communities surrounding the facility.

As local resources are limited, it is anticipated that the majority of the specialist services are likely to be sourced from regional or national service providers resulting in economic development opportunities in the relevant sectors, including solar power generation equipment and associated infrastructure suppliers. The local hospitality industry is likely to benefit from professionals visiting the site during the operational phase.

Local social and economic development opportunities need to be promoted as far as possible. In accordance with the DoE's REIPPP, the proponent is required to assess the needs of the local communities in the vicinity of the proposed facility and ensure that a portion of the revenue generated from the facility is used to contribute to social upliftment in these communities. The proposed project therefore has the potential to contribute to social improvement through investment into community upliftment projects. It is important that local community benefits and development targets are defined and aligned to local municipality objectives. This may include aspects such as supporting new local emerging entrepreneurs and youth and business skills development programmes.

CHANGE IN SENSE OF PLACE

The operation of the proposed project is likely to change in the overall nature of the area, specifically related to the development of infrastructure such as power evacuation pylons. A change in the sense of place will primarily result from the visual impact of the proposed infrastructure, namely powerline pylons. The site is unlikely to be visible from the nearest sensitive receptors (i.e. the N14 highway). A Visual Impact Assessment has been undertaken in support of the application which has identified and assessed the anticipated visual impacts of the project and where possible relevant recommendations in respect of mitigation of these impacts have been made.

Due to the location of the site in a sparsely populated area there are no settlements or communities within close proximity of the site. The change in sense of place during the operational phase is likely to be limited to local residents and tourists traveling on the N14 road network closest to the site. As tourism is not an important contributor to the Khâi-Ma Local Municipality and tourism interest in the immediate area is negligible, the change in landscape is not likely to have significant impact on the local economy.

ACCESS TO WATER RESOURCES

During the operational phase the project will require 550m³ of water per day (approximately 200 000m³ per annum) for makeup water for the steam generator; mirror washing; potable water requirements; and service water including fire protection. It is proposed that water will be supplied via pipeline from the Orange River. The operational phase of the proposed project could result in additional pressure on available water resources.

Currently 100% of local households in the Khâi-Ma Local Municipality are supplied with water (*pers comm* A Green, 2016). Sedibeng Water provides households, in Pella, Pofadder and Aggeneys, with water drawn from the Orange River. Supply to the Enamandla PV Site 5, via dedicated pipeline from the Orange River, will therefore not directly impact on current household supply. Opportunities for water efficiency to be affected within the operational requirements of the facility should be considered.

5.3 DECOMMISSIONING PHASE

LOSS OF PERMANENT EMPLOYMENT

There is the potential for the loss of the 68 skilled and 29 unskilled permanent employment positions following the closure and decommissioning of the Enamandla PV Site 5 facility. Due to the low number of permanent employees the overall impact of the loss of these jobs is not likely to be significant. Skills developed by employed individuals during the operational phase will be transferable to other similar facilities in the area or to other sectors.

GAIN OF SHORT TERM EMPLOYMENT

The decommissioning phase may require a limited number of short-term unskilled or semi-skilled labour to decommission the facility. These employees are likely to be sourced locally for a short term period. The number of decommissioning employment opportunities and the duration of the decommissioning phase are unknown at this stage. The sourcing of local labour has the potential to provide short term opportunities for social improvement for those employed individuals.

NUISANCE FROM DUST, NOISE AND TRAFFIC

The decommissioning phase of the proposed project will generate dust nuisance from the demolishing and dismantling of the facility. Noise and traffic impacts are likely to increase with the movement of trucks transporting rubble away from the site. There are no immediate sensitive receptors that are likely to be directly affected by these activities. The Traffic Impact Assessment

study has identified and assessed impacts associated with the decommissioning phase of the project and suitable mitigation recommended to reduce impacts as far as possible. Adequate mitigation to reduce dust and noise generation during the decommissioning phase must be included in the decommissioning EMPr.

Following the decommissioning and removal of the Enamandla PV Site 5 facility and subsequent rehabilitation of the site, there is likely to be a long term overall positive impact on local aesthetics and the broader landscape.

INCREASED RISK TO NEIGHBOURING LAND USERS

The decommissioning phase could result in an increased risk to neighbouring farmers, due to the presence of a labour force. This is likely to occur in areas surrounding the proposed project site and areas near to where labour is housed (if different). This could result in direct economic losses for these farmers (loss of stock, and damage to infrastructure), and could extend to greater community issues such as mistrust and conflict.

INCREASED RISK OF VELD FIRES

The decommissioning activities could result in veld fires which may impact neighbouring land users and farmers. This is particularly relevant considering the arid climate and the reliance on grazing land in the development area. This has the potential to impact on the livelihoods of neighbouring farmers through loss of grazing, stock and infrastructure.

5.4 CUMULATIVE IMPACTS

The presence of a number of solar projects (including CSP and concentrated PV projects) and wind power generation projects that are proposed within a 100 km radius of the proposed site (**Table 3, Figure 8**) was considered at the outset of the SIA. In addition to this, the Department of Environmental Affairs requested that the overall cumulative impacts of projects within the study area be undertaken (**Appendix D**) and a qualitative discussion be provided by each specialist. The positive social impacts including socio-economic, employment, local and regional economic development and community development are common themes in the majority of the other assessments.

INCREASED LOCAL ECONOMIC DEVELOPMENT OPPORTUNITIES

Currently BMM is the principle employer within the local municipality, pinning mining as the key local economic driver. One PV facility (Scuit-Klip) has been constructed 72 km northeast of the site, and a few of the nearby proposed facilities have been awarded preferred bidder status include two BioTherm developments. There are no other significant economic activities within the local area, with agricultural, tourism and social services sectors currently providing the main source of (limited) employment in the local economy.

The construction and operation of a number of solar and wind projects within the area between Springbok and Pofadder will contribute collectively towards a significant increase in local employment and business development opportunities within the local municipality. The proposed development of numerous renewable projects in the municipal area provides the impetus for the development of Small, Medium, and Micro-Sized Enterprises (SMME) which has the potential to drive economic growth and provide employment.

The provision of services by existing local communities, and the development of new opportunities through the presence of new residents (temporary and permanent) during construction and operational phases could present numerous economic development opportunities through services such as accommodation, transport provision, catering, and cleaning services.

Through the evaluation of specialist studies undertaken in support of application for EA for other renewable energy projects, the positive impacts associated with job creation and economic development are clearly identified.

INCREASED PRESSURE ON LOCAL SERVICE PROVISION

The development of numerous renewable energy projects within the Khâi-Ma Local Municipality is likely to put significant pressure on the local municipalities and communities. The proposed project is one of eight proposed solar facilities within the local area, and could potentially contribute towards this pressure.

The most significant challenge which faces the local municipality relates to the accommodation of large numbers of people related to the development of multiple projects. This poses both housing and services related implications for the municipality (*pers comm* A Green, 2016). There may be opportunities for these developments to assist the local municipalities by supplying services and infrastructure to local communities in addition to the proposed projects. These opportunities need to be identified and discussed between the development proponents and the Khâi-Ma Local Municipality.

CHANGE IN SENSE OF PLACE

The nature of the landscape will change significant as a result of the development of numerous renewable energy projects. The Visual Impact Assessment has considered the cumulative impacts as part of the scope of this study. A change in sense of place can impact on other aspects such as tourism.

Tourism is not a significant contributor to the Khâi-Ma Local Municipality, and as such it is unlikely that the development of multiple renewable projects will have negative economic impacts in respect of the tourism sector (*pers comm* A Green, 2016).

CHANGE TO EMPLOYMENT PATTERNS

With the development of a number of solar facilities within the local area, there is potential for the broad change in nature of businesses and employment patterns within the local area. The potential economic investment, business development in the area, and an overall awareness of different types of employment opportunities could result in people changing employment sectors.

Currently local employment is predominantly in mining and agriculture-based sectors. There is a potential for this to shift towards construction and services sector employment as new opportunities could be perceived as more favourable to existing opportunities. In addition, the proposed renewable project will provide the incentive for entrepreneurship and development of SMME's to support and service the renewable energy sector. Creation of employment opportunities and a change in employment patterns provides the foundation for skills development and in the long term will provide a level of resilience within the work force in the local area.

ACCESS TO WATER RESOURCES

There are numerous proposed renewable energy projects, as well as a new mining operation within the local area (Gamsberg Mine). Currently there is no storage of water in respect of supply to residents and activities in the area (*pers comm* A Green, 2016). Should all of the proposed renewable energy project be authorised and constructed, there may be pressure on water supply from the Orange River.

There are a number of agricultural development projects that are being considered and implemented for Pella, Onseepkans and Witbank. It is important that there is sufficient water to support all of these projects, and to sustain the existing agricultural activities established along, and highly dependent on, the Orange River (*pers comm* A Green, 2016). The cumulative impact on

water resources has the potential to impact on the local socio-economic environment if this resource is not managed equitably and responsibly. Alternative water supply options, such as groundwater, may need to be considered. Abstraction of ground and surface water is licensed by the Department of Water and Sanitation, who is ultimately responsible for its allocation.

5.5 NO-GO ALTERNATIVE IMPACTS

LOSS OF EMPLOYMENT AND LOCAL ECONOMIC DEVELOPMENT OPPORTUNITIES

Should the proposed Enamandla PV Site 5 facility not be developed, there will be a loss of 115 new employment opportunities in the construction phase and 43 permanent operational employment opportunities. In addition, the opportunities for local, regional and national economic development associated with this proposed project will not be realised.

MAINTENANCE OF THE EXISTING LANDSCAPE AND SENSE OF PLACE

In the event that the proposed Enamandla PV Site 5 facility is not developed, the existing landscape on the site will remain unchanged (farming). As there are a number of renewable energy projects proposed for the area, some of which are likely to be implemented within the next five to ten years, there is likely to be a change in the sense of place regardless of the implementation of Enamandla PV Site 5.

6

ASSESSMENT OF IMPACTS

The potential social impacts identified have been assessed using the methodology outlined in **Section 1**. The results of the assessment are presented in **Appendix E**. The assessment has been undertaken in consideration of relevant mitigation, which is outlined in **Section 7**.

CONSTRUCTION PHASE

The most significant positive impacts associated with the construction phase is the potential for increased employment and economic development opportunities. There are a number of recommendations that can result in an enhancement of these impacts including appointment of local contractors and use of local labour as far as possible; use of local suppliers and manufacturers; and implementation of skills development programmes.

A number of potential of negative impacts have been identified and were assessed as being of low to medium significance. Mitigation measures have been identified were relevant.

Table 5 provides a summary of significance of potential social impacts associated with the construction phase.

Table 5: Summary of Construction Phase Impacts

POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	SIGNIFICANT WITH MITIGATION
Increase in employment opportunities	Medium (positive impact)	High (positive impact)

POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	SIGNIFICANT WITH MITIGATION
Increased economic development opportunities	Medium (positive impact)	High (positive impact)
Disruption due to influx of job seekers	Medium (negative impact)	Medium (negative impact)
Increase in communicable diseases and reduced public health	Medium (negative impact)	Medium (negative impact)
Change in sense of place	Medium (negative impact)	Low (negative impact)
Nuisance from noise, dust and traffic disturbances	Medium (negative impact)	Low (negative impact)
Increased risk to neighbouring land users	Low (negative impact)	Low (negative impact)
Increased risk of veld fires	Medium (negative impact)	Low (negative impact)

OPERATIONAL PHASE

The operational phase provides permanent employment and local economic development opportunities; both of these positive impacts are considered to be of medium significance. Measures have been identified to enhance these opportunities as far as possible.

The change in sense of place as a result of an altered landscape was identified to be of medium significance. It is unlikely that an altering of the landscape will have impacts on the limited tourism sector, however the change in the nature of the area will occur and there is action that can be taken to mitigate this impact. Access to water resources is a potential negative impact of the operational phase, however as supply to the proposed project will not impact on current household supply this impact is considered to be of low significance.

Table 6 provides a summary of significance of potential social impacts associated with the operational phase.

Table 6: Summary of Operational Phase Impacts

POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	SIGNIFICANT WITH MITIGATION
Increased employment opportunities	Medium (positive impact)	High (positive impact)
Increased economic development opportunities	Low (positive impact)	Medium (positive impact)

POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	SIGNIFICANT WITH MITIGATION
Change in sense of place	Medium (negative impact)	Medium (negative impact)
Access to water resources	Low (negative impact)	Low (negative impact)

DECOMMISSIONING PHASE

The most significant social impacts associated with the decommissioning phase are associated with loss of permanent jobs and associated income. The decommissioning phase will however create additional, construction type jobs which can, with enhancement, provide local opportunities to contractors and community members. A number of typical construction type impacts, such as nuisance factors (noise, dust and traffic) and risk to neighbouring farmers may occur, however with adequate mitigation these can be managed appropriately.

Table 7 provides a summary of significance of potential social impacts associated with the decommissioning phase.

Table 7: Summary of Decommissioning Phase Impacts

POTENTIAL IMPACT	SIGNIFICANCE WITHOUT MITIGATION	SIGNIFICANT WITH MITIGATION
Loss of permanent employment	Medium (negative impact)	Low (negative impact)
Gain of short term employment	Low (positive impact)	Medium (positive impact)
Nuisance from noise, dust and traffic disturbances	Low (negative impact)	Low (negative impact)
Increased risk to neighbouring land users	Low (negative impact)	Low (negative impact)
Increased risk of veld fires	Medium (negative impact)	Low (negative impact)

CUMULATIVE IMPACTS

The implementation of numerous renewable energy project in the local municipal area will result in significant increased employment and local economic development opportunities which are considered highly significant in the context of high unemployment and the need to generate local economic growth. The projects proposed for the area have the potential to change local employment patterns and provide more versatility in respect of skills and service offerings. A number of negative impacts may occur as a result of the combined implementation of energy projects including increased pressure on local services as a result of the influx of labour and job seekers into the area. The rural character of the landscape will change as a result of the visual impacts associated with collective projects. Currently there are no significant constraints on water

resources, however the collective implementation of numerous renewable projects as well as other sector requirements for water may place pressure on available water resources.

The mitigation of cumulative impacts needs to be addressed on a cumulative scale i.e. one project cannot seek to address the cumulative issues associated with a series of projects. The relevant authorities, and particularly Khâi-Ma Local Municipality, therefore need to be involved in the identification of suitable mitigation measures in respect of renewable energy development at a strategic level in the area. There is an existing development forum which meets monthly and includes representation from all the renewable energy companies in the Khâi-Ma Local Municipality, community trusts, and the municipality (*pers comm*, A Green, 2016). It is recommended that this forum is used to address potential cumulative impacts. In respect of water provision, the Department of Water and Sanitation is responsible for the equitable allocation of water across all development sectors.

Table 8 provides a summary of significance of potential cumulative social impacts associated with the proposed project.

Table 8: Summary of Cumulative Impacts

POTENTIAL IMPACT	SIGNIFICANT WITHOUT MITIGATION
Increased local economic development opportunities	High (positive impact)
Increase pressure on local service provision	Medium (negative impact)
Change in sense of place	Medium (negative impact)
Change in employment patterns	Low (positive impact)
Access of water resources	Medium (negative impact)

7 MITIGATION AND MANAGEMENT MEASURES

Mitigation and management measures have been identified in order to enhance the potential benefits of the project and to mitigate potential negative impacts to an acceptable level (**Table 9**). It is recommended that these measures be included in the EMPr developed in support of the EA application.

Table 9: Mitigation and Management Measures

ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	MONITORING REQUIREMENTS
Maximise local employment and business opportunities	à Appointment of local contractors and use of local suppliers and manufacturers where possible.	Proponent & Contractors	Construction, Operational & Decommissioning		à Local employment and business targets to be formalised in a document before the construction phase commences.
	à Development of a database of local companies for service provision.				à Database of potential local service providers to be developed, before the construction phase commences;
	à A target of 40% of the construction labour and 60% operational staff, particularly semi and unskilled opportunities, could be sourced locally.				à Percentage of construction labour and operational staff sourced locally.
	à Communication with Khâi-Ma Local Municipality and community representatives in respect of employment opportunities.				à Record of engagement with the Khâi-Ma Local Municipality and community representatives in respect of employment opportunities and community upliftment projects.
	à Ongoing engagement with the Khâi-Ma Local Municipality in respect of anticipated community investment and upliftment projects.				à A skills and business development programme prior to commencement of construction for the development of a local skills base is recommended.
	à Review of Department of Labour skills audits and undertake relevant skills development programmes targeted at local community members.				
Minimise disruption caused by influx of job seekers	à Communicate employment opportunities to Kai-MA Local Municipality, and community representatives to manage employment expectations as far as possible and to allow these parties to manage potential issues associated with influx of people.	Proponent	Construction		à Engagement with the Khâi-Ma Local Municipality in respect of accommodation of labour
	à Engage with, and gain support from, the Khâi-Ma Local Municipality in respect of accommodation of labour brought into the area by contractors / developers.				
Minimise the increase in communicable diseases and	à Preparation and implementation of a labour force Health and Safety Plan.	Proponent & Contractors	Construction		à Health and Safety Plan prepared and implemented during the construction phase.
	à In consultation with local HIV/AIDS organisations and government structures all contractors must design				

ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	MONITORING REQUIREMENTS
reduced public health	<p>and implement a proactive and ongoing HIV/AIDS awareness and prevention campaign.</p> <ul style="list-style-type: none"> à Provide opportunities for workers to go home over the weekends or regularly. The cost of transporting workers home and back should be the responsibility of the contractor. à All workers are to be transported back to their homes within 2 days of completion of the construction contract at the cost of the contractor. 				<ul style="list-style-type: none"> à HIV/AIDS campaign implemented throughout the construction and operational phases. à Evidence of workforce transportation home during and after construction phase. à Trafficking in persons awareness programme;
Minimise nuisance from dust, noise and traffic	<ul style="list-style-type: none"> à Implement EMPr conditions in respect of mitigating dust, noise and traffic related impacts. à Establish a grievance mechanism to provide a means for affected stakeholders to communicate. 	Proponent & Contractors	Construction & Decommissioning		<ul style="list-style-type: none"> à Compliance with EMPr à Number of complaints raised by stakeholders
Minimise risk to neighbouring land users	<ul style="list-style-type: none"> à Development of a code of conduct for workers, signed by the contractor, and communicated to work force. à Contractor to be held liable for compensating farmers for any losses / damage that can be linked to workers. 	Proponent & Contractors	Construction Decommissioning		<ul style="list-style-type: none"> à Code of conduct for workers in place, signed, and implemented
Minimise risk of veld fires	<ul style="list-style-type: none"> à EMPr to include mitigation in respect of activities that may pose a fire risk: <ul style="list-style-type: none"> - No open fires allowed for cooking / heating; - Activity that pose a fire risk to be properly managed and confined to a designated area; - Adequate fire-fighting equipment to be provided on site, and appropriate training conducted; etc. 	Proponent & Contractors	Construction Decommissioning		<ul style="list-style-type: none"> à Compliance with EMPr
Minimise impacts of loss of permanent employment	<ul style="list-style-type: none"> à Relocation of employees to other renewable energy facilities where possible. à Provision of adequate retrenchment packages, that as a minimum meet relevant South African Labour legislation. 	Proponent	Decommissioning		<ul style="list-style-type: none"> à Retrenchments meet South African Labour legislation

8

STAKEHOLDER CONSULTATION

8.1 STAKEHOLDER CONSULTATION PROCESS

Public participation is a requirement of the Scoping and EIA process; it consists of a series of inclusive and culturally appropriate interactions aimed at providing stakeholders with opportunities to express their views, so that these can be considered and incorporated into the Scoping and EIA decision-making process. Effective public participation requires the prior disclosure of relevant and adequate project information to enable stakeholders to understand the risks, impacts, and opportunities of the proposed project.

A comprehensive stakeholder consultation process was undertaken during the Scoping Phase. Stakeholders were identified through existing databases, site notices, newspaper adverts and meetings. All stakeholders identified to date have been registered on the project database. All concerns, comments, viewpoints and questions (collectively referred to as 'issues') received to date have been documented and responded to in a Comment and Response Report.

There will be ongoing communication between WSP | Parsons Brinckerhoff and stakeholders throughout the Scoping and EIA process.

8.2 STAKEHOLDER COMMENTS AND RESPONSE

The comments received in respect of the Scoping Phase have been reviewed and a response to the socio-economic related comments are provided in **Table 10**.

Table 10: Responses to Comments

STAKEHOLDER DETAILS	COMMENT	SPECIALIST RESPONSE
<p>Mr Alfredo Green – Khâi-Ma Local Municipality:</p> <p>Khâi-Ma Local Municipality; Focus Group Meeting; 27 September 2016</p>	<p>I do not agree with the significance of the “increase in communicable diseases and reduced public health” being low. He mentioned that they have had significant problems to this effect in the area and that the significance should be higher.</p> <p>In past experience from development projects in the area the spread of HIV and TB increase drastically. The portion of the population affected went from an estimated 2% to 7.5% and is now considered a hotspot within the District Municipality.</p>	<p>In the Scoping Phase the impact “increase in communicable diseases and reduced public health” was identified and preliminary assessed to be of low significance.</p> <p>Mr Green’s comment was considered in the EIA Phase. A telephonic interview was held with Mr Green in November 2016 where further discussion was held on this issue. Based on the review of information and the valuable local insights shared by Mr Green this impact has been assessed to be of medium significance in the SIA.</p>

9 CONCLUSIONS

The SIA has identified a number of key socio-economic impacts (both positive and negative) associated with the proposed Enamandla PV Site 5 facility. The findings of the study indicate that the development will create employment and business opportunities at a local, regional and national level during the construction and operational phase, and to a lesser extent the decommissioning phase, of the project. The project will result in a change in the rural sense of place and character

During the construction phase the influx of job seekers and the increase in communicable disease are likely to pose various challenges for the Khâi-Ma Local Municipality. These two impacts are considered the most significant negative impacts (both negative, medium significance) on the socio-economic landscape for the operational lifespan (minimum 20 years), which cannot be easily mitigated. A number of negative impacts such as nuisance factors (dust, noise and traffic), potential risks to neighbouring farmers (including veld fires) were identified to be of low negative significance after the implementation of mitigation and management measures. The potential for cumulative impacts also exist due to the number of other renewable energy projects proposed within the Khâi-Ma Local Municipality.

None of the impacts identified are considered fatal flaws that should prevent the project from going ahead. There are significant employment and economic benefits that can be derived from the projects, as such it is recommended that the Enamandla PV Site 5 is authorised. The mitigation and management measures included in **Table 9** are to be included in the EMPr prepared in support of the EA application.

Appendix A

INTERVIEW QUESTIONS AND RESPONSES

INTERVIEW QUESTIONNAIRES: BIOTHERM SIA

A: KHÂI-MA LOCAL MUNICIPALITY REPRESENTATIVE – ALFREDO GREEN

1. What is your role at the municipality?

Communication and special programmes

2. Current situation

- 2.1 What are the key challenges for the local municipality in respect of local social and economic development requirements?

Most significant challenge for the municipality is unemployment. Skills upliftment and SMME development and also key challenges.

- 2.2 What are the key priorities for community development in the local municipality?

There are various Expanded Public Works Programme (EPWP) projects (*government programmes aimed at poverty and income relief through temporary work for the unemployed*) and CWP (Community Working Programme).

Water supply is not a critical issue in the Local Municipality. 100% of households in the municipality are supplied with water. There is aging infrastructure which needs repair and replacement.

There are sanitation problems, as a result of informal settlements.

Housing is a challenge in the municipality, we are struggling with plotted / surveyed even.

There are good health care facilities in each town, with hospital facilities in Pofadder.

- 2.3 What are some of the municipal infrastructure and/or social services projects being implemented to meet community needs?

A new council was elected in August 2016. There is a strategy session in December 2016 which will identify the approach to address issues and prioritise projects to be rolled out in the local municipality.

3. Biotherm project

- 3.1 What benefits do you foresee that this project can bring to the area?

The most significant benefits that the project can bring to the Khai-Ma Municipal area are employment, and local economic development as a result of local businesses supporting the project.

- 3.2 What are some of the challenges or potential negative impacts of the project?

The most significant challenge in respect of new development projects in the area is the decay in moral values: alcohol abuse, prostitution, HIV increase.

These projects result in an influx of people (jobseekers) into small towns. People come from as far as the Eastern Cape and Mpumalanga looking for employment. News of new developments' in the area travels fast. It is difficult to manage / mitigate the influx of jobseekers and there are a range of secondary impacts such as informal settlements, lack of service provision (sanitation etc). which become challenges for the municipality.

Construction phase aspects:

- 3.3 The project site is located in a sparsely populated area characterised by large tracts of farming area. Have there been issues with past projects in terms of impacts of farmers {Do think the project poses a risk to these farmers during the construction phase i.e. petty theft, damage in infrastructure, potential fire risk?}

Mr Green noted that from past experience with other developments, there are unlikely to be any direct impacts on farmers. There have been no previous incidents such as petty theft, or crime in relation to previous projects. The potential impacts on farmers would be limited to movement (traffic), nuisance factors (dust etc.), and potentially impacts on underground water (most farmers rely on underground water).

- 3.4 There are a number of small towns within an 80km radius of the proposed development site (Aggeneys {14km}; Pella {40km}; Pofadder {50km}; Witbank {60km}) – how do you think these local towns could potentially support / service the development? (construction phase only)

There are local service providers that can support the project during the construction and operational phase i.e. transportation, accommodation etc. Pofadder is the largest town and therefore the most likely source of support / services, followed by Pella to a lesser extent.

There is a need to develop SMME's so they can be positioned for future support of renewable projects.

- 3.5 The project is anticipated to generate 500 new job opportunities in the construction phase, 125 skilled and 350 unskilled:
- Does the municipality have any records on the availability of skills locally?
 - Has a skills audit been undertaken in the LM area / are you aware of what skills exist within the municipal area which could support this project?

Department of Labour (DoL) undertake skills audits on a regular basis (updated month by month). The DoL regional office is located in Springbok. This information can you used in inform developments in respect of available skills in the local municipal area.

- Unskilled opportunities would be sourced locally – where would these individuals likely to be sourced from?

Recruitment is likely to be driven from Pofadder, as the main seat of the municipality, assisted by satellite offices in other smaller towns

- 3.6 You have mentioned previously that a significant increase in communicable diseases was experiences with previous development projects. Can you tell me more about this?
{was is one particular project, or a series of projects?}
{was the project within the LM area?}

There have been a series of development projects in the Local Municipal Area, once Biotherm project has already been commissioned and a project being undertaken by Abengoa. The statistics show a significant increase in communicable diseases associated with development projects.

- 3.7 What do you think was the primary cause of the increase in communicable diseases {housing arrangements?}

It is difficult to relate the increase in communicable diseases to one factor. There are a number factors that come into play such as the influx of people into the area, improved education and increased number of people being tested for communicable diseases, and increased income leading to people spending money unwisely.

3.8 What do you think could be done to prevent this from occurring in the future?

It is very difficult to mitigate the increase in public health related issues. The programmes that are running related to HIV are fairly minimal and need to be run daily, actively engaging with communities on HIV related issues. A second suggestion is that people need to be taught how to manage and spend their money wisely (i.e. financial planning) as a lot of health related issues are as a result of people spending their money on unsavoury activities.

Operational phase aspects:

3.9 There are a number of small towns within an 80km radius of the proposed development site (Aggeneys {14km}; Pella {40km}; Pofadder {50km}; Witbank {60km}) – how do you think these local towns could potentially support / service the development? (operational phase only)

*Answered under Question 3.4

3.10 How can Biotherm contribute towards the Local Municipality initiatives?

Renewable projects do have the potential to contribute to the initiatives in the Local Municipality. The Khâi-Ma Local Municipality has a good relationship with Biotherm which will form the foundation of a good working relationship into the future.

The proponent of the project is required to identify community needs and utilise a portion of the revenue from the facility to contribute to social upliftment within these local community areas.

- What type of projects do you foresee being implemented as part of this initiative?
- It would be preferable for the proponent to work with the LM to support projects already identified by the LM – would you agree?

To date there has been minimal involvement from proponents of projects in community upliftment projects. Currently there is still engagement ongoing on how this will work.

In most cases, developers identify projects without consulting with the local government which is not ideal. It is preferable for the two parties to work closely and to talk about potential projects that can make a difference to the area.

The IDC has set up a development forum which meets on a regular basis (monthly). The forum represents all the renewable companies in the Khai-Ma local municipal area, representatives of the community trusts associated with renewable projects, a councillor responsible for Local Economic Development, and NGO's are invited as necessary. The forum is in its second year of operation. There have been challenges to get the forum registered, the registration is now finalised and the intention is for a project manager to be appointed to run the forum by February 2017.

Each company must sit with the LM to identify the projects / opportunities that they can get involved in. The LM will not tell the developer which project to get involved in but will inform them of a number of projects and allow them to choose what they would like to be involved in. They must decide where they want to support and where they have the opportunity to leave a legacy.

3.11 To what extent is tourism a significant contributor to the LM? Do you foresee that this project would have a positive or negative impact of tourism?

Tourism is not a significant contributor in the LM and as such the project will not impact on this sector.

3.12 The project requires water to operate – it is anticipated that water will be sourced via pipeline from the Orange River. There are currently pressures on existing water

resources {BMM owns and operated Pelladrift Water Board which provides households in Pella, Pofadder and Aggeneys from water from the Orange River}.

- Do you think supply from the Orange River poses any potential social issues (positive or negative?)

Water is not currently an issue in the LM. Supply from the Orange Rive is not going to be a problem in the future – there is a proposal currently to build a dam in Vooilsdrift.

The Dept of Water and Sanitation is responsible for assessing the water availability from the Orange River. There is an agricultural focus in Pella, Ontsepkans, Witbank – agriculture development projects are being considered and implemented, it is important that there is sufficient water for all sectors.

It was noted that underground water supply should be considered as a viable alternative supply.

4. Energy projects (cumulative)

There are a number of renewable projects proposed for this area.

- 4.1 What are the potential benefits of a number of renewable projects being implemented in the area?

There are definitely opportunities and benefits from the local municipal area as a result of all these projects, in particularly SMME development to service projects locally and employment opportunities within the LM.

- 4.2 Do you foresee any challenges or cumulative impacts associated with the implementation of a series of renewable projects in the local area?

From a municipal point of view, the most significant challenges related to the accommodation of all the people related to the development of these projects – this poses housing and services related challenges. However, there are significant opportunities to be gained and opportunities for the LM to increase the revenue allowing them to use this revenue to improve local conditions.

Community liaison

- How do community convey issues that they experience in the local area? Ward councillor or forums?
- Key NGO's active in the area

Appendix B

CURRICULUM VITAE

DANIELLE SANDERSON, M.Soc.Sc.

SENIOR CONSULTANT, ENVIRONMENT & ENERGY



YEARS WITH THE FIRM

7

YEARS TOTAL

9

AREAS OF PRACTICE

Environmental Impact
Authorisation Processes

Social Impact
Assessments

Waste Management
Licensing

Coastal Planning and
Permitting

CAREER SUMMARY

Danielle is a senior consultant with 8 years' experience as an environmental and social sciences consultant within a variety of sectors, including renewable energy, infrastructure, mining and industrial. Danielle has managed, and been integrally involved in, numerous environmental management projects, specifically related to environmental impact assessment, social and socio-economic impact assessment, and waste management.

Danielle's environmental management experience includes basic assessment, scoping and environmental impact assessment processes for a variety of industries and sectors, including mining, renewable energy, and infrastructure. Waste management licensing experience includes processes undertaken for paper and pulp sector, as well as various other industrial sectors. Danielle has also managed and undertaken projects related to the integration of sustainable development into local government policies and coastal management initiatives in various provinces around South Africa. Socio-economic consulting experience includes a variety of social impact assessment projects in the mining, renewable energy, and industrial sectors, coordinating and facilitating community participation and stakeholder engagement processes, and coordinating and facilitating socio-economic surveys and field research.

During Danielle's time at WSP she was elected as Sustainability Champion for the Durban office, and represents South Africa on the WSP International Social Sciences Roundtable. Danielle also sits on the national executive committee and the regional branch committee of the South African affiliate of the International Association of Impact Assessors.

EDUCATION

Bachelor of Social Science (Masters), Geography and Environmental Management, University of KwaZulu-Natal, Durban, South Africa	2006
Bachelor of Social Science (Honours), Geography and Environmental Management, University of KwaZulu-Natal, Durban, South Africa	2002

ADDITIONAL TRAINING

Leadership Development Programme and Personal Mastery	2014
Integrating HIV and Gender Related Issues into the EA Process – SAIEA, UNDP and IAIAAsa certificated course, International Association of Impact Assessors South Africa	2013
Sustainable Livelihoods Where Social And Natural Systems Meet – International Association of Impact Assessors, South Africa	2009

PROFESSIONAL MEMBERSHIPS

International Association of Impact Assessors, South Africa (IAIAAsa) (National Executive Committee member, 2014 – present, and KwaZulu-Natal Branch Committee member)	IAIAAsa
--	---------

DANIELLE SANDERSON, M.Soc.Sc.

PROFESSIONAL EXPERIENCE

EIA Processes

- à EIA for the Solis 2 Concentrated Solar Power, Upington, Northern Cape, South Africa (2015): Project Manager and EAP. BrightSource is proposes to develop a 125MW Commercial Concentrated Solar Power (CSP) Client: BrightSource Energy.
- à Basic Assessment for Expansion of the Island View Fuel Storage, Durban, KwaZulu-Natal, South Africa (2015). Project Manager and EAP. Client: Engen Petroleum Limited.
- à E/F Slab Basic Assessment, Richards Bay, KwaZulu-Natal, South Africa (2015). Project Manager and EAP. Client: Transnet Port Terminals.
- à Basic Assessment for the expansion of polyester manufacturing plant, Durban, KwaZulu-Natal, South Africa (2015): Project Manager and EAP. Client: Hosaf (a division of PG Bison (Pty) Ltd).
- à Basic Assessment and Water Use and Waste Management Licenses for Jozini Community Healthcare Centre, Jozini, KwaZulu-Natal, South Africa (2013): Project Manager and EAP. Client: Sakisizwe Architects.
- à Basic Assessment for Energy Expansion at Tugela Mill, Tugela, KwaZulu-Natal, South Africa (2012). Project Manager and EAP. Client: Sappi Southern Africa Limited.
- à Scoping and EIA for the upgrade of Liquid Petroleum Gas (LPG) Storage, Durban, KwaZulu-Natal, South Africa (2012). Project Manager and EAP. Client: Easigas (Pty) Ltd.
- à Basic Assessment for Photovoltaic Solar Facility, Durban, KwaZulu-Natal, South Africa (2011). Project Manager and EAP. Client: eThekweni Municipality.
- à Basic Assessment for Bulk Water Pipeline, Eshowe, KwaZulu-Natal, South Africa (2011). Project Manager and EAP. Client: Aurecon (Pty) Ltd.

Social Impact Assessments

- à SIA for Kraft Paper Mill, Frankfort, Free State, South Africa (2015): Lead Social Consultant. Client: Industrial Development Corporation of SA (Pty) Ltd.
- à SIA for Sappi Ngodwana Mill Expansion – Ngodwana Mill, Ngodwana, Mpumalanga, South Africa (2014): Lead Social Consultant. Client: Sappi Southern Africa Limited.
- à SIA for Block Z Expansion – Isibonelo Colliery, Isibonelo, Mpumalanga, South Africa (2014): Lead Social Consultant. Client: Anglo American Thermal Coal.
- à Solis II Concentrated Solar Power, Upington, Northern Cape, Southern Africa (2014): Lead Social Consultant. Client: BrightSource.
- à SIA for Tumela Central Shaft, Thabazimbi, Limpopo, South Africa (2013): Social Consultant. Client: Anglo American Platinum Ltd.
- à SIA for Proposed Yzermyn Coal Mine, Mpumalanga, South Africa (2013): Social Consultant. Client: Atha-Africa Ventures (Pty).
- à SIA for Green Energy Power Project: Socio-Economic Impact Assessment, Nelspruit, Mpumalanga, South Africa (2012): Social Consultant. Client: Sappi Southern Africa Limited.

DANIELLE SANDERSON, M.Soc.Sc.

- à SIA for Sasol New Energy's Holding Concentrated Solar Park, Upington, Eastern Cape, South Africa (2012): Social Consultant. Client: Sasol New Energy Holdings.
- à Eerstelingsfontein Coal Mine Social Impact Assessment, Belfast, Mpumalanga, South Africa (2011): Social Consultant. Client: Exxaro Coal Mpumalanga (Pty) Ltd.
- à Social assessment of a proposed effluent pipeline diversion, Sasolburg, Free State, South Africa (2010): Social Consultant. Client: Sasol Infrachem.
- à Nottingham Road Social Impact Assessment, Nottingham Road, KwaZulu-Natal, South Africa (2008): Social Consultant. Client: Afzelia Environmental Consultants.

Waste Management Licensing

- à Waste Management Licenses for Jozini Community Healthcare Centre, Jozini, KwaZulu-Natal, South Africa (2014): Project Manager and EAP. Client: Sakisizwe Architects.
- à Integrated Waste Management License – Tugela Mill. Mandeni, KwaZulu-Natal, South Africa (2013): Project Manager and EAP. Client: Sappi Southern Africa Limited
- à Waste Management License for the Delkor Waste Water Treatment Plant (WWTP), Richards Bay, KwaZulu-Natal, South Africa (2012): Client: Transnet Port Terminals (TPT).

Coastal Planning and Permitting

- à Coastal Setback Lines, Environmental consultant and stakeholder engagement, Western Cape, South Africa (2010): Environmental consultant and stakeholder. Client: Western Cape Department of Environmental Affairs and Development Planning.
- à Development of a Shoreline Management Plan, Durban, KwaZulu-Natal, South Africa (2009): Project Assistant. Client: eThekweni Municipality.
- à Environmental and Engineering Input for the extension of the Durban Yacht Mole, Durban, KwaZulu-Natal, South Africa (2009): Environmental Consultant. Client: eThekweni Municipality.

AWARDS

Phelamanga Award: Continuing Professional Development – 2013
IAIAsa KwaZulu-Natal Branch.

PUBLICATIONS AND PRESENTATIONS

Publications

- à Michel, D. P. and Scott, D. (2005). The La Lucia – Umhlanga Ridge as an Emerging 'Edge City'. South African Geographical Journal, vol. 87, no. 2, pp. 104-114.

HILARY KONIGKRAMER, B.SocH., EAP

DIRECTOR (ENVIRONMENTAL SCIENCE), ENVIRONMENT & ENERGY



CAREER SUMMARY

Hilary is a Director with 15 years' experience as a consulting social and environmental scientist with extensive experience in integrated environmental management in a variety of sectors including petrochemical, paper and pulp, general industrial, commercial and infrastructure.

Hilary has thorough working knowledge of current environmental laws and policies and a comprehensive understanding of environmental processes. She has experience in undertaking pre-feasibility assessments, legal reviews, and the co-ordination of a wide range of application processes (Basic Assessment and Scoping and EIA processes, Section 24G, and Waste Management License applications). Hilary has been involved in a number of high profile projects for Transnet SOC Ltd; Engen Petroleum Limited, Sappi Southern Africa, and Exxaro Coal Mpumalanga (Pty) Ltd Mpumalanga (Pty) Ltd. She has excellent verbal communication skills in terms of authority consultation, stakeholder engagement and client liaison.

Specialist social science expertise includes conducting Social Impact Assessments (SIA) involving social profiling, social sensitivity mapping, development and implementation of questionnaires, co-ordination of social surveys, stakeholder workshops and focus group sessions. A number of key SIA studies have been undertaken over the past few years for a variety of waste, industrial and mining projects in South Africa, as well as stakeholder engagement for a large residential and tourism development in the Seychelles.

Stakeholder engagement has become a key focus of her capability in recent years. She recognises the value of the development of targeted stakeholder engagement strategies to ensure stakeholder engagement processes are implemented effectively. Recent stakeholder engagement experience includes directing and managing the stakeholder engagement process in the early phases of the proposed Durban Dig-Out Port for Transnet Capital Projects

EDUCATION

BSoc Sci (Hons) Environmental Management, University of Natal, Durban, South African 1998

BSoc Sci Geography, Environmental Management, University of Natal, Durban, South African 1997

ADDITIONAL TRAINING

Sustainability Framework Learning Programme, IFC 2012

PROFESSIONAL MEMBERSHIPS

Member of the International Association for Impact Assessment South Africa IAIAsa

Certified Environmental Assessment Practitioner (10/2010) EAP

YEARS WITH THE FIRM

11

YEARS TOTAL

16

PROFESSIONAL QUALIFICATIONS

EAP

AREAS OF PRACTICE

Environmental Impact Assessment Experience

Specialist Environmental Support

Specialist Stakeholder Engagement and Social Impact Assessment Experience

HILARY KONIGKRAMER, B.SocH., EAP

PROFESSIONAL EXPERIENCE

Environmental Impact Assessment Experience

- à Expansion of polyester manufacturing plant, Durban, KwaZulu-Natal, South Africa (2015): Project Director. Hosaf operates a polyester production facility in Jacobs (South Durban) and proposed to increase polyethylene terephthalate (PET) production at the facility through the expansion of the plant and installation of a second processing facility. The project involved a Basic Assessment process for the amendment of their Atmospheric Emissions License. Client: Hosaf, a division of PG Bison (Pty) Ltd.
- à Expansion of the Island View Fuel Storage, Durban, KwaZulu-Natal, South Africa (2014-2015): Project Director. Engen Petroleum Limited proposed the expansion of fuel storage and modification of the Engen Island View D site, located within the Port of Durban. The project entailed a Basic Assessment process, application for Atmospheric Emissions License, and close coordination with consulting and client engineers. Client: Engen Petroleum Limited.
- à Decommissioning of the pulp mill and associated structures including tanks at the Sappi Southern Africa Limited: Enstra Mill in Springs, Gauteng, South Africa (2014-2015): Project Director. This project involves the undertaking of a Basic Assessment process in order to gain Environmental Authorisation for the proposed decommissioning of the Pulp Mill and associated structures including tanks. Client: Sappi Southern Africa Limited.
- à Green Energy Power Project - Tugela Mill, KwaZulu-Natal, South Africa (2013-2015): Project Director. Environmental Authorisation and Waste Management License procedure associated with the generation of 40WM of electrical power to supply the Tugela Mill and the national grid. Client: Sappi Southern Africa Limited.
- à Sappi Ngodwana Expansion Project – Ngodwana Mill, Mpumalanga, South Africa (2013-2014). Project Director. Environmental Authorisation and Waste Management License for the expansion of the existing specialised cellulose production and construction of a sawmill at the Ngodwana Mill. Client: Sappi Southern Africa Limited.
- à Green Energy Power Project – Ngodwana Mill, Mpumalanga, South Africa (2012-2013): Project Director. Environmental Authorisation and Waste Management License procedure for the installation of a biomass boiler, condensing turbine and associated biomass handling equipment, collectively termed the green energy power project. Specialist studies included air quality, visual, traffic, noise and socio-economic impact assessments. Client: Sappi Southern Africa Limited.
- à Eerstelingsfontein Open Cast Coal Mine, Mpumalanga, South Africa (2010-2013): Project Manager. The project involved facilitating receipt of an Environmental Authorisation for the proposed open cast coal mining activity. The study included an extensive range of specialist inputs, comprehensive authority engagement, stakeholder engagement and project management. Client: Exxaro Coal Mpumalanga (Pty) Ltd Mpumalanga (Pty) Ltd.
- à Cato Ridge Regional Landfill Site, KwaZulu Natal, South Africa (2010-2011): Project Director. An EIA process, including a Waste License Application, was undertaken for the development of a regional landfill site to service the west of the eThekweni Municipality. The study included a wide range of specialist

HILARY KONIGKRAMER, B.SocH., EAP

inputs, and extensive stakeholder engagement and project management.
Client: eThekweni Cleansing and Solid Waste Department.

- à Sanibonani Mixed Development, Himeville, KwaZulu-Natal, South Africa (2005-2011): Project Director. The project commenced with an environmental pre-feasibility assessment in order to clarify the legal requirements and determine opportunities and constraints associated with the proposed mixed housing and commercial development between the towns of Underberg and Himeville. An Environmental Authorisation procedure was undertaken which included significant project management and co-ordination of a large team of specialists. Client: Retsol Holdings (Pty) Ltd.
- à Closure and Remediation of the Guernica Chemicals Site in Cato Ridge, KwaZulu-Natal, South Africa (2009-2010): Project Manager. A Basic Assessment process was undertaken for the closure and remediation of the Guernica Chemicals site in Cato Ridge. The focus of this Basic Assessment process is the identification of the best technology to treat and dispose of mercury contaminated material on site, and prepare implementation plans for the rehabilitation of this site. The site has been covered widely in both local and national media for over 15 years. Client: Guernica Chemicals (Pty) Ltd (formally Thor Chemicals).
- à Back of Berth Upgrade at the Island View Complex, and a Tank Replacement at the Engen Refinery, KwaZulu-Natal, South Africa (2008-2010): Project Director. The project involved the upgrade of back of berth pipeline infrastructure within the Durban Harbour, as well as a tank replacement at the Engen Refinery. The challenge with the project was addressing impacts associated with two locations within one application, with one of the locations being within the contentious South Durban area. The Environmental Authorisation process involved significant authority and stakeholder engagement. Client: Engen Petroleum Limited.
- à Alkylation Unit Upgrade at the Engen Refinery, South Durban, KwaZulu-Natal, South Africa (2006-2009): Project Manager. Environmental Scoping and Environmental Management Plan was undertaken for the proposed upgrade of the Alkylation Unit at the Engen Refinery. This project involved significant public and authority consultation and a detailed technical component. Stakeholder engagement was a significant challenge within the South Durban context, and an innovative approach was required in order to ensure those who were likely to be directly affected by the project were afforded an opportunity to engage in the process. Client: Engen Petroleum Limited.
- à Ngwadini Reservoir, KwaZulu-Natal, South Africa (2007-2009): Project Manager. Environmental Scoping and EMP for the proposed off-stream earth embankment dam in the Ngwadini Valley, to ensure a reliable supply of water to the Sappi Saiccor Mill located in Umkomaas, KwaZulu-Natal. The Environmental Authorisation process included extensive stakeholder and authority engagement, and the management of a wide range of specialist. Client: Sappi Saiccor (Pty) Ltd.
- à Permit Amendment for the Existing H:H Landfill Site, Newcastle, KwaZulu-Natal, South Africa (2007-2008): Project Manager. A Basic Assessment process was followed for the permit amendment of the existing H:H landfill at the Arcelor Mittal South Africa Ltd Steel Newcastle Plant. This permit amendment allow for certain waste types generated at the Arcelor Mittal South Africa Ltd Vereeniging Plant to be transported and disposed of at the Newcastle Plant. Client: Arcelor Mittal South Africa Ltd.

HILARY KONIGKRAMER, B.SocH., EAP

Specialist Environmental Support

- à Environmental support associated with the Richards Bay Oil Spill, KwaZulu-Natal, South Africa (2014-2015): Project Manager. Provision of strategic support in respect of clean-up operations and longer terms monitoring support in respect to the Heavy Fuel Oil spill which occurred in the Port of Richards Bay. Client: Confidential.
- à Environmental input into a technical report and Preliminary Economic Assessment for the Enchi Gold Project, Ghana (2015): Project Manager. An environmental screening assessment was undertaken to identify key environmental issues associated with the proposed gold project, and environmental legal review to identify the regulatory requirements and processes applicable to the project.

Specialist Stakeholder Engagement and Social Impact Assessment Experience

- à Proposed Durban Dig-Out Port, early planning phase Stakeholder Engagement, Durban, KwaZulu-Natal, South Africa (2012-2013): Stakeholder Engagement Director and Project Manager. The proposed Durban Dig-Out Port is a large infrastructure project of national strategic importance. WSP has been responsible for stakeholder engagement in the early phase (FEL1) of the project planning lifecycle. A Stakeholder Engagement Strategy was developed to ensure the stakeholder engagement process was implemented effectively. Stakeholder identification, mapping and evaluation was undertaken throughout the project. A series of discussion sessions were arranged with key representatives of the various stakeholder groups in order to develop relationships and trust, share information and obtain feedback (key issues) early in the planning process. This early engagement has developed the foundation for future engagement (EIA phase). Client: Transnet Capital Projects.
- à Umhlanga Tidal Pool, KwaZulu-Natal, South Africa (2013): Social Impact Assessment (SIA) Project Director. eThekweni proposed to construct a tidal pool at Umhlanga Beach within the northern eThekweni region. The SIA was commissioned due to public request, and involved extensive surveys and interviews. The outcome included the identification of the most socially acceptable site, and recommendations regarding development and management of the tidal pool in the short to long term. Client: eThekweni Municipality.
- à Re-Processing of the Waterval Tailings Storage Facility, Rustenburg, North West Province, South Africa (2013): SIA Project Director. An SIA was required in support of the Environmental Authorisation process for the amendment of the Environmental Management Programme. The existing social climate in and around the Rustenburg mining operations was potentially unstable at the time of the study, due to historical and on-going issues between labour and mining companies. The SIA aimed to establish both direct and indirect impacts of the proposed project, and establish the significance of these impacts within the local socio-economic landscape, and included a review of existing information and the collection of primary data through interviews with key local stakeholders. The SIA ultimately determined that there would be no direct significant negative impacts on the local communities, although certain measures would need to be put in place to ensure that any negative impacts would be mitigated during the construction and operational phases. Client: Anglo American Platinum Limited.

HILARY KONIGKRAMER, B.SocH., EAP

- à SIA for Proposed Yzermyn Coal Mine, Mpumalanga, South Africa (2013): SIA Project Director. In support of an Environmental Authorisation procedure for the proposed underground coal mine, an SIA was undertaken to assess the socio-economic impacts of the activity. A variety of techniques, including household surveys, stakeholder interviews, and group meetings were used to establish the potential issues, impacts and recommendations. The social impacts of the proposed mine were determined to be of significance to the local population, and firm measures were provided to prevent excessive loss of local sense of place and livelihoods, and ensure economic stability for the local communities. Client: Atha-Africa Ventures (Pty).
- à Tumela Central Shaft, Thabazimbi, Limpopo, South Africa (2013): SIA Project Director (2013): In support of the EIA process for the proposed new shaft at the Amandelbult Section, a social screening was undertaken to establish potential socio-economic impacts of the proposed development. The site, being located a number of kilometres away from populated areas, was unlikely to have a significant social impact. To ensure independent assessment, and given the instability of mining communities, the social screening reviewed existing data, and interviewed a number of key local stakeholders to determine the possible issues, impacts and recommendations. Client: Anglo American Platinum Limited.
- à Sasol New Energy Holding Concentrated Solar Park, Upington, Northern Cape, South Africa (2012): SIA Project Director. Sasol New Energys Holding proposed the construction of a solar power generation complex near Upington in the Northern Cape. The SIA was undertaken to determine the socio-economic impact of the proposed project. The objective of the SIA was to identify and assess potential impacts of the proposed SSP on the socio-economic receiving environment. The SIA determined that there were a number of key socio-economic benefits of the proposed project, and provided sound recommendations regarding the development of community trusts, small business opportunities and education programmes, in order to maximise these social benefits. Client: Sasol Energy.
- à Social Impact Assessment of the Proposed Green Energy Project at Sappi Ngodwana Mill, Mpumalanga, South Africa (2012): SIA Project Director. Sappi Southern Africa (Pty) Ltd proposes the installation of a biomass boiler to generate electricity, a portion of which will be fed into the national grid. The SIA focuses on the identification and assessment of the direct socio-economic impacts of the proposed project. Client: Sappi Southern Africa (Pty) Ltd.
- à Coal Mine Social Impact Assessment, Eerstelingsfontein, North West Province, South Africa (2011): SIA Project Director. Exxaro proposed to mine an area of agricultural land for the extraction of high-quality coal. The social impact assessment (SIA) team undertook a detailed assessment of the immediate communities, local government and broader social and economic issues through surveys of the local community and farmers, assessment of other specialist studies in terms of the potential social impacts, and the provision of mitigation measures and a social management plan for the construction and operation of the mine. The presence of an established community on the site provided a significant social hurdle; however, the team provided a social management strategy to manage and mitigation potential social impacts on the local communities. Client: Exxaro Coal Mpumalanga (Pty) Ltd.
- à Social Impact Assessment of the Town of Nottingham Road – Implications of the Proposed Rawdons and Hillside Developments, KwaZulu-Natal, South

HILARY KONIGKRAMER, B.SocH., EAP

Africa (2008): SIA Project Director. A socio-economic assessment of the proposed Rawdons extension and the Hillside developments was undertaken. Of particular consideration were the cumulative social impacts and the future growth of the town of Nottingham Road. Client: Afzelia Environmental Consultants CC.

- à SIA for Proposed Relocation of Denel's Philippi Munitions Facility, Western Cape, South Africa (2007): Social Consultant. A qualitative methodology was employed during the SIA study in order to identify the social issues associated with the relocation of the Philippi munitions facility. The study sought to understand the differing issues and concerns of the stakeholders likely to be affected by the project. The methodology included a social review of the project areas, primary data collection in the form of questionnaires and stakeholder meetings, and the identification and assessment of potential impacts. Client: Denel Munitions (Pty) Ltd.
- à Proposed Cato Ridge Regional Landfill Site, KwaZulu-Natal, South Africa (2007): Social Consultant. The eThekweni Municipality propose the development of a large regional general landfill site to meet the future waste management requirements of the municipality. This SIA study involved the identification and assessment of potential social issues associated with the development of the landfill site. The study included a desktop socio-economic review of the area, primary data collection in the form of questionnaires and stakeholder workshops. Client: eThekweni Cleansing and Solid Waste Department.
- à Public Impact Assessment for the Proposed Île Aurore Development, Mahé, Seychelles (2007): Social Consultant. A public impact assessment was undertaken as a specialist component of the Scoping study for the development of an exclusive golf course and casino development on the island of Île Aurore, Seychelles. The purpose of the study was to consult with the local community who would be most affected by the development, document the key issues and identify the likely impacts. Client: Pinnacle Point Holdings (Pty) Ltd.
- à Social Probe for the Proposed Ngwadini Reservoir, KwaZulu-Natal, South Africa (2006): Social Consultant. Sappi Saiccor proposed the construction of an off-stream storage reservoir, with a design capacity of 10 million cubic meters of water, to supplement water supply to the Saiccor Mill during period of low river flow. The reservoir footprint is 73 hectares, located within a rural context. The social probe provided a description of the social environment surrounding the proposed Ngwadini Reservoir site, thereby identifying possible social issues associated with the proposed project. The report included a description of social impacts, preliminary assessment of impacts and recommendations. Client: Sappi Saiccor (Pty) Ltd.

Appendix C

DECLARATION OF INDEPENDENCE



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

File Reference Number:	(For official use only)
NEAS Reference Number:	12/12/20/ or 12/9/11/L
Date Received:	DEA/EIA

Application for integrated environmental authorisation and waste management licence in terms of the-

- (1) National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014; and
- (2) National Environmental Management Act: Waste Act, 2008 (Act No. 59 of 2008) and Government Notice 921, 2013

PROJECT TITLE

PROPOSED DEVELOPMENT OF THE LETSOAI AND ENAMANDLA SOLAR RENEWABLE ENERGY PROJECTS, AGGENEYS, NORTHERN CAPE PROVINCE

Specialist:	WSP Environmental (Pty) Ltd		
Contact person:	Danielle Sanderson		
Postal address:	1 on Langford, Langford Road, Westville, Durban		
Postal code:	3629	Cell:	072 2598319
Telephone:	(031) 240 8860	Fax:	(031) 240 8861
E-mail:	Danielle.sanderson@wspgroup.co.za		
Professional affiliation(s) (if any)	-		

Project Consultant:	WSP Environmental (Pty) Ltd		
Contact person:	Ashlea Strong / Nigel Seed		
Postal address:	P O Box 98867 Sloane Park		
Postal code:	2152	Cell:	082 786 7819
Telephone:	011 361 1392	Fax:	011 361 1381
E-mail:	Ashlea.Strong@wspgroup.co.za / Nigel.Seed@wspgroup.co.za		

4.2 The specialist appointed in terms of the Regulations_

I, Danielle Sanderson, declare that – General declaration:

I act as the independent specialist in this application;
I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
I declare that there are no circumstances that may compromise my objectivity in performing such work;
I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
I will comply with the Act, Regulations and all other applicable legislation;
I have no, and will not engage in, conflicting interests in the undertaking of the activity;
I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
all the particulars furnished by me in this form are true and correct; and
I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

D Sanderson
Signature of the specialist:

WSP Environmental (Pty) Ltd
Name of company (if applicable):

2016/09/08
Date:

Appendix D

CUMULATIVE ASSESSMENT

BIO THERM – CUMULATIVE ASSESSMENT

APPROACH

The Department of Environmental Affairs (DEA) has requested that a detailed cumulative assessment is undertaken for each of the proposed BioTherm projects. The cumulative assessment must take the specialist studies from the surrounding Environmental Authorisations into account.

In order to ensure that a consolidated cumulative assessment can be developed for each project, a template has been produced to ensure that the specialist studies across the disciplines utilise the same approach.

Each specialist discipline will be required to compile the table below and provide a qualitative discussion on the overall cumulative impact of the projects in the study area.

MASTER ASSUMPTIONS

The following assumptions and limitations have been identified in relation to the above approach:

- à Due to the number of different significance rating methodologies utilised across the various projects, significance ratings have been simplified to include only Low, Medium and High ratings.
- à In the event that specialist studies were unable to be obtained, this has been noted.
- à All approved and ongoing environmental authorisations within a 70km radius above been considered

PROPOSED DEVELOPMENT NAME	DEA REFERENCE	CURRENT EA STATUS	PROPONENT	EXTENT	PROPOSED CAPACITY	FARMS	IMPACTS																			PROPOSED MITIGATION MEASURES		
							Construction							Operation							Decommissioning							
							Economic	Socio-economic	Social	Employment	Community dev	Public safety	Waste	Economic	Climate change	Local and regional economy	Socio-economic	Employment	Energy supply	Community dev	Public safety	Waste	Economic	Socio economic	Employment		Energy supply	Community dev
The Proposed Boesmanland Solar Farm Portion 6 (A Portion Of Portion 2), Farm 62 Zuurwater, Aggeneys, Northern Cape Province.	12/12/20/2602	Approved		200	75																							
75MW PV plant on the Farm Zuurwater No 62 in the Namakwa District, Northern Cape Province, Phase 4.	14/12/16/3/3/2/473	In Process		222	75		M (+)	L		H (+)	H (+)	L	L	M (+)			L	H (+)	H (+)	H (+)	L	L	M	L	M	H	M	L
Proposed Boesmanland Solar Farm Portion 6 (A portion of portion 2) Farm 62 Zuurwater, Aggeneys, Northern Cape.	14/12/16/3/3/2/222	Approved		200	75																							
Proposed Wind Energy Facility and Associated Infrastructure on Namies Wind Farm Pty Ltd, near Aggeneys, Northern Cape Province.	14/12/16/3/3/2/550	In Process		15	220		M (+)	H (+)		H (+)	M (+)			H (+)			L (+)	H (+)		M (+)								

PROPOSED DEVELOPMENT NAME	DEA REFERENCE	CURRENT EA STATUS	PROPONENT	EXTENT	PROPOSED CAPACITY	FARMS	IMPACTS																				PROPOSED MITIGATION MEASURES																		
							Construction							Operation							Decommissioning																								
							Economic	Socio-economic	Social	Employment	Community dev	Public safety	Waste	Economic	Climate change	Local and regional economy	Socio-economic	Employment	Energy supply	Community dev	Public safety	Waste	Economic	Socio economic	Employment	Energy supply		Community dev	Public safety																
The Proposed Construction of a Photovoltaic Power Generation Facility within the Black Mountain Mining Area near Aggeneys in the Northern Cape Province.	12/12/20/2151	Approved		19.5	19																																								
Proposed 75MW Korana Wind Energy Facility, near Poffader in the Northern Cape.	14/12/16/3/3/2/683	Unknown		3257 (all facilities)	Unknown				H	M (+)	H (+)	L							H	M (+)	M (+)	H (+)																							
Proposed 140MW Khai-Mai Wind Energy Facility near Pofadder.	14/12/16/3/3/2/680	Unknown		3257 (all facilities)	Unknown				H	M (+)	H (+)	L							H	M (+)	M (+)	H (+)																							
				Total	Total																																								
				50248.5	1538 MW																																								
Significance Totals per impact	Significance Rating			Total Hectares per impact																																									
	High Significance																										3 257	3 257											222						
	Medium Significance																																								222	222	222		
Low Significance																																									222	222			222

PROPOSED DEVELOPMENT NAME	DEA REFERENCE	CURRENT EA STATUS	PROPONENT	EXTENT	PROPOSED CAPACITY	FARMS	IMPACTS																			PROPOSED MITIGATION MEASURES
							Construction							Operation							Decommissioning					
							Economic	Socio-economic	Social	Employment	Community dev	Public safety	Waste	Economic	Climate change	Local and regional economy	Socio-economic	Employment	Energy supply	Community dev	Public safety	Waste	Economic	Socio economic	Employment	
Positive Impacts							237	46 550	3 494	3 494			237	46 535	46 535	46 550	3 494	3 479	3 494							

The following EAs surrounding the solar developments have been either withdrawn or have lapsed and are therefore not been considered as part of the cumulative impact assessment:

PROPOSED DEVELOPMENT NAME	DEA REFERENCE	CURRENT EA STATUS	PROPONENT	EXTENT	PROPOSED CAPACITY	FARMS
Proposed Sato Energy Holdings Photovoltaic Project, Khai Ma Local Municipality, Northern Cape.	12/12/20/2334/7	Withdrawn / Lapsed			75	
Proposed Sato Energy Holdings Photovoltaic Project, Khai Ma Local Municipality, Northern Cape.	12/12/20/2334/6	Withdrawn / Lapsed			75	
Proposed Sato Energy Holdings Photovoltaic Project, Khai Ma Local municipality, Northern Cape.	12/12/20/2334/7	Withdrawn / Lapsed			75	
Proposed Gamsberg Solar Energy Project on Portion 1 of Farm 57 Aroams near Upington, Khai-Ma Municipality, Northern Cape.	12/12/20/2605	Withdrawn / Lapsed			Unknown	

Appendix E

ASSESSMENT OF IMPACTS

APPENDIX E-1

CONSTRUCTION

Construction Phase

Enamandla PV Site 5

Potential Impact		Extent	Duration	Magnitude	Probability	Significance	Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)	(+ve or -ve)	
Increase in Employment Opportunities	Nature of impact:	Short term employment opportunities to be recognised at a local, regional and national level (62 unskilled, 68 skilled)						
	Without Mitigation	4	2	4	4	40	Medium	+
	degree to which impact can be reversed:	None						
	degree of impact on irreplaceable resources:	None						
	Mitigation Measures	Appointment of local contractors; Employment of local labour as far as possible, particularly for semi and unskilled opportunities; Communication with Local Municipality and community representatives in respect of opportunities; skills development programmes for locals						
	With Mitigation	4	2	6	4	48	Medium	+
Increased Economic Development Opportunities	Nature of impact:	Generation of construction phase Local Economic Development opportunities (national, regional and local level)						
	Without Mitigation	4	2	4	4	40	Medium	+

Potential Impact		Extent	Duration	Magnitude	Probability	Significance	Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)	(+ve or -ve)	
	degree to which impact can be reversed:	None						
	degree of impact on irreplaceable resources:	None						
	Mitigation Measures	Use of local suppliers and manufacturers; development of a database of local companies (in local municipal area) for service provision associated with the construction phase; support for entrepreneurs and businesses.						
	With Mitigation	4	2	6	4	48	Medium	+
Disruption due to influx of job seekers	Nature of impact:	Influx of job seekers into towns could lead to social conflict of resources and employment opportunities. Challenges for local municipality including establishment of informal settlements and service provision.						
	Without Mitigation	2	2	6	5	50	Medium	-
	degree to which impact can be reversed:	Medium - Difficult to manage or control influx of job seekers and the local impacts.						
	degree of impact on irreplaceable resources:	Low						

Potential Impact		Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
	Mitigation Measures	Manage employment expectations as far as possible, prioritise local employment, engage with local municipality in respect of accommodation of labour/staff brought into the area by contractors/developer							
	With Mitigation	2	2	6	4	40	Medium	-	
Increase in communicable diseases and reduced public health	Nature of impact:	Presence of an outside labour force, and the influx of job seekers, would potentially affect local public health due to a higher likelihood of a spread of communicable diseases such as TB and HIV/AIDS and other sexually transmitted diseases.							
	Without Mitigation	2	2	8	4	48	Medium	-	
	degree to which impact can be reversed:	Medium - Difficult to manage or control communicable diseases which could permanently impact local populations							
	degree of impact on irreplaceable resources:	High							
	Mitigation Measures	Development of a labour force Health and Safety Plan, HIV/AIDS awareness, prevention and testing campaign							
	With Mitigation	2	2	6	4	40	Medium	-	
Change in sense of place	Nature of impact:	Change in the local sense of place as a result of construction activities, increased population and economic development in local towns							
	Without Mitigation	2	2	4	4	32	Medium	-	

Potential Impact		Extent	Duration	Magnitude	Probability	Significance	Status	Confidence	
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)	(+ve or -ve)		
	degree to which impact can be reversed:	High - Project could be removed							
	degree of impact on irreplaceable resources:	Low							
	Mitigation Measures	Air quality, noise and traffic related mitigation measures recommended by relevant specialist and included in the EMPr							
	With Mitigation	2	2	4	3	24	Low	-	
Nuisance from noise, dust and traffic disturbances	Nature of impact:	Localised disturbance as a result of dust, noise and traffic							
	Without Mitigation	2	2	4	4	32	Medium	-	
	degree to which impact can be reversed:	Medium - Implementation of EMPr measures to reduce noise, dust and traffic related impacts, but unlikely to negate completely							
	degree of impact on irreplaceable resources:	Low							
	Mitigation Measures	Air quality, noise and traffic related mitigation measure recommended by relevant specialist and included in the EMPr							
	With Mitigation	2	2	4	3	24	Low	-	

Potential Impact		Extent	Duration	Magnitude	Probability	Significance	Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)	(+ve or -ve)	
Increased risk to neighbouring land users	Nature of impact:	Potential increased risk to farmers as a result of presence of labour force including petty theft, stock theft, damage to infrastructure						
	Without Mitigation	2	2	6	3	30	Low	-
	degree to which impact can be reversed:	High - The provision of compensation to farmers for damage to infrastructure, stock theft, etc.						
	degree of impact on irreplaceable resources:	Low						
	Mitigation Measures	Development of a code of conduct for construction workers, to be signed by the contractor; Contractor to be held liable for compensating farmers for any losses and/or damage that can be linked to construction workers						
	With Mitigation	2	2	4	3	24	Low	-
Increased risk of veld fires	Nature of impact:	Increased risk of veld fires as a result of construction phase activities						
	Without Mitigation	2	2	6	4	40	Medium	-
	degree to which impact can be reversed:	High - The provision of compensation to farmers for losses resulting from veld fires						
	degree of impact on	Low						

Potential Impact		Extent	Duration	Magnitude	Probability	Significance	Status	Confidence	
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)	(+ve or -ve)		
	irreplaceable resources:								
	Mitigation Measures	Implementation of EMPr i.e. mitigation in respect of construction phase activities that may pose a fire risk (i.e. no open fires allowed on site for cooking/heating; activities that pose a fire risk to be properly managed and confined to designated areas; adequate firefighting equipment to be provided; training to be provided)							
	With Mitigation	2	2	4	3	24	Low	-	
Enamandla PV Site 5 - No-Go									
Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)	Status (+ve or -ve)	Confidence	
Loss of employment and local economic development opportunities	Nature of impact:								
	Without Mitigation	4	5	2	5	55	Medium	-	
	degree to which impact can be reversed:	N/A							
	degree of impact on irreplaceable resources:	N/A							
	Mitigation Measures	None.							

Potential Impact		Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
	With Mitigation	4	5	2	5	55	Medium	-	
Maintenance of the existing landscape and sense of place	Nature of impact:								
	Without Mitigation	3	5	2	5	50	Medium	+	
	degree to which impact can be reversed:								
	degree of impact on irreplaceable resources:								
	Mitigation Measures								
	With Mitigation	4	5	2	5	55	Medium	+	

APPENDIX E-2

OPERATION

Operational Phase

Enamandla PV Site 5

Potential Impact		Extent	Duration	Magnitude	Probability	Significance	Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)	(+ve or -ve)	
Increased employment opportunities	Nature of impact:	Creation of long term employment opportunities (29 unskilled, 68 skilled)						
	Without Mitigation	4	4	2	3	30	Low	+
	degree to which impact can be reversed:	N/A						
	degree of impact on irreplaceable resources:	Low						
	Mitigation Measures	Appointment of local contractors; Employment of local labour as far as possible, particularly for semi and unskilled opportunities; Communication with Local Municipality and community representatives in respect of opportunities; Implementation of a skills development programmes for locals						
	With Mitigation	4	4	4	4	48	Medium	+
Increased economic development opportunities	Nature of impact:	Creation of business opportunities and economic development associated with the operational phase						
	Without Mitigation	4	4	4	3	36	Medium	+

Potential Impact		Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
	degree to which impact can be reversed:	N/A							
	degree of impact on irreplaceable resources:	Low							
	Mitigation Measures	Use of local suppliers and manufacturers; development of a database of local companies (in local municipal area) for service provision associated with the construction phase; support for entrepreneurs and businesses. Co-ordination with the Local Municipality in respect of community upliftment initiatives and support of community projects to ensure alignment.							
	With Mitigation	4	4	4	4	48	Medium	+	
Change in sense of place	Nature of impact:								
	Without Mitigation	2	4	4	4	40	Medium	-	
	degree to which impact can be reversed:	High - removal of the proposed development							
	degree of impact on irreplaceable resources:	Low							
	Mitigation Measures	Implementation of recommendations contained in Visual Impact Assessment							

Potential Impact		Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
	With Mitigation	2	4	4	4	40	Medium	-	
Access to water resources	Nature of impact:	Additional pressure on available water resources.							
	Without Mitigation	3	4	6	2	26	Low	-	
	degree to which impact can be reversed:	High - Good water management and equitable provision							
	degree of impact on irreplaceable resources:	Low - Access to water, not water use.							
	Mitigation Measures	Investigation opportunities for water efficiencies.							
	With Mitigation	3	4	6	2	26	Low	-	
Enamandla PV Site 5 - No-Go									
Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Lost opportunity for provision of clean, renewable energy and associated	Nature of impact:								
	Without Mitigation	4	5	6	5	75	High	-	

Potential Impact		Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
employment and economic benefits	degree to which impact can be reversed:	N/A							
	degree of impact on irreplaceable resources:	N/A							
	Mitigation Measures	None.							
	With Mitigation	4	5	6	5	75	High	-	
Maintenance of the existing landscape and sense of place	Nature of impact:								
	Without Mitigation	3	5	2	5	50	Medium	+	
	degree to which impact can be reversed:	N/A							
	degree of impact on irreplaceable resources:	N/A							
	Mitigation Measures	None.							
	With Mitigation	3	5	2	5	50	Medium	+	

APPENDIX E-3

DECOMMISSIONING

Decommissioning Phase

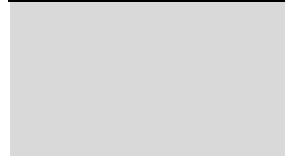
Enamandla PV Site 5

Potential Impact		Extent	Duration	Magnitude	Probability	Significance	Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)	(+ve or -ve)	
Loss of permanent employment	Nature of impact:	Loss of 20 permanent employment positions (68 skilled, 29 unskilled)						
	Without Mitigation	2	5	4	3	33	Medium	-
	degree to which impact can be reversed:	N/A						
	degree of impact on irreplaceable resources:	Low						
	Mitigation Measures	Relocation of employees to other renewable energy facilities; provision of retrenchment packages						
	With Mitigation	2	5	2	3	27	Low	-
Gain of short term employment	Nature of impact:	Limited short term unskilled / semi-skilled opportunities						
	Without Mitigation	2	1	6	3	27	Low	+
	degree to which impact can be reversed:	N/A						

Potential Impact		Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
	degree of impact on irreplaceable resources:	Low							
	Mitigation Measures	Appointment of local contractors; Employment of local labour as far as possible, particularly for semi and unskilled opportunities; Communication with Local Municipality and community representatives in respect of opportunities; skills development programmes for locals							
	With Mitigation	2	1	6	4	36	Medium	+	
Nuisance from dust, noise and traffic	Nature of impact:	Localised disturbance as a result of dust, noise and traffic							
	Without Mitigation	2	1	4	4	28	Low	-	
	degree to which impact can be reversed:	High - Implementation of EMPr measures to reduce noise, dust and traffic related impacts							
	degree of impact on irreplaceable resources:	Low							
	Mitigation Measures	Air quality, noise and traffic related mitigation measure recommended by relevant specialist and included in the EMPr							
	With Mitigation	2	1	4	3	21	Low	-	
	Nature of impact:	Potential increased risk to farmers as a result of presence of labour force including petty theft, stock theft, damage to infrastructure							

Potential Impact		Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
Increased risk to neighbouring land users	Without Mitigation	2	1	6	3	27	Low	-	
	degree to which impact can be reversed:	High - The provision of compensation to farmers for damage to infrastructure, theft, etc.							
	degree of impact on irreplaceable resources:	Low							
	Mitigation Measures	Development of a code of conduct for decommissioning phase workers, to be signed by the contractor; Contractor to be held liable for compensating farmers for any losses and/or damage that can be linked to decommissioning workers							
	With Mitigation	2	1	4	3	21	Low	-	
Increased risk of veld fires	Nature of impact:	Increased risk of veld fires as a result of construction phase activities							
	Without Mitigation	2	2	6	4	40	Medium	-	
	degree to which impact can be reversed:	High - The provision of compensation to farmers for losses resulting from veld fires							
	degree of impact on irreplaceable resources:	Low							

Potential Impact		Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
	Mitigation Measures	Implementation of EMPr i.e. mitigation in respect of construction phase activities that may pose a fire risk (i.e. no open fires allowed on site for cooking/heating; activities that pose a fire risk to be properly managed and confined to designated areas; adequate firefighting equipment to be provided; training to be provided)							
	With Mitigation	2	2	4	3	24	Low	-	



APPENDIX E-4

CUMULATIVE

Cumulative Impacts

Enamandla PV Site 5

Potential Impact		Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
Increased local economic development opportunities	Nature of impact:	Increase in local employment and business development opportunities							
	Without Mitigation	3	4	8	5	75	High	+	
	degree to which impact can be reversed:	N/A							
	degree of impact on irreplaceable resources:	Low							
	Mitigation Measures	Use of local suppliers and manufacturers; development of a database of local companies (in local municipal area) for service provision associated with the construction phase; support for entrepreneurs and businesses.							
	With Mitigation	3	4	8	5	75	High	+	
Increased pressure on local service provision	Nature of impact:	Increased pressure on local municipalities and communities in respect of service provision							
	Without Mitigation	3	4	6	4	52	Medium	-	
	degree to which impact can be reversed:	Medium - May be mitigated but difficult to reverse once in place							
	degree of impact on irreplaceable resources:	Low							

Potential Impact		Extent	Duration	Magnitude	Probability	Significance	Status	Confidence	
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)	(+ve or -ve)		
	Mitigation Measures	Prioritise local employment, engage with local municipality regarding infrastructure and service provision							
	With Mitigation								
Change in sense of place	Nature of impact:	Change in the landscape as a result of the development of numerous renewable energy projects							
	Without Mitigation	3	4	4	3	33	Medium	-	
	degree to which impact can be reversed:	High - Project could be removed							
	degree of impact on irreplaceable resources:	Low							
	Mitigation Measures	Implementation of recommendations contained in Visual Impact Assessment							
	With Mitigation								
Change in employment patterns	Nature of impact:	Change in the nature of businesses and employment patterns within the local area							
	Without Mitigation	3	4	2	3	27	Low	+	
	degree to which impact can be reversed:	Medium - May be mitigated but cannot be completely reversed once in place							
	degree of impact on irreplaceable resources:	Low							
	Mitigation Measures	None							

Potential Impact		Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
	With Mitigation								
Access to water resources	Nature of impact:	Pressure on water resources as a result of numerous renewable energy projects and other development projects in the area.							
	Without Mitigation	3	4	6	4	52	Medium	-	
	degree to which impact can be reversed:	High - Good water management and equitable provision							
	degree of impact on irreplaceable resources:	Low - Access to water, not water use.							
	Mitigation Measures	DWS to manage water resources equitably to ensure there is sufficient water for all sectors							
	With Mitigation								
Enamandla PV Site 5 - No-Go									
Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Lost opportunity for provision of clean, renewable energy and associated employment and economic benefits	Nature of impact:								
	Without Mitigation	4	5	0	2	18	Low	-	
	degree to which impact can be reversed:	N/A							
	degree of impact on irreplaceable resources:	N/A							

Potential Impact		Extent	Duration	Magnitude	Probability	Significance	Status	Confidence	
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)	(+ve or -ve)		
	Mitigation Measures	None.							
	With Mitigation	4	5	0	2	18	Low	-	
Maintenance of the existing landscape and sense of place	Nature of impact:								
	Without Mitigation	4	5	0	2	18	Low		
	degree to which impact can be reversed:	N/A							
	degree of impact on irreplaceable resources:	N/A							
	Mitigation Measures	None.							
	With Mitigation	4	5	0	2	18	Low		

