DEA REFERENCE NUMBER: 14/12/16/3/3/2/963

PROPOSED MARALLA WEST WIND ENERGY FACILITY NEAR SUTHERLAND, NORTHERN CAPE

DRAFT ENVIRONMENTAL IMPACT REPORT

PUBLIC

FEBRUARY 2017

PROPOSED MARALLA WEST WIND ENERGY FACILITY NEAR SUTHERLAND, NORTHERN CAPE

DRAFT ENVIRONMENTAL IMPACT REPORT

BioTherm Energy (Pty) Ltd

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Signature				
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Signature	Senior Associate			
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DOCUMENT DESCRIPTION

CLIENT

BioTherm Energy (Pty) Ltd

PROJECT NAME

Proposed Maralla West Wind Energy Facility near Sutherland, Northern Cape

REPORT TYPE

Draft Environmental Impact Report

WSP PROJECT NUMBER

47579

AUTHORITY REFERENCE NUMBERS

DEA: 14/12/16/3/3/2/963

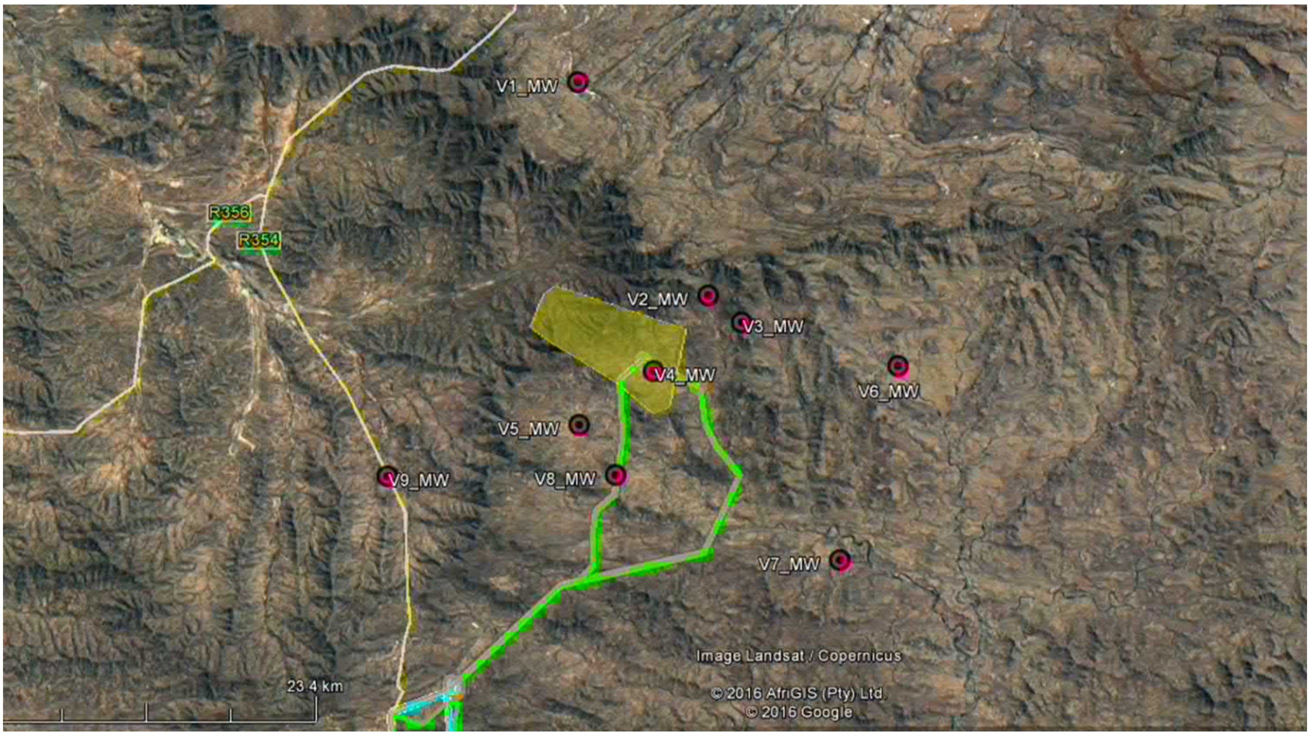
GENERAL SITE INFORMATION

TECHNICAL DETAILS OF THE PROPOSED MARALLA WEST WIND ENERGY FACILITY	
Location of Site	The proposed project is to be developed approximately 34km South of Sutherland in the Northern Cape
Farm Names	Farm Drie Roode Heuvels 180, Remainder Farm Annex Drie Roode Heuvels 181, Remainder Farm Wolven Hoek 182, Portion 1 Farm Wolven Hoek 182, Portion 2
SG Codes	C07200000000018000000 C07200000000018100000 C07200000000018200001 C07200000000018200002
Total area of Site	5 646 ha
Area of Buildable Area	Approximately 200 ha
Area Occupied by Each Turbine	0.5 ha (85m x 60m)
Generation Capacity	Up to 250 MW
Technology	Wind
Number of Turbines	Up to 125 (The revised layout has reduced the number of turbines to 56)
Turbine Hub Height	Up to 120m
Rotor Diameter	Up to 150m
Turbine Foundation	20m diameter x 3m deep – 500 to 650m^3 concrete. Excavation area approx. 1000 m^2 in sandy soils due to access requirements and safe slope stability requirements.
Electrical Turbine Transformers	0.5ha (85m x 60m)
Area of Preferred Operations and Maintenance Building Assessment Site	O&M buildings will be in proximity of the Substation due requirements for power, water and access.
Footprint of Operations and Maintenance Building(s)	O&M building includes operations, on site spares storage and workshop. Typical areas indicated below: → Operations = 20 x 8 = 160m^2 → Work shop = 12 x 8 = 96m^2 → Stores = 15 x 8 = 120m^2
Area of Preferred Construction Laydown areas	Construction camp typical area 60m x 40m = 2 400m^2 → Laydown or staging area 150m x 75m = 11 250m^2 → Laydown for concrete towers (only if required) = 40 000m^2 "

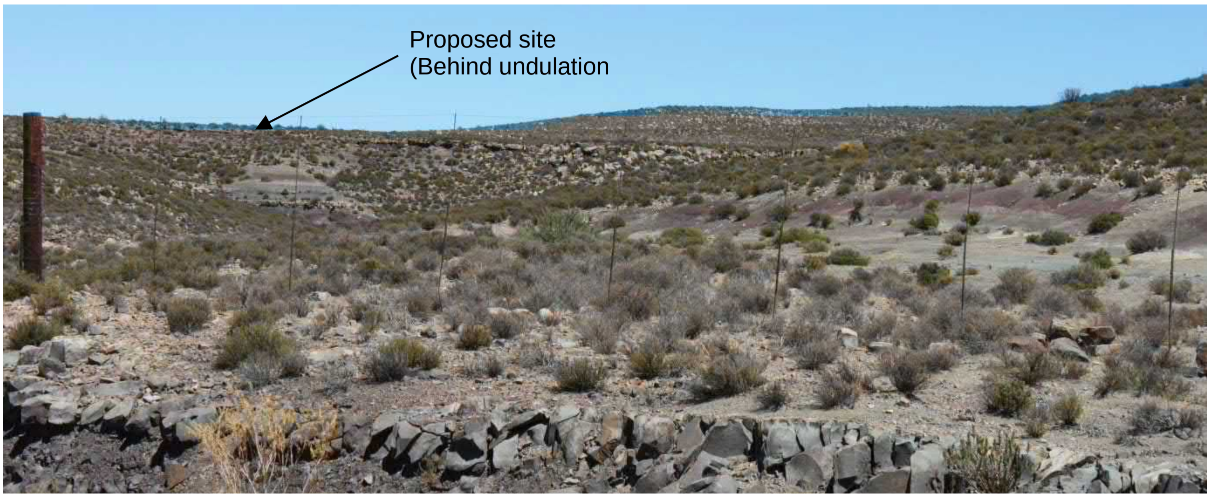
Cement Batching Plant	Gravel and sand will be stored in separate heaps whilst the cement will be contained in a silo. The actual mixing of the concrete will take place in the concrete truck. The footprint of the plant will be in the order of 0.25ha. The maximum height of the cement silo will be 20m. This will be a temporary structure during construction.
Width of Internal Roads	Between 4.0m and 6.0m, however this may increase to 8m on bends
Length of Internal Roads	Approximately 60 km
Type and Height of Fencing	Approximately 5m high palisade or mesh fencing where required
Sewage	Septic tanks (with potable toilets during the construction phase)
Power Evacuation	
Footprint of Internal Onsite Substation	150m x 150m
Onsite Substation Capacity	Up to 132kV
Specifications of onsite switching stations, transformers, invertors, onsite cables etc	The medium voltage collector system will comprise of cables (1kV up to and including 33kV) that will be run underground, except where a technical assessment suggests that overhead lines are applicable, in the facility connecting the turbines to the onsite substation.
Width of the Powerline Servitude	31m (15.5m either side)
Powerline Tower Types and Height	Tower (suspension / strain) / Steel monopole structure, which may be self-supported or guyed suspension.
Closest Grid Connection Point	Komsberg Substation
Proximity to Grid Connection	Komsberg Substation is approximately 25 km from the Maralla East Site.
List of additional infrastructure to be built	Access roads and internal roads. Administration, control and warehouse buildings.

GENERAL SITE PHOTOGRAPHS

The map below indicates the position of the viewpoints (V1 – 9) at which photos were taken.

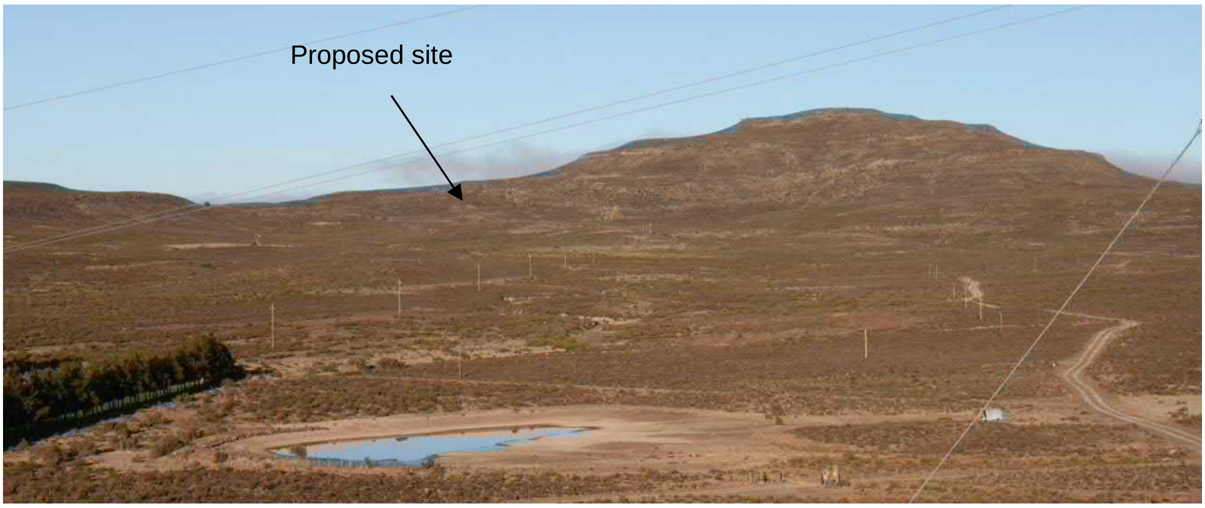


Viewpoint 1



Viewpoint 2 (site not visible behind local undulation but turbines will be)

Viewpoint 3

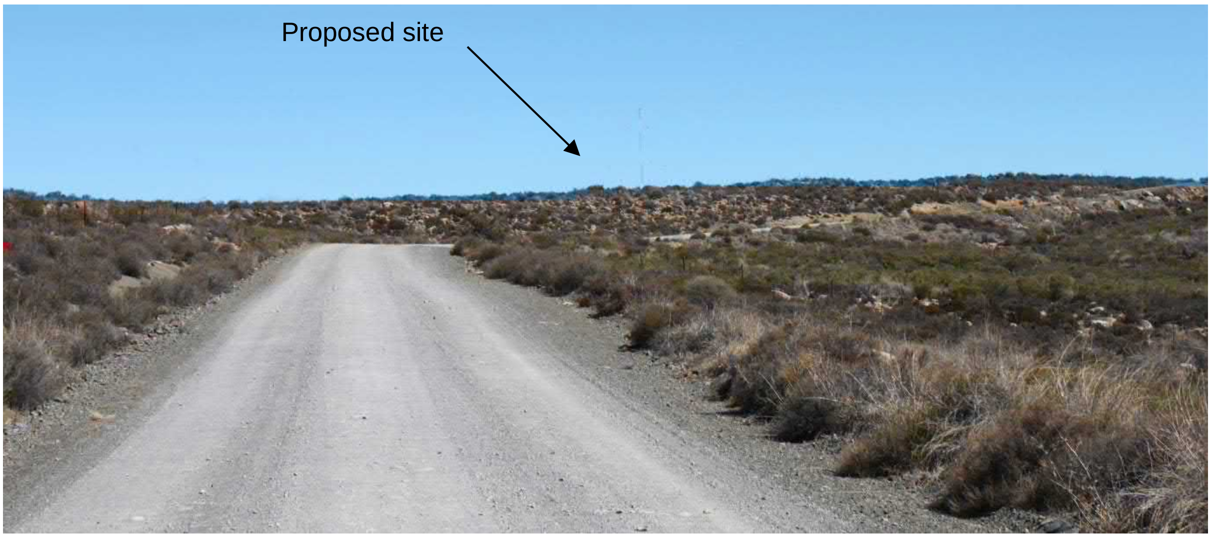


Viewpoint 4

Viewpoint 5

Viewpoint 6 (site not visible behind koppies)

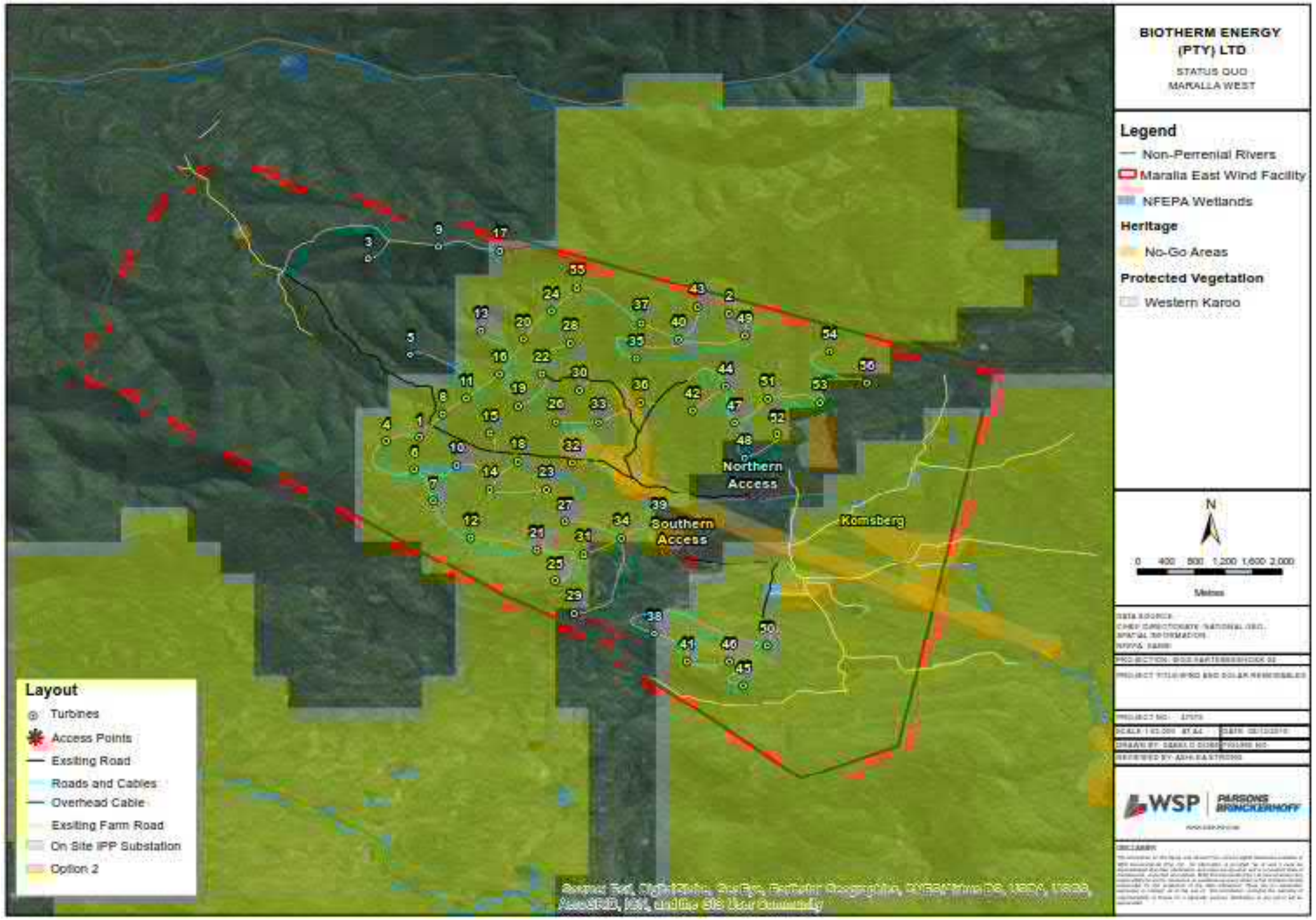
Viewpoint 7 (site not visible wind turbines may be marginally visible on horizon)



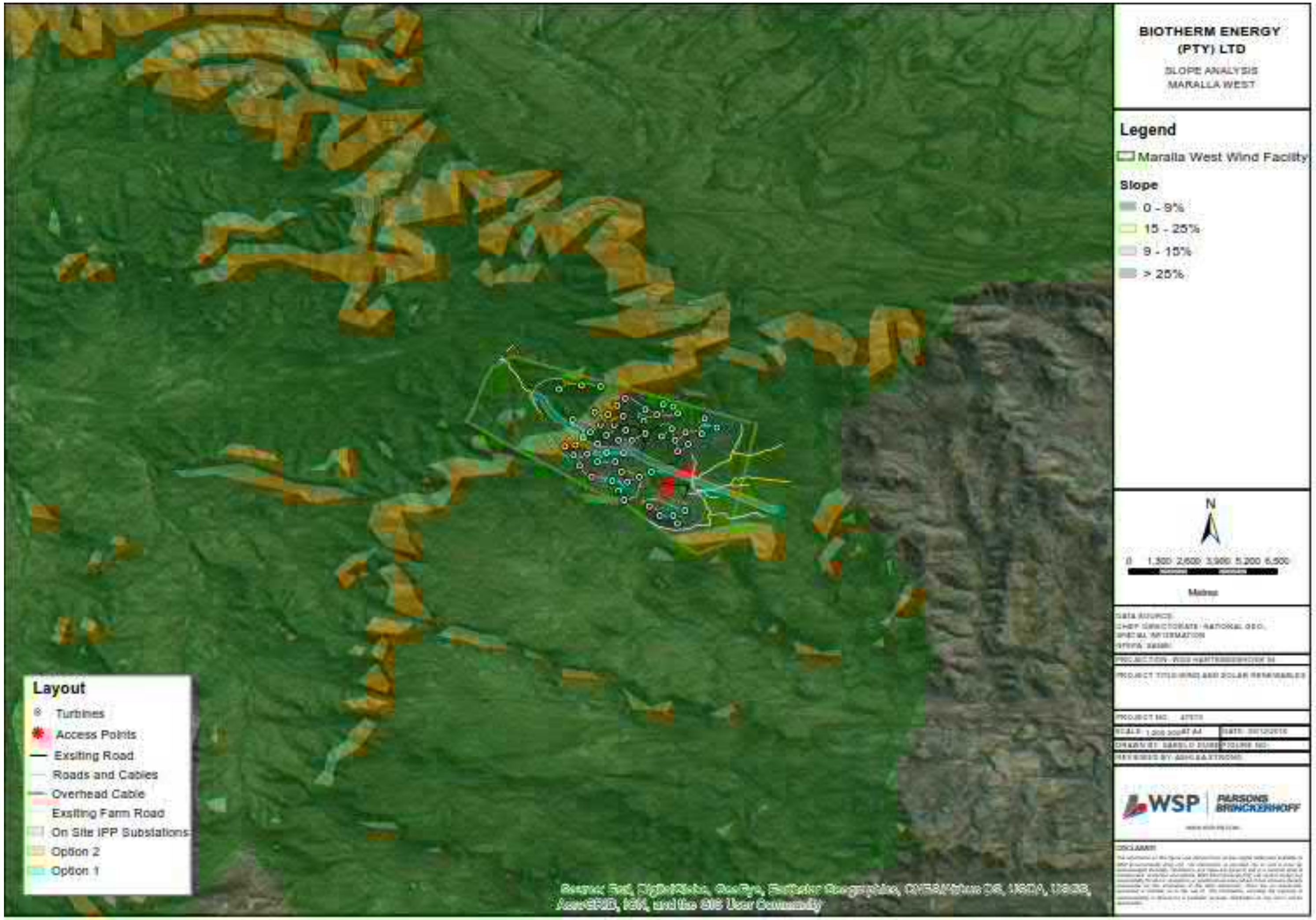
Viewpoint 8

Viewpoint 9 (site not visible beyond local undulations)

STATUS QUO MAP

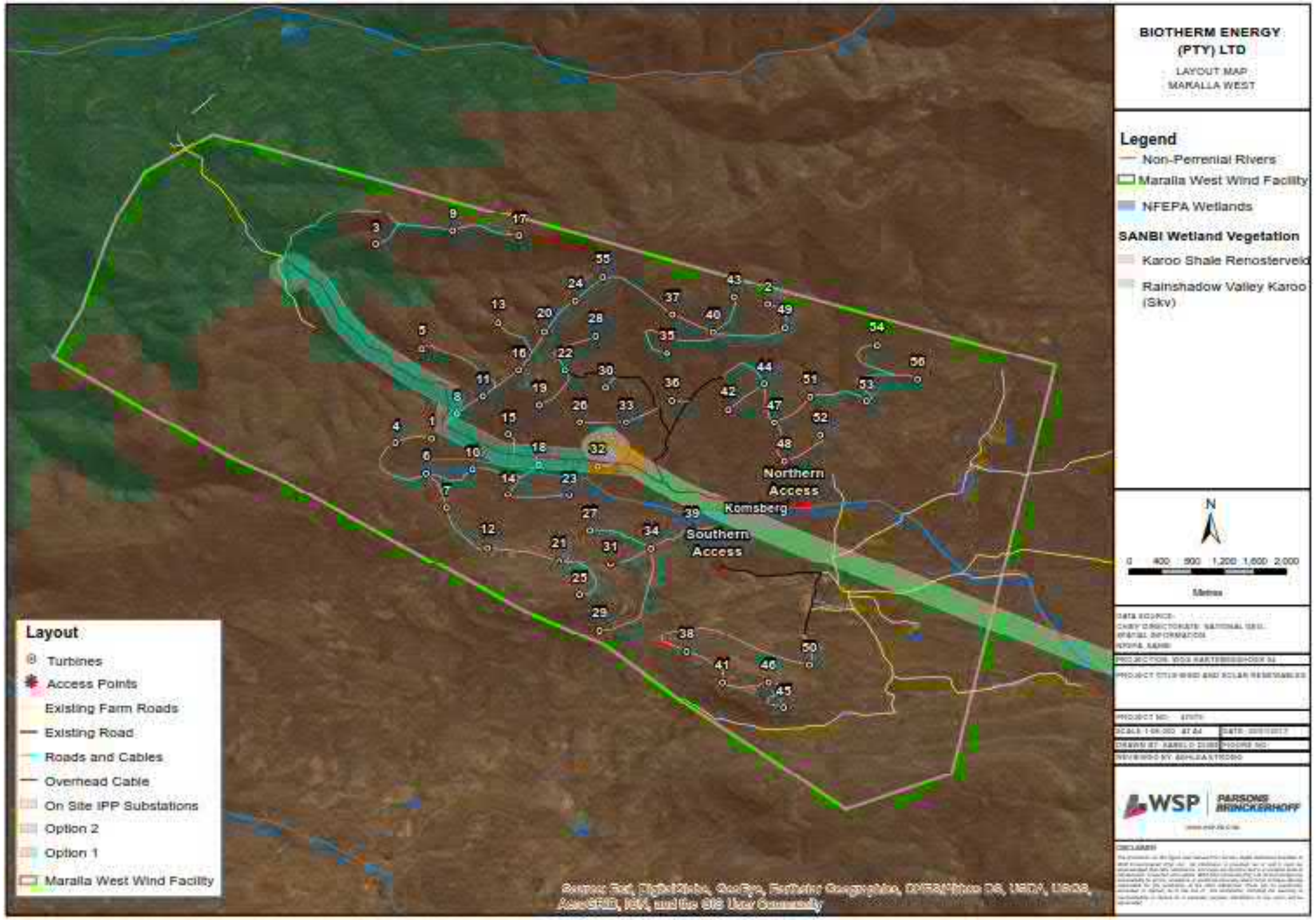


SLOPE ANALYSIS MAP



REGIONAL MAP

SITE DEVELOPMENT PROPOSAL MAP



PRODUCTION TEAM

CLIENT

Senior Associate	Michael Barnes
Environmental Manager	Mohammed Junaid Yusuf

WSP | PARSONS BRINCKERHOFF

Environmental Consultant	Bronwyn Fischer
Project Manager	Ashlea Strong
Project Director	Nigel Seed
Social Specialists	Danielle Sanderson and Hillary Konigkramer
Soil, Land Capability and Wetland Specialist	Bruce Wickham, Colin Homes and Greg Matthews
Noise Specialist	Kirsten Collett
Traffic Specialist	Christo Bredenhann

SUBCONSULTANTS

Heritage Specialist	ACO Associates – Tim Hart, Lita Webley and David Harkett
Avifauna Specialist	Chris van Rooyen
Bat Specialist	Werner Marias and Monika Moir
Visual Specialist	Belinda Gebhardt
Paleontological Specialist	Natura Viva – John Almond
Biodiversity Specialist	Simon Todd
Social Peer Review	Tony Barbour - Environmental Consultant and Researcher
Soil and Land Capability Peer Review	Garry Paterson – Agricultural Research Council
Hydrological Peer Review	Michiel Jonker – Ecotone Freshwater Consultants
Noise Peer Review	Terry Mackenzie-Hoy – Machoy Consulting Acoustics, Noise Control and Electrical Engineers
Traffic Peer Review	Andrew Bulman – Urban EQ Consulting Engineers

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1 INTRODUCTION

1.1 PURPOSE OF THIS REPORT

This draft environmental impact report (EIR) documents the process and findings of the impact assessment phase of the Scoping and Environmental Impact Reporting (S&EIR) process for the proposed establishment of the Maralla West Wind Energy project (hereafter referred to as 'Maralla West'). The proposed project is located approximately 34km south of Sutherland in the Northern Cape within the Karoo Hoogland Local Municipality under the jurisdiction of the Namakwa District Municipality.

1.2 BACKGROUND INFORMATION

BioTherm Energy (Pty.) Ltd. (BioTherm) is the proponent and applicant for the Environmental Authorisation (EA) for the Maralla West facility. BioTherm is a leading renewable energy project development and financing company that owns, develops, constructs and operates solar and wind projects in South Africa and Sub-Saharan Africa.

BioTherm has proposed the development of three Wind Energy Projects within the Western Cape and a portion of the Northern Cape, namely Maralla East, Maralla West and Esizayo Wind Energy Projects. The wind energy developments will consist of 3 x up to 250 MW (**Figure 1-1**). The infrastructure associated with each of the Wind Energy Projects has been outlined within **Table 1-1**.

It must be noted that while there are several approved EA's for various wind energy projects, surrounding the proposed development site, EA's for these projects do not equate actual 'development'. The surrounding projects, except for the Preferred Bidders, are still subject to the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bidding process like the Maralla West project. Depending on the next bid window Maralla West due to its competitive nature may be selected as a Preferred Bidder. Similarly other proposed Wind Energy projects have received their EA several years ago, but have yet to secure Preferred Bidder status.

Table 1-1: Projects within the Wind Energy Development Project

PROJECT NUMBER	PROJECT NAME	LOCATION	TECHNOLOGY
1	Maralla East	Northern and Western Cape	Wind
2	Maralla West	Northern Cape	Wind
3	Esizayo	Western Cape	Wind

Figure 1-1: The proposed Wind Energy Developments

It is important to note that a separate S&EIR process is being undertaken for each of the above projects. **This EIR bears relevance to the proposed Maralla West Wind Project only**. The Esizayo and Maralla West projects entail separate EA applications and S&EIR processes.

WSP| Parsons Brinckerhoff, Environment and Energy, Africa (WSP | Parsons Brinckerhoff) has been appointed in the role of Independent Environmental Assessment Practitioner (EAP) to undertake the S&EIR processes for each of the three projects collectively forming part of the wind energy development project. **Table 1-2** outlines the details of the EAP and their expertise. The CVs of the Project Director and Project Manager are available in **Appendix A**. The EAP declaration of interest and undertaking is included in **Appendix B.** In order to adequately identify and assess potential environmental impacts, the EAP was supported by a number of specialists. The signed Specialist Declarations are included in **Appendix C**.

Table 1-2: Details of the Environmental Assessment Practitioner

NAME OF CONSULTANT:	WSP ENVIRONMENTAL (PTY) LTD
Contact Person:	Ashlea Strong
Postal Address:	P O Box 98867 Sloane Park 2152
Telephone:	011 361 1392
Fax:	011 361 1381
E-mail:	Ashlea.Strong@wspgroup.co.za
Expertise to conduct this EIA	Ms A. Strong holds a Masters in Environmental Management; a BTech (Nature Conservation), and a National Diploma (Nature Conservation); She is also a Certified Environmental Assessment Practitioner of South Africa (CEAPSA) with the interim Board of Certification. She has 13 years' experience in the environmental field - she provides technical and strategic expertise on diverse projects in the environmental management field, including environmental scoping and impact assessment studies, environmental management plans, waste management, as well as the provision of environmental management solutions and mitigation measures. She has been involved in the management of a number of large environmental impact assessments (EIAs) within South Africa and has environmental auditing and training experience and expertise.

1.3 ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The EIA Regulations (GNR 982 of 2014) identify the Maralla West WEF project as an activity being subject to a S&EIR process due to the applicability of the EIA Listing Notices Government Regulation Notice (GNR) 983 and 984 (8 December 2014). In order for the project to proceed it will require an EA from the national Department of Environmental Affairs (DEA).

WSP| Parsons Brinckerhoff has been appointed as the independent EAP to carry out the S&EIR process in accordance with the 2014EIA Regulations.

The Scoping Process carried out involved consultation with interested and affected parties and the drafting of the Plan of Study for EIA (POS for EIA), and culminated in the submission of a Final Scoping Report to the DEA on the 15 September 2016. The DEA acceptance of the Final Scoping Report and authorisation to proceed with EIA was received on 1 December 2016 (**Appendix D**)

PROCEDURAL FRAMEWORK

As defined in Appendix 3 of GNR 982 of 2014, the objective of the impact assessment process is to, through a consultative process:

- Determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
- Describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- Identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
- Determine the--
  - Nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and

    Degree to which these impacts-

    - Can be reversed;
    - May cause irreplaceable loss of resources, and
    - Can be avoided, managed or mitigated;
- Identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;
- Identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;
- Identify suitable measures to avoid, manage or mitigate identified impacts; and
- Identify residual risks that need to be managed and monitored.

PUBLIC PARTICIPATION PROCESS

Public participation is a requirement of the S&EIR 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 S&EIR 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. The objectives of the public participation process can be summarised as follows:

- Identify relevant individuals, organisations and communities who may be interested in or affected by the Proposed Project;
- Clearly outline the scope of the Proposed Project, including the scale and nature of the existing and proposed activities;
- Identify viable Proposed Project alternatives that will assist the relevant authorities in making an informed decision;
- Identify shortcomings and gaps in existing information;
- Identify key concerns, raised by Stakeholders that should be addressed in the subsequent specialist studies;
- Highlight the potential for environmental impacts, whether positive or negative; and

→ To inform and provide the public with information and an understanding of the Proposed Project, issues and solutions.

1.4 IMPACT ASSESSMENT REPORT STRUCTURE

Table 1-3 cross-references the sections where the legislated requirements as per Appendix 3 of GNR 982 of 2014 can been located within the EIR.

Table 1-3: Legislation Requirements as detailed in GNR 982

APPENDIX 3	LEGISLATED REQUIREMENTS AS PER THE NEMA GNR 982		RELEVANT REPORT SECTION
(a)	Details of		
	i)	the EAP who compiled the report; and	Section 1.2
	ii)	the expertise of the EAP, including a Curriculum Vitae	Section 1.2 and Appendix A
(b)	The location of the activity, including-		
	i)	The 21 digit Surveyor code for each cadastral land parcel;	Section 2.1
	ii)	Where available, the physical address and farm name	Section 2.1
	iii)	Where the required information in terms of (i) and (ii) is not available, the coordinates of the boundary of the property.	Section 2.1
(c)	A plan which locates the proposed activities applied for at an appropriate scale, or, if it is-		
	i)	A linear activity, a description of the corridor in which the proposed activity or activities is to be undertaken; or	Not Applicable
	ii)	On land where the property has not been defined, the coordinates within which the activity is to be undertaken.	Section 2.1
(d)	A description of the scope of the proposed activity, including-		
	i).	All listed and specified activities triggered and being applied for;;	Section 3.2
	ii).	A description of the associated structures and infrastructure related to the development;;	Section 7.2
(e)	A description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context;;		Section 7
(f)	A motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred location;		Section 6
(g)	A motivation for the preferred development footprint within the approved site		Section 7.4
(h)	A full description of the process followed to reach the proposed development footprint within the approved site, including-		
	i).	Details of the development footprint alternatives considered;;	Section 7.4
	ii).	Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Section 5.3
	iii).	A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	Section 5.3 and Appendix H

APPENDIX 3	LEGISLATED REQUIREMENTS AS PER THE NEMA GNR 982		RELEVANT REPORT SECTION
	iv).	The environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 8
	v).	The impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	Section 9
	vi).	The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;	Section 5.2
	vii).	Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 9
	viii).	The possible mitigation measures that could be applied and level of residual risk;	Section 9 and Appendix W
	ix).	If no alternative development locations for the activity were investigated, the motivation for not considering such; and;	Section 7.4
	i).	A concluding statement indicating the preferred alternative development location within the approved site	Section 11.5
(i)	A full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred location through the life of the activity, including-		
	i).	A description of all environmental issues and risks that were identified during the environmental impact assessment process; and	Section 9
	ii).	An assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.	Section 9
(j)	An assessment of each identified potentially significant impact and risk, including-		
	i).	Cumulative impacts;	Section 10
	ii).	The nature, significance and consequences of the impact and risk;	Section 9
	iii).	The extent and duration of the impact and risk;	Section 9
	iv).	The probability of the impact and risk occurring;	Section 9
	v).	The degree to which the impact and risk can be reversed;	Section 9
	vi).	The degree to which the impact and risk may cause irreplaceable loss of resources; and	Section 9
	vii).	The degree to which the impact and risk can be mitigated	Section 9
(k)	Where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;		Section 11
(l)	An environmental impact statement which contains-		
	i)	A summary of the key findings of the environmental impact assessment:	Section 11

APPENDIX 3	LEGISLATED REQUIREMENTS AS PER THE NEMA GNR 982	RELEVANT REPORT SECTION
	ii) A map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and	Section 11
	iii) A summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	Section 11
(m)	Based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;	Section 9 and Appendix W
(n)	The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	Section 11.5
(o)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	Appendix W
(p)	A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Section 1.5
(q)	A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	Section 11.6
®	Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised;	Not Applicable
(s)	An undertaking under oath or affirmation by the EAP in relation to-	
	i). the correctness of the information provided in the report;	Appendix B
	ii). the inclusion of comments and inputs from stakeholders and I&APs;	Appendix B
	iii). the inclusion of inputs and recommendations from the specialist reports where relevant; and	Appendix B
	iv). any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	Appendix B
(u)	an indication of any deviation from the approved scoping report, including the plan of study, including-	
	i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and	Not Applicable
	ii) a motivation for the deviation	Not Applicable
(v)	Any specific information required by the competent authority; and	Section 4.2
(w)	Any other matter required in terms of section 24(4)(a) and (b) of the Act.	Not Applicable

1.5 ASSUMPTIONS AND LIMITATIONS

General assumptions and limitations relating to the impact assessment study and the EIR are listed below:

- The EAP hereby confirms that they have undertaken to obtain project information from the client that is deemed to be accurate and representative of the project;

- Site visits have been undertaken to better understand the project and ensure that the information provided by the client is correct, based on site conditions observed;
- The EAP hereby confirms their independence and understands the responsibility they hold in ensuring all comments received are accurately replicated and responded to within the EIA documentation; and
- The comments received in response to the public participation process, are representative of comments from the broader community; and
- The competent authority would not require additional specialist input, as per the proposals made in this report, in order to make a decision regarding the application.

Notwithstanding these assumptions, it is the view of WSP | Parsons Brinckerhoff that this EIR provides a good description of the issues associated with the project and the resultant impacts.

2 BOUNDARY OF THE STUDY AREA

2.1 PROJECT STUDY AREA

The proposed project is to be developed approximately 34km South of Sutherland in the Northern Cape and will comprise a single site located on the farms outlined in **Table 2-1**.

Table 2-1: Farms included in the Maralla West Site

FARM NAME & NUMBER	21 DIGIT SG CODE	PROVINCE	FARM SIZE (HA)
Farm Drie Roode Heuvels 180, Remainder	C07200000000018000000	Northern Cape	3 929
Farm Annex Drie Roode Heuvels 181, Remainder	C07200000000018100000	Northern Cape	329
Farm Wolven Hoek 182, Portion 1	C07200000000018200001	Northern Cape	763
Farm Wolven Hoek 182, Portion 2	C07200000000018200002	Northern Cape	625

The Maralla West Wind Energy Facility falls within the Karoo Hoogland Local Municipality, which are located within the Namakwa District Municipality (**Figure 2-1**).

The site is considered highly suitable for a wind energy project due to the following attributes:

- Climatic Conditions;
- Relief and aspect;
- Land availability; and
- Access to the National Grid through Eskom's Komsburg Substation located approximately 2km from the site.

From a socio-economic perspective indirect and direct project influence areas are defined:

- The area of indirect influence includes the country of South Africa, the Northern Cape Province and the Namakwa District Municipality; given the nature of the project there will be some influences at the national, provincial and district levels.
- The area of direct influence includes the Karoo Hoogland Local Municipality and surrounding areas.

2.2 SURROUNDING AREA

There are a number of EA (either issued or in process) in the area surrounding the proposed project site. It is important to note that the existence of an approved EA does not directly equate to actual 'development'. The surrounding projects, except for the Preferred Bidders, are still subject to the REIPPPP bidding process like the Maralla West project. Depending on the next bid window Maralla West due to its competitive nature could potentially be selected as the next Preferred Bidder and commence with construction prior to other facilities with existing EA approvals. Some of the surrounding proposed Wind Energy facilities secured the EA several years ago, but have not obtained Preferred Bidder status and as such have not been implemented. These existing surrounding projects of varying approval status have been illustrated in **Figure 2-2** and detailed in **Table 2-2**. **Figure 2-2** includes projects that have received their EA, those that are in the process of applying for an EA, those that have had their EA application withdrawn or lapsed as well as those projects that have obtained REIPPPP preferred bidder status. The site is located within the Komburg REDZ and is therefore considered to be located within the renewable energy hub that is developing in this focus area.

In addition to the above, the proposed project forms part of a broader project plan proposed by the Applicant. BioTherm propose to develop two additional renewable wind energy projects in this area, namely:

- Maralla East - 1 x up to 250 MW Wind Facility and associated infrastructure; and
- Esizayo - 1 x up to 250 MW Wind Facility and associated infrastructure.

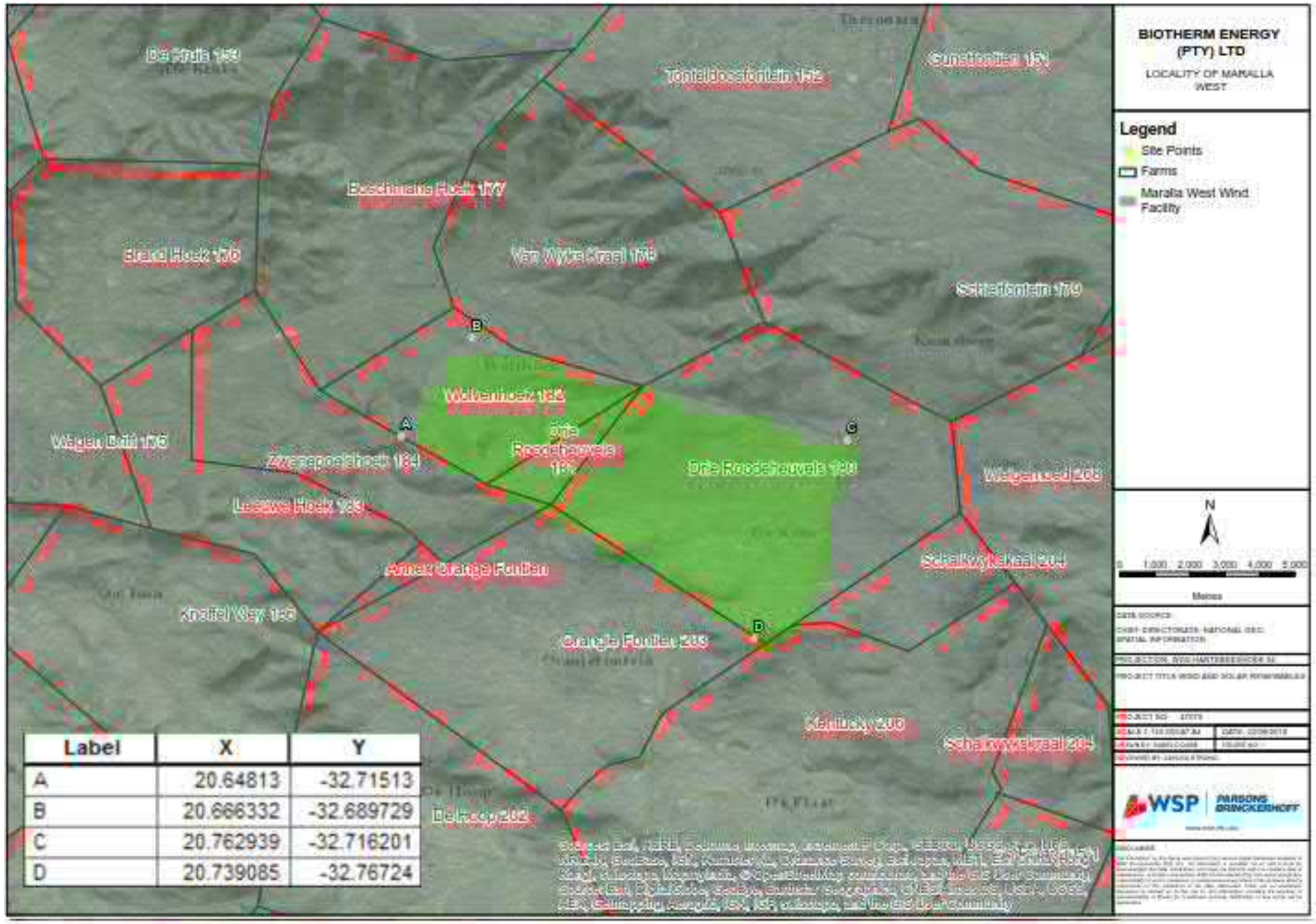

Figure 2-1: Location of the Maralla West Wind Energy Facility

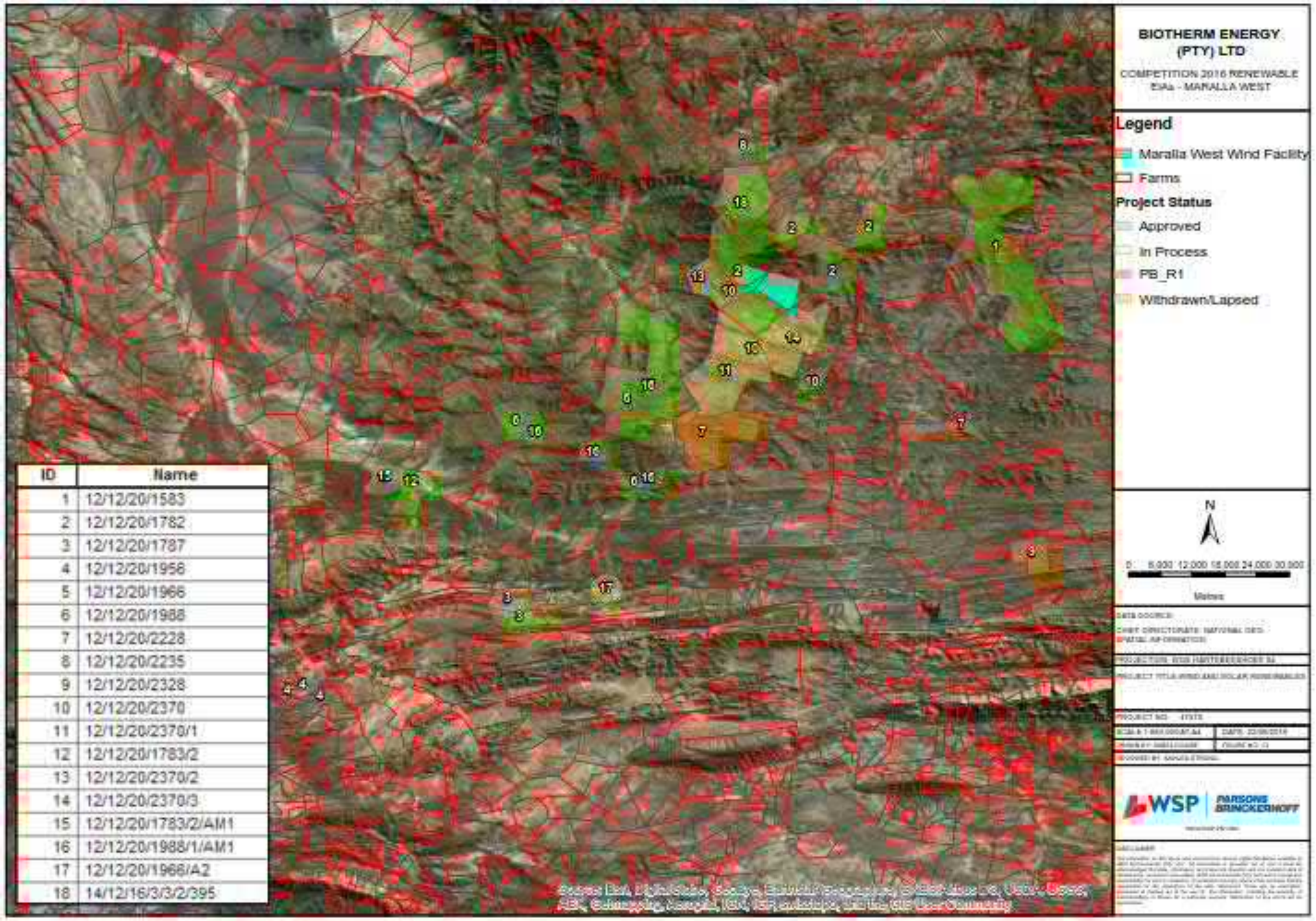

Figure 2-2: The location of the Existing Environmental Authorisations in the study area surrounding the proposed site

Table 2-2: Existing Environmental Authorisations study area surrounding the Maralla West Site

DEA Reference Number	EIA Process	Applicant	Project Title	EAP	Technology	Megawatt	Project Status
14/12/16/3/3/2/395	S&EIR	Networx Eolos Renewables (Pty) Ltd	Proposed 280 MW Gunstfontein Wind Energy Project	Savannah Environmental Consultants (Pty) Ltd	Onshore Wind	280 MW	Approved
12/12/20/1782/AM1	S&EIR	Mainstream Power Sutherland	Proposed development of renewable energy facility at the Sutherland site, Western and Northern Cape.	Environmental Resource Management (Pty) Ltd	Onshore Wind	811 MW	Approved
12/12/20/2370/2	S&EIR	Hidden Valley Wind-African Clean Energy Developments (Pty) Ltd	Proposed Hidden Valley Wind Energy Facility, Northern Cape	Environmental Resource Management (Pty) Ltd	Onshore Wind	150 MW	In Process
12/12/20/2370/3	S&EIR	Hidden Valley Wind-African Clean Energy Developments (Pty) Ltd	Proposed Hidden Valley wind energy facility , Northern cape	Savannah Environmental Consultants (Pty) Ltd	Onshore Wind	150 MW	In Process
12/12/20/2370/1	S&EIR	Hidden Valley Wind-African Clean Energy Developments (Pty) Ltd	Proposed Hidden Valley wind energy facility , Northern cape	Aurecon South Africa (Pty) Ltd	Onshore Wind	150MW	Approved
12/12/20/2370	S&EIR	Hidden Valley Wind-African Clean Energy Developments (Pty) Ltd	Proposed Hidden Valley wind energy facility , Northern cape	Environmental Resource Management (Pty) Ltd	Onshore Wind	650 MW	Approved
12/12/20/2228	S&EIR	Inca Komsberg Wind (Pty) Ltd	Proposed wind energy facility near Komsberg, Western Cape	Environmental Resource Management (Pty) Ltd	Onshore Wind	300 MW	Withdrawn or Lapsed
12/12/20/1988/1/AM1	Amendment	G7 Renerable Energies (Pty) Ltd	Proposed Construction Of The 140Mw Roggeveld Wind Farm Within The Karoo Hoogland Local Municipality Of The Northern Cape Province And Within The Laingsburg Local Municipality Of The Western Cape Province	Environmental Resource Management (Pty) Ltd	Onshore Wind	140 MW	Approved

DEA REFERENCE NUMBER	EIA PROCESS	APPLICANT	PROJECT TITLE	EAP	TECHNOLOGY	MEGAWATT	PROJECT STATUS
12/12/20/2235	BAR	Inca Komsberg Wind (Pty) Ltd	Proposed Photovoltaic (PV) Solar Energy Facility On A Site South Of Sutherland, Within The Karoo Hoogland Municipality Of The Namakwa District Municipality, Northern Cape Province	Environmental Evaluation Unit: UCT	Solar PV	10 MW	Approved
12/12/20/1583	S&EIR	Moyeng Energy (Pty) Ltd	Proposed establishment of the Suurplaat wind energy facility and associated infrastructure on a site near Sutherland, Western Cape and Northern Cape.	Savannah Environmental Consultants (Pty) Ltd	Onshore Wind	120 MW	Approved
12/12/20/2328	S&EIR	Unknown	Proposed wind and solar project near Laingsburg, Western Cape	CSIR	Onshore Wind	50 MW	Withdrawn or Lapsed
12/12/20/1966/A2	Amendment	Witberg Wind Power (Pty) Ltd	Proposed establishment of the Witberg Bay wind energy facility, Laingsburg Local Municipality, Central Karoo District, Western cape	Environmental Resource Management (Pty) Ltd	Onshore Wind	Unknown	In Process
12/12/20/1787	S&EIR	South Africa Mainstream Renewable Power Development	Proposed renewable energy facility at Konstabel	Environmental Resource Management (Pty) Ltd	Onshore Wind & Solar PV	170 MW	Approved
12/12/20/1783/2/AM1	Amendment	South Africa Mainstream Renewable Power Development	Proposed development of a renewable Energy facility at Perdekraal, Western Cape - Split 1	Environmental Resource Management (Pty) Ltd	Onshore Wind	Unknown	Approved
12/12/20/1956	S&EIR	Unknown	Proposed Touwsrivier Solar energy facility	University of Cape Town Environmental Evaluation	Solar PV	36 MW	Unknown

3 GOVERNMENT FRAMEWORK

The South African regulatory framework establishes well-defined requirements and standards for environmental and social management of industrial and civil infrastructure developments. Environmental protection functions are carried out by different authorities at both national and regional levels. The following sections outline summaries of:

- Key regulatory authorities and other relevant bodies related to the governance of the proposed activities, the S&EIR process, and other permitting requirements.
- Current national, provincial and local legislative framework in South Africa as it relates to the project during planning, development and operation; including national policies and standards referred to as guidelines for the identification and management (including mitigation) of impacts.

3.1 INSTITUTIONAL FRAMEWORK

The key institutions and their main roles and responsibilities in relation to the S&EIR process are described in the following subsections:

DECISION MAKING AUTHORITY

Due to the fact that this is a renewable energy project it is linked to the Integrated Resource Plan 2010. Section 24C(2)(a) of the National Environmental Management Act (No. 107 of 1998) (NEMA) stipulates that the Minister must be identified as the competent authority if the activity has implications for international environmental commitments or relations. At the 15th Conference of the Parties to the United Nations Framework Convention on Climate change held in 2010, the President, Mr Jacob Zuma, committed the country to voluntary reductions in CO_2 emissions through the Copenhagen Accord. As such, applications which fall within the energy reduction plans of government must be considered by the Minister. Therefore, the national Department of Environmental Affairs (DEA) is the authorising department.

COMMENTING AUTHORITIES

The following will act as commenting authorities for this application:

- Northern Cape Department of Environment and Nature Conservation (NC DENC)
- Department of Water and Sanitation (DWS). The Department of Water and Sanitation Northern Region will act as a commenting authorities for this application and will provide input with regards to water use license requirements. The project falls within the Olifants-Doring Water Management Area;
- Department of Environmental Affairs: Biodiversity and Conservation;
- South African Heritage Resources Agency;
- Heritage Western Cape;
- Square Kilometre Array (SKA);
- Karoo Hoogland Local Municipality; and
- Namakwa District Municipality.

3.2 NATIONAL LEGAL AND REGULATORY FRAMEWORK

THE CONSTITUTION OF SOUTH AFRICA (NO. 108 OF 1996)

Since 1994 South African legislation, including environmental legislation has undergone a large transformation and various laws and policies were promulgated with a strong emphasis on environmental concerns and the need for sustainable development. The Constitution of South Africa (No. 108 of 1996) (The Constitution) provides environmental rights (contained in the Bill of Rights, Chapter 2, Section 24) and includes implications for environmental management. The environmental rights are guaranteed in Section 24 of the Constitution, and state that:

"Everyone has the right –

- *To an environment that is not harmful to their health or well-being; and*
- *To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:*
  - *Prevent pollution and ecological degradation;*
  - *Promote conservation and*
  - *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."*

The Constitution cannot manage environmental resources as a stand-alone piece of legislation hence additional legislation has been promulgated in order to manage the various spheres of both the social and natural environment. Each promulgated Act and associated Regulations are designed to focus on various industries or components of the environment to ensure that the objectives of the Constitution are effectively implemented and upheld on an on-going basis throughout the country. In terms of Section 7, a positive obligation is placed on the State to give effect to the environmental rights.

NATIONAL ENVIRONMENTAL MANAGEMENT ACT (NO. 107 OF 1998)

The National Environmental Management Act, (No. 107 of 1998) (NEMA) provides the environmental legislative framework for South Africa and requires that activities be investigated that may have a potential impact on the environment, socio-economic conditions, and cultural heritage. The results of such investigation must be reported to the relevant authority. Procedures for the investigation and communication of the potential impact of activities are contained in Section 24(7) of the Act.

EIA REGULATIONS 2014

On the 8th December 2014 the Minister responsible for Environmental Affairs promulgated new EIA Regulations (GNR 982) in terms of Chapter 5 of the NEMA. The EIA regulations contain three listing notices (GNR 983, 984 and 985) which identify activities that are subject to either a Basic Assessment or Scoping and EIA in order to obtain an Environmental Authorisation (EA). A Basic Assessment must be completed if the proposed project triggers activities listed in GNR 983 (Listing Notice 1) or GNR 985 (Listing Notice 3). If an activity triggers any activity listed within GNR 984 then S&EIA process must be completed.

Table 3-1, Table 3-2 and **Table 3-3** outline the listed activities that are triggered by the proposed project under GNR 983, 984 and 985 respectively. The GNR 985 activities are relevant to the Western Cape Province, **Figure 3-1** provides a graphical representation of the proposed development within the respective geographical area (i.e. Western and Northern Cape).

Table 3-1: Determination of GNR 983 Listed Activities

Listed Activity As Described In GNR 983	Applicable (Y/N)	Applicability & Licence Requirement
(11)- The development of facilities or infrastructure for the transmission and distribution of electricity- (i) Outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.	Applicable	Maralla West will require the construction of on-site IPP substations and 132kV overhead powerlines. These powerlines will all be outside an urban area and will connect to common on-site substations prior to the electricity being evacuated to the Eskom Grid.
(12)- The development of- (xii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; (c) if no development setback exists, within **32 metres of a watercourse**, measured from the edge of a watercourse;	Applicable	The construction of Maralla West may require construction within 32 meters of a watercourse and will be outside an urban area. Internal access roads will be required for access to Maralla West which will cross watercourses.
(19)- The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from- (i) a watercourse.	Applicable	Internal access roads will be required for access to Maralla West which will cross watercourses.
(24)- The development of- (ii) A road with a reserve wider than 13,5 meters, or where no reserve exists where the road is no wider than 8 meters.	Applicable	Internal access roads will be required for access to the wind facility. These roads may be wider than 8m and no road reserve exists on the site.
(28)- Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 01 April 1998 and where such development: (ii) Will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.	Applicable	Maralla West is proposed to be developed outside an urban area with a development footprint of more than 1 ha.
(30)- Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).	Applicable	Maralla West is located within a Critical Biodiversity Area.
(56)- The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre- (i) Where the existing reserve is wider than 13,5 meters; or (ii) Where no reserve exists, where the existing road is wider than 8 metres.	Applicable	The main access road that connects Maralla West to the main road may require widening.

Table 3-2: Determination of Applicable GNR 984 Listed Activities

Listed Activity As Described In GNR 984	**Applicable (Y/N)**	**Applicability & Licence Requirement**
(1)- The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development	Applicable	Maralla West will generate electricity from a renewable resource with an electricity output of up to 250MW.

Listed Activity As Described In GNR 984	Applicable (Y/N)	Applicability & Licence Requirement
of facilities or infrastructure is for photovoltaic installations and occurs within an urban area.		
(15)- The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	Applicable	Maralla West is proposed to be developed outside an urban area and the proposed development footprint will be greater than 20ha

Table 3-3: Determination of GNR 985 Listed Activities

Listed Activity As Described In GNR 985	Applicable (Y/N)	Applicability & Licence Requirement
(4)- The development of a road wider than 4 metres with a reserve less than 13,5 metres. In The Northern Cape - (bb) National Protected Area Expansion Strategy Focus Areas (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans	Applicable	Maralla West is located within a Critical Biodiversity Area.
(10)- The development of facilities or infrastructure for the storage or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic meters In the Northern Cape – (ii) Outside urban areas- (bb) National Protected Area Expansion Strategy Focus Areas (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans	Applicable	Maralla West may require the storage of more than $30m^3$ of dangerous goods on site which will be located outside an urban area containing indigenous vegetation. The dangerous goods referred to above will include cement and diesel that will be required on site in quantities of more than $30m^3$.
(12)- The clearance of an area of 300 square meters or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan In the Northern Cape - (i) Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified a critically endangered	Applicable	Maralla West is located within a Critical Biodiversity Area and will entail the clearance of over $300m^2$ of vegetation.

LISTED ACTIVITY AS DESCRIBED IN GNR 985	APPLICABLE (Y/N)	APPLICABILITY & LICENCE REQUIREMENT
in the National Spatial Biodiversity Assessment 2004; (ii) Within critical biodiversity areas identified in bioregional plans		
(14) The development of – (xii) infrastructure or structures with a physical footprint of 10 square meters or more- In the Northern Cape (bb) National Protected Area Expansion Strategy Focus Areas (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	Applicable	Maralla West is located within a Critical Biodiversity Area.
(18) The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. (a) In the Northern Cape – (ii) Outside urban areas- (bb) National Protected Area Expansion Strategy Focus Areas (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans	Applicable	Maralla West will require internal access roads that may be wider that 4m. The project area is located outside an urban area containing indigenous vegetation
(23) The expansion of: (iii) bridges where the bridge is expanded by 10 square metres or more in size (a) In the Northern Cape – (ii) Outside urban areas- (bb) National Protected Area Expansion Strategy Focus Areas (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans	Applicable	Maralla West is located within a Critical Biodiversity Area and the upgrading of existing access roads located over water courses maybe required for access.

Based on the determination above, activities listed in GNR 983, GNR 984 and GNR 985 are applicable to the project. The EIA Regulations stipulate that where more than one Listing Notice is applicable, the more rigorous process is to be followed, therefore a S&EIR process is being undertaken in order to obtain the required EA.

Figure 3-1: Graphical representation of the proposed development within the respective geographical area (i.e. Western and Northern Cape)

NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT (NO. 59 OF 2008)

The National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEM:WA) is subsidiary and supporting legislation to the NEMA. The Act is a framework legislation that provides the basis for the regulation of waste management. The Act also contains policy elements and gives a mandate for further regulations to be promulgated.

On 29 November 2013 GNR 921 was promulgated (repealing GN R718) which contains a list of waste management activities that if triggered require a Waste Management License (WML) and in turn a Basic Assessment (Category A activities) or Scoping and EIA (Category B activities) process to be undertaken in terms of the NEMA EIA Regulations. Category C activities are required to comply with the Norms and Standards for Storage of Waste 2013 (GN. 926) and do not require authorisation.

It is anticipated that activities on the site will not trigger the NEM:WA. However, waste handling, storage and disposal during the construction and operational phase of the project must be undertaken in accordance with the requirements of this Act and the Best Practicable Environmental Option which will be incorporated into the site specific Environmental Management Programme (EMPr).

NATIONAL ENVIRONMENTAL MANAGEMENT AIR QUALITY ACT (NO. 39 OF 2004)

The National Environment Management: Air Quality Act, 2004 (Act No. 39 of 2004) (NEM:AQA), which repeals the Atmospheric Pollution Prevention Act of 1965 (APPA), came into effect on 11 September 2005, with the promulgation of regulations in terms of certain sections resulting in the APPA being repealed entirely on 1 April 2010. Persons undertaking such activities are required to possess an Atmospheric Emissions License (AEL), essentially the equivalent of a Registration Certificate under the APPA.

In terms of Section 32 of the NEM:AQA The National Dust Control Regulations (GNR 827) were promulgated, which aim at prescribing general measures for the control of dust in both residential and non-residential areas.

Although no AEL will be required for the construction and operation of the wind energy facility, the dust control regulations will be applicable during construction.

NATIONAL WATER ACT (NO. 36 OF 1998)

The National Water Act, 1998 (Act No. 36 of 1998) provides the framework to protect water resources against over exploitation and to ensure that there is water for social and economic development, human needs and to meet the needs of the aquatic environment.

The Act defines water source to include watercourses, surface water, estuary or aquifer. A watercourse is defined in the Act as a river or spring, a natural channel in which water flows regularly or intermittently, a wetland, lake or dam into which or from which water flows, and any collection of water which the Minister may declare a watercourse.

Section 21 of the Act outlines a number of categories which require a water user to apply for a Water Use License (WUL) and Section 22 requires water users to apply for a General Authorisation (GA) with the Department of Water and Sanitation (DWS) if they are under certain thresholds or meet certain criteria. The list of water uses that require a WUL under section 21 are presented below:

(a) Taking water from a water resource;

(b) Storage of water;

(c) Impeding or diverting the flow of water in a watercourse;

(d) Engaging in a stream flow reduction activity;

(e) Engaging in a controlled activity;

(f) Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;

(g) Disposing of waste in a manner which may detrimentally impact on a water resource;

(h) Disposing in any manner of water which contains waste from, or which has been heated in. any industrial or power generation process;

(i) Altering the bed, banks, course or characteristics of a watercourse;

(j) Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and

(k) Using water for recreational purposes.

It is not anticipated that a WUL will be needed for the abstraction of water under Section 21(a) as water is not required for the operation of a wind facility. However, it is anticipated that a WUL or GA may be needed for the impeding or diverting of the flow of water in a watercourse and the altering of bed, banks, course or characteristics of a watercourse under Section 21(c) and (i) respectively in the event that the internal powerlines or access roads cross a watercourse or a turbine is constructed within 500m of a wetland or watercourse.

It should be noted that the WUL application will only be processed by the DWS should the project be selected as a preferred bidder in terms of the REIPPP.

NATIONAL ENVIRONMENTAL MANAGEMENT BIODIVERSITY ACT (NO. 10 OF 2004)

The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) was promulgated in June 2004 within the framework of NEMA to provide for the management and conservation of national biodiversity. The NEMBA's primary aims are for the protection of species and ecosystems that warrant national protection, the sustainable use of indigenous biological resources, the fair and equitable sharing of benefits arising from bioprospecting involving indigenous biological resources. In addition, the NEMBA provides for the establishment and functions of a South African National Biodiversity Institute (SANBI).

SANBI was established by the NEMBA with the primary purpose to report on the status of the country's biodiversity and conservation status of all listed threatened or protected species and ecosystems.

The construction of the proposed wind facility, including the associated infrastructure may negatively impact on the biodiversity of the area, even though the facility is within one of the Renewable Energy Development Zone (REDZs). As such, SANBI will be invited to provide comment on the proposed project and any licenses or permits that maybe applicable will be obtained.

Portions of the Maralla West Wind Energy Facility will be located within the Biodiversity Assessment of the Central Karoo District Municipality. This biodiversity assessment identifies Critical Biodiversity Areas (CBAs) which represent biodiversity priority areas which should be maintained in a natural to near natural state. The CBA maps indicate the most efficient selection and classification of land portions requiring safeguarding in order to meet national biodiversity objectives. As such, an Ecological Assessment will be undertaken as part of the EIA process.

The Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA) Regulations with regards to alien and invasive species have been superseded by the National Environmental Management: Biodiversity Act, 2004 (Act no. 10 of 2004) – Alien and Invasive Species (AIS) Regulations which became law on 1 October 2014.

Specific management measures for the control of alien and invasive plants will be included in the Environmental Management Programme (EMPr)

CONSERVATION OF AGRICULTURAL RESOURCES ACT (NO. 43 OF 1983)

The Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA) includes the use and protection of land, soil, wetlands and vegetation and the control of weeds and invader plants. This is the only legislation that is directly aimed at conservation of wetlands in agriculture.

In terms of the amendments to the regulations under the CARA, landowners are legally responsible for the control of alien species on their properties. Various Acts administered by the DEA and DWS, as well as other laws (including local by-laws), spell out the fines, terms of imprisonment and other penalties for contravening the law. Although no fines have yet been placed against landowners who do not remove invasive species, the authorities may clear their land of invasive alien plants and other alien species entirely at the landowners cost and risk.

Specific management measures for the conservation of agricultural resources will be included in the EMPr.

NATIONAL HERITAGE RESOURCES ACT (NO. 25 OF 1999)

The National Heritage Resource Act (Act No. 25 of 1999) (NHRA) serves to protect national and provincial heritage resources across South Africa. The NHRA provides for the protection of all archaeological and palaeontological sites, the conservation and care of cemeteries and graves by SAHRA, and lists activities which require any person who intends to undertake to notify the responsible heritage resources agency and furnish details regarding the location, nature, and extent of the proposed development.

In terms of the Section 38 of NHRA, any person who intends to undertake a linear development exceeding 300m in length or a development that exceeds 5000m^2 must notify the heritage resources authority and undertake the necessary assessment requested by that authority.

In the case of the proposed wind energy facility, a Heritage Impact Assessment (HIA) will be undertaken looking at Archaeology, Heritage and Palaeontology. The proposed project will be brought to the attention of SAHRA, as well as the provincial Heritage Resource Agencies, who will provide comment, and provide the required approval.

CIVIL AVIATION ACT (NO. 13 OF 2009)

Civil aviation in South Africa is governed by the Civil Aviation Act, 2009 (Act 13 of 2009). This Act provides for the establishment of a stand-alone authority mandated with controlling, promoting, regulating, supporting, developing, enforcing and continuously improving levels of safety and security throughout the civil aviation industry. This mandate is fulfilled by the South African Civil Aviation Authority (SA CAA) as an agency of the Department of Transport (DoT). The SA CAA achieves the objectives set out in the Act by complying with the Standards and Recommended Practices (SARPs) of the International Civil Aviation Organisation (ICAO), while considering the local context when issuing the South African Civil Aviation Regulations (SA CARs). All proposed developments or activities in South Africa that potentially could affect civil aviation must thus be assessed by SACAA in terms of the SA CARs and South African Civil Aviation Technical Standards (SA CATS) in order to ensure aviation safety.

The Obstacle Evaluation Committee (OEC) which consists of members from both the SA CAA and South African Air Force (SAAF) fulfils the role of streamlining and coordinating the assessment and approvals of proposed developments or activities that have the potential to affect civil aviation, military aviation, or military areas of interest. With both being national and international priorities, the OEC is responsible for facilitating the coexistence of aviation and renewable energy development, without compromising aviation safety.

The details of the project will be provided to the SA CAA as they will be required to provide comment and approval of the proposed location and development of the proposed Wind Energy Facility.

ASTRONOMY GEOGRAPHIC ACT (ACT NO. 21 OF 2007)

The Astronomy Geographic Act (Act No. 21 of 2007) provides for:

- The preservation and protection of areas that are uniquely suited for optical and radio astronomy;
- Intergovernmental cooperation and public consultation on matters concerning nationally significant astronomy advantage areas and matters connected herewith.

In terms of section 7(1) and 7(2) of this Act, national government established core astronomy advantage areas. As such, all land within a 3 kilometre radius of the centre of the Southern African Large Telescope (SALT) dome located in the Northern Cape Province falls under the Sutherland Core Astronomy Advantage Area. The declaration also applies to core astronomy advantage area containing the MeerKAT radio telescope and the core of the planned Square Kilometre Array (SKA) telescope.

Under section 22(1) of the Act the national government has the authority to protect the radio frequency spectrum for astronomy observations within a core or central astronomy advantage area.

As such no person may undertake certain activities within a core or central astronomy advantage area. These activities prohibited include the construction, expansion or operation; of any fixed radio frequency interference source, facilities for the generation, transmission or distribution of electricity, or any activity capable of causing radio frequency interference or which may detrimentally influence the astronomy and scientific endeavours.

Although the proposed project is not within the Core SKA area, any renewable energy project being proposed within the Northern Cape should receive comment from SKA, regardless of the proposed technology. Comments from the SKA, obtained during the scoping process stated that the Maralla West WEF should have no impact on the SKA.

OCCUPATIONAL HEALTH AND SAFETY ACT (NO. 85 OF 1993)

The National Occupational Health and Safety Act (No. 85 of 1993) (OHSA) and the relevant regulations under the Act are applicable to the proposed project. This includes the Construction Regulations promulgated in 2014 under Section 43 of the Act. Adherence to South Africa's OHSA and its relevant Regulations, is essential.

3.3 PROVINCIAL CONTEXT

NORTHERN CAPE PROVINCE SPATIAL DEVELOPMENT FRAMEWORK

The Northern Cape Spatial Development Framework (PSDF) is a policy document that promotes a 'developmental state' in accordance with national and provincial legislation and directives. It aligns with the Northern Cape Provincial Growth and Development Strategy which has committed the Northern Cape to 'building a prosperous, sustainable and growing provincial economy which reduces poverty and improves social development'.

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

- Enhancing systems for integrated planning and implementation
- Sustaining our ecosystem and using natural efficiently
- Towards green economy
- Building sustainable communities
- Responding effectively to climate change

The PSDF makes reference to the need to ensure the availability of energy and the potential for renewable energy generation within the province. Under Section B14, Economic Development Profile, The White Paper on Renewable Energy (2003) discussed a 10 000GWh of energy to be produced from renewable energy sources. The PSDF identifies the potential for wind energy within the province especially along the Namaqualand Coast and in certain parts of the interior of the province. The regular occurrence of strong winds and the wind regime, especially along the coast, is suitable for sustainable electricity generation. The upper limit of wind energy available to be captured in South Africa is estimated at 3 GW. Taking a conservative estimate of 30% conversion efficiency and 25% capacity factor, it is estimated that wind power could supply at least 1% of South Africa's projected electricity requirements (19 800 GWh) (White Paper of Renewable Energy, 2003).

- One of the policies outlined with the PSDF is for renewable energy sources to comprise 25% of the province's energy capacity by 2020. The proposed project therefore aids the province in reaching its 2020 target.

3.4 MUNICIPAL CONTEXT

NAMAKWA DISTRICT MUNICIPALITY INTEGRATED DEVELOPMENT PLAN

The Namakwa District Municipality Integrated Development Plan (IDP) has been developed to align with the National Development Plan, which has identified various central development challenges. The challenges in the NDP have a direct impact on the development and growth in the Namakwa District. The Key Challenges identified within the NDP are:

- Unemployment;
- Poor quality of education;
- Ineffective economic infrastructure, poorly located, under-maintained and insufficient to support sustainable growth;
- Spatial Development patterns exclude the poor from benefitting from the fruits of development;
- The economy needs transformation in terms of resource management and use;
- Ineffective public health system;
- Public services are uneven and often of poor quality;
- Corrupt activities; and
- Transform in coherent South African society.

To create a better life for the people of Namakwa the focus and alignment of priorities as identified in the National Development Plan – Vision 2030 are:

- Creating jobs and livelihoods;
- Expanding infrastructure;
- Transitioning to a low-carbon economy;
- Transforming our spatial reality;
- Improving education and training;
- Providing quality healthcare;
- Building a capable state;
- Fighting corruption and enhancing accountability; and
- Transforming society and uniting the nation.

The IDP has identifies issues that need to be focused on if the NDM want to maximise service delivery potential. A number of programs of action have been drafted with specific focus areas. One of the programmes of action is economic development, for the promotion of the standard of living and economic health and wealth of the communities in a sustainable qualitative manner by optimal utilization of natural and human resources. One of the focus areas is the optimal utilization of Natural Resources in a sectoral manner, which includes renewable energy.

KAROO HOOGLAND LOCAL MUNICIPALITY INTEGRATED DEVELOPMENT PLAN

The Karoo Hoogland Integrated Development Plan (IDP) 2014/ 2015 identified a number of socio-economic development focus areas namely:

- Basic service delivery;
- Economic development by focusing on initiatives such as SKA and SALT and the historical value of settlements; and

- The conservation of the natural vegetation that is unique to the arid environment.

The IDP focuses largely on economic development, based primarily on the tourism potential of the area. The town’s located within the local municipality have been identified as priority investment areas as this where the population is concentrated. Three key investment priorities have been outlined within the IDP:

- Investment in infrastructure to provide a basic level of infrastructure services;
- Investment in human capital to promote economic growth; and
- Investment in human capital to promote general welfare and stimulate the local economy.

The socio-economic benefits that have been reported from operational renewable energy facilities across South Africa, will contribute towards the achievement of the objectives set up by the Local Municipality.

3.5 STRATEGIC ENERGY PLANNING CONTEXT

NATIONAL ENERGY ACT (NO. 34 OF 2008)

The National Energy Act (Act No. 34 of 2008) was promulgated in 2008. The National Energy Act aims to ensure that diverse energy resources are available, in sustainable quantitates, and at affordable prices, to the South African economy in support of economic growth and poverty alleviation, taking into account environmental management requirements and interactions amongst economic sectors.

The main objectives of the Act-

- Ensure uninterrupted supply of energy to the Republic;
- Promote diversity of supply of energy and its sources;
- Facilitate effective management of energy demand and its conservation;
- Promote energy research;
- Promote appropriate standards and specifications for the equipment, systems and processes used for producing, supplying and consuming energy;
- Ensure collection of data and information relating to energy supply, transportation and demand;
- Provide for optimal supply, transformation, transportation, storage and demand of energy that are planned, organised and implemented in accordance with a balanced consideration of security of supply, economics, consumer protection and a sustainable development;
- Provide for certain safety, health and environment matters that pertain to energy;
- Facilitate energy access for improvement of the quality of life of the people of Republic;
- Commercialise energy-related technologies;
- Ensure effective planning for energy supply, transportation and consumption; and
- Contribute to sustainable development of South Africa’s economy.

The Act provides the legal framework which supports the development of renewable energy facilities for the greater environmental and social good.

ELECTRICITY REGULATION ACT (NO. 4 OF 2006)

In 2011, the electricity regulation on new generation capacity was published under Section 35(4) of the Electricity Regulation Act (No. 4 of 2006). These regulations apply to the procurement of new generation capacity by organs of state. The objectives of the regulations include:

- To facilitate planning for the establishment of new generation capacity;
- The regulation of entry by a buyer and a generator into a power purchase agreement;
- To set minimum standards or requirements for power purchase agreements;
- The facilitation of the full recovery by the buyer of all costs efficiently incurred by it under, or in connection with, a power purchase agreement including a reasonable return based on the risks assumed by the buyer thereunder and to ensure transparency and cost reflectivity in the determination of electricity tariffs; and
- The provision of a framework for implementation of an Independent Power Producer (IPP) procurement programme and the relevant agreements concluded.

The Act establishes a National Energy Regulator as the custodian and enforcer of the National Electricity Regulatory Framework. The Act also provides for licenses and registration as the manner in which generation, transmission, distribution, trading and the import and export of electricity are regulated.

INTEGRATED RESOURCE PLAN 2010-2030

The Department of Energy published the Integrated Resource Plan (IRP) in March 2011 to cover the period of 2010 - 2030. The IRP is a medium-long term plan which is aimed at providing help and support for the direct expansion of electricity supply including private and own generation and power purchases from regional projects. This plan identifies the need for 400MW of additional wind capacity to be added every year from 2013 until 2023 with a further 4400MW to be added in the years thereafter up to 2030. This amounts to a total of 8.4GWp by 2030.

The overall objectives of the IRP are to evaluate the security of supply, and determine the least-cost supply option through the consideration of various demand side management and supply-side options. In addition, the IRP aims to provide information on the opportunities for investment into new power generating projects.

STRATEGIC INTEGRATED PROJECTS (SIPS)

The South African Government adopted a National Infrastructure Plan in 2012, with the aim of transforming the economic landscape of South Africa, create significant numbers of new jobs, and strengthen the delivery of basic services. It outlines the challenges and enablers which needs to be addressed in the building and developing of infrastructure. The Presidential Infrastructure Coordinating Commission (PICC) was established by the Cabinet to integrate and coordinate the long-term infrastructure build.

Under the guidance of the PICC, 18 Strategic Infrastructure Projects (SIPs) have been developed through the integration of more than 150 of the individual Infrastructure Plans into one coherent package. The SIPs present five core functions namely to unlock opportunity, transform the economic landscape, create new jobs, strengthen the delivery of basic services, and support the integration of African Economies.

SIPs 8 and 9 of the energy SIPs supports the development of the Maralla West wind energy facility which is as follows:

- SIP 8: Green energy in support of the South African economy: Support sustainable green energy initiatives on a national scale through a diverse range of clean energy options envisaged in the Integrated Resource Plan (IRP 2010) and supports bio-fuel production facilities.
- SIP 9: Electricity generation to support socio-economic development: Accelerate the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy and address historical imbalances. Monitor implementation of major projects such as new power stations: Medupi, Kusile and Ingula.

WHITE PAPER ON THE RENEWABLE ENERGY POLICY OF THE REPUBLIC OF SOUTH AFRICA (2003)

In response to overexploitation of resources and climate change, South African government ratified the United Nations Framework Convention on Climate Change (UNFCC) in August 1997 and acceded to the Kyoto Protocol, the enabling mechanism for the convention, in August 2002. In addition, national response strategies have been developed for both climate change and renewable energy.

The White Paper on Renewable Energy was published in 2003 and supplements the National Energy Policy published in 1998. The White Paper on Renewable Energy sets out the vision, policy principles, strategic goals and objectives of the South African Governments for promoting and implementing renewable energy in South Africa. The paper identifies that the medium and long-term potential of renewable energy is significant and that it is the intention of the government to contribute to the global effort to mitigate greenhouse gas emissions. In addition, it states that there is a need for Government to create an enabling environment through the introduction of fiscal and financial support mechanisms within an appropriate legal and regulatory framework to allow renewable energy technologies to compete with fossil-based technologies.

The objectives of the White Paper are considered in six focal areas:

- Financial instruments;
- Legal instruments,
- Technology development,
- Awareness raising,
- Capacity building and education, and
- Market based instruments and regulatory instruments.

The policy supports the investment in renewable energy facilities as they contribute towards ensuring energy security through the diversification of energy supply, reducing GHG emissions and the promotion of renewable energy sources.

RENEWABLE ENERGY DEVELOPMENT ZONES

The DEA, in consultation with DoE, has been mandated to undertake a Strategic Environmental Assessment (SEA), to identify geographical areas most suitable for the rollout of wind and solar PV energy projects and the supporting electricity grid network. These concentrated development zones are referred to as REDZs. The outputs of the SEAs directly relate to several government priorities including:

- Contributing to reducing present current energy constraints by facilitating renewable energy development in strategic areas in South Africa;
- Addressing the major objectives of the National Development Plan, namely transitioning to a low carbon economy, developing infrastructure to create jobs and reducing the regulatory burden and the cost of doing business;

- Contributing to achieving the renewable energy target identified in the Integrated Resource Plan and implementing the renewable energy independent power producers program (REI4P) implemented by the Department of Energy and National Treasury;
- Promoting the green economy and sustainable development; and
- Promoting intergovernmental coordination and integrated authorisations

The outcome of the gazetting process will mean that wind and solar PV activities within the 8 Renewable Development Zones and electricity grid expansion within the 5 Power Corridors will be subjected to a Basic Assessment and not a full EIA process. It is intended that the introduction of the REDZs will lead to:

- A reduction of potential negative environmental impacts or consequences;
- Synchronisation and streamlining of authorisation and approval processes;
- Potentially attractive incentives; and
- Focused expansion of the South African electricity grid.

The DEA has released a map with focus areas best suited for the roll-out of wind and solar photovoltaics projects in South Africa. The proposed Maralla West project will fall within the Komsberg Wind REDZ, located within the Northern and Western Cape

DEPARTMENT OF ENERGY PROCESS FOR INDEPENDENT POWER PRODUCERS

The REIPPPP was established in August 2011 and was designed to contribute towards the target of 3 725 megawatts (MW), generated from Renewable Energy sources, and towards socio-economic and environmentally sustainable growth and to stimulate growth in the renewable energy industry in South Africa.

The Minister has allocated 100 MW of the 3 725 MW to the procurement of small projects which individually have a maximum contracted capacity of 5 MW (DoE). The projects, with a generation capacity of not less than 1 MW and not more than 5 MW, utilising the following technologies shall be considered for the small projects IPP procurement programme:

- Onshore wind;
- Solar photovoltaic;
- Biomass;
- Biogas; and
- Landfill gas.

3.6 SOUTH AFRICAN STANDARDS AND GUIDELINES

NATIONAL STRATEGY FOR SUSTAINABLE DEVELOPMENT

The National Strategy for Sustainable Development (NSSD 1) NFSD provides a high-level roadmap for strategic sustainable development. Its intention is to provide public and private sector organisations with guidance when it comes to their own long-term planning, as the development of sector- or subject- specific strategies and action plans must be consistent with the NSSD 1.

The NSSD 1 sets out key areas that are in need of attention to ensure that a shift takes place towards a more sustainable development path. In this regard, the following key elements have been identified:

- Directing the development path towards sustainability;

- Changing behaviour, values and attitudes; and
- Restructuring the governance system and building capacity.

The Action Plan that forms part of the strategy is formulated within the context of the five strategic priorities that have been identified in the NSSD 1. It sets out the strategic goals, interventions and indicators for each of these strategic priorities.

One of the strategic priorities identified within the NSSD 1 is responding effectively to climate change, with the headline indicators being:

- Greenhouse gas emissions (metric ton CO2 equivalent) [34% reduction below a business-as-usual baseline by 2020 and 42% by 2025];
- Percentage of power generation that is renewable [10 000 GWh by 2014]; and
- Climate change adaptation plans developed [12 sectors by 2012 (Biodiversity, Forestry, Water, Coastal Management, Agriculture, Health, Tourism, Land and Rural Development, Local Government, Fisheries, Human Settlements, Business/Insurance)].

STRATEGIC INITIATIVE TO INTRODUCE COMMERCIAL LAND BASED WIND ENERGY DEVELOPMENT TO THE WESTERN CAPE – TOWARDS A REGIONAL METHODOLOGY FOR WIND ENERGY SITE SELECTION

In 2003 the Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning (DEA&DP), embarked on a programme to pave the way for wind energy as a viable, clean, renewable energy development within the Province.
This specialist assessment flows from a strategic initiative undertaken by DEA&DP entitled '*Strategic initiative to introduce commercial land-based wind energy developments to the Cape West Coast'*. This report sets out the following vision:

> "*The vision for the Western Cape is to establish a policy on the implementation of regional criteria for the identification of areas suitable for the establishment of wind energy projects. This will promote the implementation of wind energy projects while balancing national interests of promoting alternative energy generation with local strategic environmental objectives. This will also avoid conflict between local and national interests through a proactive environmental planning process*."

The vision of the strategic initiative is to establish a policy on the implementation of a methodology to be used for the identification of areas suitable for the establishment of wind energy projects, and is supported by the following objectives:

- To facilitate the practical implementation of wind energy generation technology in a manner that meets the principles of the White Paper on Energy Policy for the Republic of South Africa;
- To introduce wind energy developments to the Western Cape in a coordinated manner, that meets the requirements of sustainability as reflected in the National Environmental Management Act, 1998 (Act 107 of 1998), and which is based on international best practice;
- To encourage responsible and rational wind energy developments, which are beneficial not only to developers, but to communities at large;
- To discourage the investment of time and money in potentially unsuitable sites;
- To introduce the wind energy industry to the public and thereby increase support for and interest in alternative renewable energy sources; and
- To provide policy guidance in terms of the environmental impact assessment process.

DRAFT GUIDELINES FOR THE GRANTING OF EXEMPTION PERMITS FOR THE CONVEYANCE OF ABNORMAL LOADS AND FOR OTHER EVENTS ON PUBLIC ROADS

The National Road Traffic Act (Act 93 of 1996) and the National Road Traffic Regulations, 2000 prescribe certain limitations on vehicle dimensions and axle and vehicle masses that a vehicle using a public road must comply with. However, certain vehicles and loads cannot be moved on public roads without exceeding the limitations in terms of the dimensions and/or mass as prescribed. Where such a vehicle or load cannot be dismantled, without disproportionate effort, expense or risk of damage, into units that can travel or be transported legally, it is classified as an abnormal load and is allowed to travel on public roads under an exemption permit issued in terms of Section 81 of the National Road Traffic Act.

The guidelines for the granting of exemption permits for the conveyance of abnormal loads and for other events on public roads (2009) describes the rules and conditions that apply to the transportation of abnormal loads and the operation of abnormal vehicles on public roads and the detailed procedures to be followed in applying for exemption permits.

3.7 INTERNATIONAL STANDARDS AND GUIDELINES

IFC PERFORMANCE STANDARDS

The International Finance Corporation (IFC) is an international financial institution that offers investment, advisory, and asset management services to encourage private sector development in developing countries. The IFC is a member of the World Bank Group and is headquartered in Washington, D.C., United States. It was established in 1956 as the private sector arm of the World Bank Group to advance economic development by investing in strictly for-profit and commercial projects that purport to reduce poverty and promote development.

The IFC's stated aim is to create opportunities for people to escape poverty and achieve better living standards by mobilizing financial resources for private enterprise, promoting accessible and competitive markets, supporting businesses and other private sector entities, and creating jobs and delivering necessary services to those who are poverty-stricken or otherwise vulnerable. Since 2009, the IFC has focused on a set of development goals that its projects are expected to target. Its goals are to increase sustainable agriculture opportunities, improve health and education, increase access to financing for microfinance and business clients, advance infrastructure, help small businesses grow revenues, and invest in climate health.

The IFC is owned and governed by its member countries, but has its own executive leadership and staff that conduct its normal business operations. It is a corporation whose shareholders are member governments that provide paid-in capital and which have the right to vote on its matters. Originally more financially integrated with the World Bank Group, the IFC was established separately and eventually became authorized to operate as a financially autonomous entity and make independent investment decisions. It offers an array of debt and equity financing services and helps companies face their risk exposures, while refraining from participating in a management capacity. The corporation also offers advice to companies on making decisions, evaluating their impact on the environment and society, and being responsible. It advises governments on building infrastructure and partnerships to further support private sector development.

The IFC's Sustainability Framework articulates the Corporation's strategic commitment to sustainable development, and is an integral part of IFC's approach to risk management. The Sustainability Framework comprises IFC's Policy and Performance Standards on Environmental and Social Sustainability, and IFC's Access to Information Policy. The Policy on Environmental and Social Sustainability describes IFC's commitments, roles, and responsibilities related to environmental and social sustainability. IFC's Access to Information Policy reflects IFC's commitment to transparency and good governance on its operations, and outlines the Corporation's institutional disclosure obligations regarding its investment and advisory services. The Performance Standards are directed towards clients, providing guidance on how to identify risks and impacts, and are designed to help avoid, mitigate, and manage risks and impacts as a way of doing business in a sustainable way, including stakeholder engagement and disclosure obligations of the client in relation to project-level activities. In the case of its direct investments (including project and corporate finance provided through financial intermediaries), IFC requires its clients to apply the Performance Standards to manage environmental and social risks and impacts so that development opportunities are enhanced. IFC uses the Sustainability Framework along with other strategies, policies, and initiatives to direct the business activities of the Corporation in order to achieve its overall development objectives. The Performance Standards may also be applied by other financial institutions.

The objectives and applicability of the eight Performance Standards are outlined in **Table 3-4**.

Table 3-4: Objectives and Applicability of the IFC Performance Standards

REFERENCE	REQUIREMENTS	PROJECT SPECIFIC APPLICABILITY
Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts		
Performance Standard 1 underscores the importance of managing environmental and social performance throughout the life of a project. An effective Environmental and Social Management System (ESMS) is a dynamic and continuous process initiated and supported by management, and involves engagement between the client, its workers, local communities directly affected by the project (the Affected Communities) and, where appropriate, other stakeholders. **Objectives:** → To identify and evaluate environmental and social risks and impacts of the project. → To adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimize,5 and, where residual impacts remain, compensate/offset for risks and impacts to workers, Affected Communities, and the environment. → To promote improved environmental and social performance of clients through the effective use of management systems. → To ensure that grievances from Affected Communities and external communications from other stakeholders are responded to and managed appropriately. → To promote and provide means for adequate engagement with Affected Communities throughout the project cycle on issues that could potentially affect them and to ensure that relevant environmental and social information is disclosed and disseminated		
1.1	Policy	A formal Environmental and Social Management System will be compiled in the event that the project is identified as a preferred bidder.
1.2	Identification of Risks and Impacts	
1.3	Management Programmes	
1.4	Organisational Capacity and Competency	
1.5	Emergency Preparedness and Response	
1.6	Monitoring and Review	
1.7	Stakeholder Engagement	
1.8	External Communication and Grievance Mechanism	
1.9	Ongoing Reporting to Affected Communities	

REFERENCE	REQUIREMENTS	PROJECT SPECIFIC APPLICABILITY
Performance Standard 2: Labour and Working Conditions;		
Performance Standard 2 recognises that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental rights of workers **Objectives:** → To promote the fair treatment, non-discrimination, and equal opportunity of workers. → To establish, maintain, and improve the worker-management relationship. → To promote compliance with national employment and labour laws. → To protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain. → To promote safe and healthy working conditions, and the health of workers. → To avoid the use of forced labour.		
2.1	Working Conditions and Management of Worker Relationship → Human Resources Policy and Management → Working Conditions and terms of Engagement → Workers organisation → Non Discrimination and Equal Opportunity → Retrenchment → Grievance Mechanism	Formal human resource and labour policies will be compiled in the event that the project is identified as a preferred bidder.
2.2	Protecting the Workforce → Child Labour → Forced Labour	
2.3	Occupational health and Safety	
2.4	Workers Engaged by Third Parties	
2.5	Supply Chain	
Performance Standard 3: Resource Efficiency and Pollution Prevention		
Performance Standard 3 recognises that increased economic activity and urbanisation often generate increased levels of pollution to air, water, and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional, and global levels. There is also a growing global consensus that the current and projected atmospheric concentration of greenhouse gases (GHG) threatens the public health and welfare of current and future generations. At the same time, more efficient and effective resource use and pollution prevention and GHG emission avoidance and mitigation technologies and practices have become more accessible and achievable in virtually all parts of the world. **Objectives:** → To avoid or minimise adverse impacts on human health and the environment by avoiding or minimising pollution from project activities. → To promote more sustainable use of resources, including energy and water. → To reduce project-related GHG emissions.		
3.1	Resource Efficiency	

Reference	Requirements	Project Specific Applicability
	→ Greenhouse Gases → Water Consumption	The only applicable and material resource efficiency issue is water consumption due to the arid nature of the region and general propensity for drought conditions in the country. The project is not greenhouse gas (GHG) emissions intensive and the detailed assessment and reporting of emissions is not required. This project, however, seeks to facilitate resource efficiency and pollution prevention by contributing to the South African green economy. Dust air pollution in the construction phase has been adequately addressed in the EMPr. The project will not result in the release of industrial effluents. Potential pollution associated with sanitary wastewater is low and mitigation measures have been included in the EMPr. Land contamination of the site from historical land use (i.e. low intensity agricultural / grazing) is not considered to be a cause for concern. The waste generation profile of the project is not complex. Waste mitigation and management measures have been included in EMPr. Hazardous materials are not a key issue; small quantities of construction materials (oil, grease, diesel fuel, cement etc.) and stored sanitary sewage in the operational phase are the only wastes expected to be associated with the project. The EMPr and emergency preparedness and response plan identifies these anticipated hazardous materials and recommends relevant mitigation and management measures.
3.2	Pollution Prevention → Air Emissions → Stormwater → Waste Management → Hazardous Materials Management → Pesticide use and Management	
Performance Standard 4: Community Health, Safety, and Security		
Performance Standard 4 recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts. **Objectives:** → To anticipate and avoid adverse impacts on the health and safety of the Affected Community during the project life from both routine and non-routine circumstances. → To ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the Affected Communities		
4.1	Community Health and Safety → Infrastructure and Equipment Design and Safety → Hazardous Materials Management and Safety → Ecosystem Services → Community Exposure to Disease → Emergency Preparedness and Response	The requirements included in PS 4 have been addressed in the S&EIR process and the development of the EMPr. The following generic plans have been included in the EMPr: → Emergency Response Plan; → Transport Management Plan; → HIV Management Plan; and → Security Policy. All plans will be made site specific, as part of the financial close process, in the event that Preferred Bidder status is achieved.
4.2	Security Personnel	
Performance Standard 5: Land Acquisition and Involuntary Resettlement		
Performance Standard 5 recognises that project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons that use this land. Involuntary resettlement refers both		

Reference	Requirements	Project Specific Applicability
to physical displacement (relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or other means of livelihood) as a result of project-related land acquisition and/or restrictions on land use. **Objectives:** → To avoid, and when avoidance is not possible, minimise displacement by exploring alternative project designs. → To avoid forced eviction. → To anticipate and avoid, or where avoidance is not possible, minimise adverse social and economic impacts from land acquisition or restrictions on land use by (i) providing compensation for loss of assets at replacement cost and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected. → To improve, or restore, the livelihoods and standards of living of displaced persons. → To improve living conditions among physically displaced persons through the provision of adequate housing with security of tenure at resettlement sites		
5.1	Displacement → Physical Displacement → Economic Displacement → Private Sector Responsibilities under Government Managed Resettlement	In terms of the land acquisition and involuntary settlement provisions in IFC PS 5, the development site is located on privately owned land that is utilised for the sole commercial agricultural use by the landowner. The project will restrict the future use of the land by the farmer as per voluntarily agreement in the lease agreement. There is no other use of the land by communities or persons and as such there will be no involuntary physical or economic displacement.
Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources		
Performance Standard 6 recognizes that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. **Objectives:** → To protect and conserve biodiversity. → To maintain the benefits from ecosystem services. → To promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.		
6.1	Protection and Conservation of Biodiversity	The S&EIR and EMPr development process includes a biodiversity assessment (undertaken by Simon Todd) comprising of a combination of literature review, stakeholder engagement and consultation, and in-field surveys. This substantively complies with the PS 6 general requirements for scoping and baseline assessment for determination of biodiversity and ecosystem services issues. The determination of habitat sensitivity was undertaken within the legal and best practice reference framework for South Africa. The project is located within a critical biodiversity area. The prevalence of invasive alien species on the site is low; however, the S&EIR process had noted the propensity for the spread of alien invasive species in the construction and operational phases and mitigation and management measures are included in the EMPr.

<table>
<tr><th>REFERENCE</th><th>REQUIREMENTS</th><th>PROJECT SPECIFIC APPLICABILITY</th></tr>
<tr><td colspan="3">Performance Standard 7: Indigenous People</td></tr>
<tr><td colspan="3">Performance Standard 7 recognizes that Indigenous Peoples, as social groups with identities that are distinct from mainstream groups in national societies, are often among the most marginalized and vulnerable segments of the population. In many cases, their economic, social, and legal status limits their capacity to defend their rights to, and interests in, lands and natural and cultural resources, and may restrict their ability to participate in and benefit from development. Indigenous Peoples are particularly vulnerable if their lands and resources are transformed, encroached upon, or significantly degraded.
Objectives:
→ To ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of Indigenous Peoples.
→ To anticipate and avoid adverse impacts of projects on communities of Indigenous Peoples, or when avoidance is not possible, to minimize and/or compensate for such impacts.
→ To promote sustainable development benefits and opportunities for Indigenous Peoples in a culturally appropriate manner.
→ To establish and maintain an ongoing relationship based on Informed Consultation and Participation (ICP) with the Indigenous Peoples affected by a project throughout the project's life-cycle.
→ To ensure the Free, Prior, and Informed Consent (FPIC) of the Affected Communities of Indigenous Peoples when the circumstances described in this Performance Standard are present.
→ To respect and preserve the culture, knowledge, and practices of Indigenous Peoples.</td></tr>
<tr><td>5.1</td><td>General
→ Avoidance of Adverse Impacts
→ Participation and Consent</td><td rowspan="4">Whilst the project development site and the adjacent areas appeared to be uninhabited, PS 7 identifies that cultural heritage in project areas may link to the identity and/or cultural, ceremonial, or spiritual aspects of indigenous peoples.
A cultural heritage study has been undertaken and the potential impacts resulting from the installation of a WEF on the heritage resources of the sites are considered to be of low significance. This suggests a low probability of linkages with, and impacts on potential Indigenous Peoples (IP).
The office of the regional land claims commissioner has confirmed the absence of land claims against the property in terms of the Restitution of Land Rights Act (1994).</td></tr>
<tr><td>5.2</td><td>Circumstances Requiring Free, Prior, and Informed Consent
→ Impacts on Lands and Natural Resources Subject to Traditional Ownership or Under Customary Use
→ Critical Cultural Heritage
→ Relocation of Indigenous Peoples from Lands and Natural Resources Subject to Traditional Ownership or Under Customary Use</td></tr>
<tr><td>5.3</td><td>Mitigation and Development Benefits</td></tr>
<tr><td>5.4</td><td>Private Sector Responsibilities Where Government is Responsible for Managing Indigenous Peoples Issues</td></tr>
<tr><td colspan="3">Performance Standard 8: Cultural Heritage</td></tr>
<tr><td colspan="3">Performance Standard 8 recognizes the importance of cultural heritage for current and future generations
Objectives:
→ To protect cultural heritage from the adverse impacts of project activities and support its preservation.
→ To promote the equitable sharing of benefits from the use of cultural heritage.</td></tr>
</table>

Reference	Requirements	Project Specific Applicability
8.1	Protection of Cultural Heritage in Project Design and Execution	A cultural heritage study was performed as part of the S&EIR process. The impact of the proposed development on the cultural heritage resources of the area was assessed to be low. Chance find provisions have been included in the EMPr.

EQUATOR PRINCIPLES

The Equator Principles (EPs) is a risk management framework, adopted by financial institutions, for determining, assessing and managing environmental and social risk in projects and is primarily intended to provide a minimum standard for due diligence to support responsible risk decision-making. The EP apply globally, to all industry sectors and to four financial products 1) Project Finance Advisory Services 2) Project Finance 3) Project-Related Corporate Loans and 4) Bridge Loans. The relevant thresholds and criteria for application is described in detail in the Scope section of the EP. Currently 84 Equator Principles Financial Institutions (EPFIs) in 35 countries have officially adopted the EPs, covering over 70 percent of international Project Finance debt in emerging markets. EPFIs commit to implementing the EP in their internal environmental and social policies, procedures and standards for financing projects and will not provide Project Finance or Project-Related Corporate Loans to projects where the client will not, or is unable to, comply with the EP.

While the EP are not intended to be applied retroactively, EPFIs may apply them to the expansion or upgrade of an existing project where changes in scale or scope could result in significant environmental and social risks and impacts, or significantly change the nature or degree of an existing impact. The EPs have greatly increased the attention and focus on social/community standards and responsibility, including robust standards for indigenous peoples, labour standards, and consultation with locally affected communities within the Project Finance market. They have also promoted convergence around common environmental and social standards. Multilateral development banks, including the European Bank for Reconstruction & Development and export credit agencies through the Organisation for Economic Co-operation and Development (OECD) Common Approaches are increasingly drawing on the same standards as the EPs.

The EPs have also helped spur the development of other responsible environmental and social management practices in the financial sector and banking industry (for example, Carbon Principles in the US, Climate Principles worldwide) and have provided a platform for engagement with a broad range of interested stakeholders, including non-governmental organisations (NGOs), clients and industry bodies.

The Equator Principles include:

- Principle 1: Review and Categorisation
- Principle 2: Environmental and Social Assessment
- Principle 3: Applicable Environmental and Social Standards
- Principle 4: Environmental and Social Management System and Equator Principles Action Plan
- Principle 5: Stakeholder Engagement
- Principle 6: Grievance Mechanism
- Principle 7: Independent Review
- Principle 8: Covenants
- Principle 9: Independent Monitoring and Reporting
- Principle 10: Reporting and Transparency

The requirements and applicability of the Equator Principles are outlined in **Table 3-5**. it should be noted that Principles 8 and 10 relate to a borrower's code of conduct and are therefore not considered relevant to the EIA process and have not been included in this discussion.

Table 3-5: Requirements and Applicability of the Equator Principles

REQUIREMENT	PROJECT SPECIFIC APPLICABILITY
Principle 1: Review and Categorisation	
When a project is proposed for financing, the EPFI will, as part of its internal social and environmental review and due diligence, categorise such project based on the magnitude of its potential impacts and risks in accordance with the environmental and social screening criteria of the IFC. Using categorisation, the EPFI's environmental and social due diligence is commensurate with the nature, scale and stage of the Project, and with the level of environmental and social risks and impacts. The categories are: → Category A – Projects with potential significant adverse environmental and social risks and/or impacts that are diverse, irreversible or unprecedented; → Category B – Projects with potential limited adverse environmental and social risks and/or impacts that are few in number, generally site-specific, largely reversible and readily addressed through mitigation measures; and → Category C – Projects with minimal or no adverse environmental and social risks and/or impacts.	Based upon the significance and scale of the project's environmental and social impacts, the proposed project is regarded as a Category B project i.e. a project with potential limited adverse environmental or social risks and/or impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures.
Principle 2: Environmental and Social Assessment	
For all Category A and Category B Projects, the EPFI will require the client to conduct an Assessment process to address, to the EPFI's satisfaction, the relevant environmental and social risks and impacts of the proposed Project (which may include the illustrative list of issues found in Exhibit II). The Assessment Documentation should propose measures to minimise, mitigate, and offset adverse impacts in a manner relevant and appropriate to the nature and scale of the proposed Project. The Assessment Documentation will be an adequate, accurate and objective evaluation and presentation of the environmental and social risks and impacts, whether prepared by the client, consultants or external experts. For Category A, and as appropriate, Category B Projects, the Assessment Documentation includes an Environmental and Social Impact Assessment (ESIA). One or more specialised studies may also need to be undertaken.	This document is the final deliverable from the S&EIR process undertaken for the proposed project. The impact assessment comprehensively assesses the key environmental and social impacts and complies with the requirements of the South African EIA Regulations. In addition an EMPr has been compiled and is included in **Appendix W**.
Principle 3: Applicable Environmental and Social Standards	
The Assessment process should, in the first instance, address compliance with relevant host country laws,	As South Africa is designated as a non-designated country the reference framework for environmental

REQUIREMENT	PROJECT SPECIFIC APPLICABILITY
regulations and permits that pertain to environmental and social issues. For Projects located in Non-Designated Countries, the Assessment process evaluates compliance with the then applicable IFC PS and WBG EHS Guidelines	and social assessment is based on the IFC PS. In addition, this S&EIR process has been undertaken in accordance with NEMA (the host country's relevant legislation).
Principle 4: Environmental and Social Management System and Equator Principles Action Plan	
For all Category A and Category B Projects, the EPFI will require the client to develop or maintain an Environmental and Social Management System (ESMS). Further, an Environmental and Social Management Plan (ESMP) will be prepared by the client to address issues raised in the Assessment process and incorporate actions required to comply with the applicable standards. Where the applicable standards are not met to the EPFI's satisfaction, the client and the EPFI will agree on an Equator Principles Action Plan (AP). The Equator Principles AP is intended to outline gaps and commitments to meet EPFI requirements in line with the applicable standards.	A formal Environmental and Social Management System will be compiled in the event that the project is identified as a preferred bidder.
Principle 5: Stakeholder Engagement	
EPFI will require the client to demonstrate effective Stakeholder Engagement as an ongoing process in a structured and culturally appropriate manner with Affected Communities and, where relevant, Other Stakeholders. For Projects with potentially significant adverse impacts on Affected Communities, the client will conduct an Informed Consultation and Participation process. In order to accomplish this, the appropriate assessment documentation, or non-technical summaries thereof, will be made available to the public by the borrower for a reasonable minimum period in the relevant local language and in a culturally appropriate manner. The borrower will take account of and document the process and results of the consultation, including any actions agreed resulting from the consultation. For projects with adverse social or environmental impacts, disclosure should occur early in the Assessment process and in any event before the project construction commences, and on an ongoing basis	The S&EIR process includes an extensive stakeholder engagement process which complies with the South African EIA Regulations. The process includes consultations with local communities, nearby businesses and a range of government sector stakeholders (state owned enterprises, national, provincial and local departments). The stakeholder engagement process solicited interest from potentially interested parties through the placement of site notices and newspaper advertisements. In addition a number of public meetings and focus group meetings have been undertaken.
Principle 6: Grievance Mechanism	
The borrower will inform the Affected Communities about the mechanism in the course of its community engagement process and ensure that the mechanism addresses concerns promptly and transparently, in a culturally appropriate manner, and is readily accessible to all segments of the affected communities	The EMPr includes a *Grievance Mechanism Process for Public Complaints and Issues*. This procedure effectively allows for external communications with members of the public to be undertaken in a transparent and structured manner. This procedure will be revised and updated as part of the EMPr amendment process in the event that the project is identified as a preferred bidder.

REQUIREMENT	PROJECT SPECIFIC APPLICABILITY
Principle 7: Independent Review	
For all Category A projects and, as appropriate, for Category B projects, an independent social or environmental expert not directly associated with the borrower will review the Assessment, AP and consultation process documentation in order to assist EPFI's due diligence, and assess Equator Principles compliance	This principle will only become applicable in the event that the project is identified as a preferred bidder.
Principle 9: Independent Monitoring and Reporting	
To ensure ongoing monitoring and reporting over the life of the loan, EPFIs will, for all Category A projects, and as appropriate, for Category B projects, require appointment of an independent environmental and/or social expert, or require that the borrower retain qualified and experienced external experts to verify its monitoring information which would be shared with EPFIs	This principle will only become applicable in the event that the project is identified as a preferred bidder.

4 SCOPING PHASE SUMMARY

4.1 PROCEDURAL PROCESS

The application form was compiled and submitted to the DEA on **15 September 2016**.

The DEA reference number allocated to this application is **14/12/16/3/3/2/963**. This reference number will appear on all official correspondence with the authorities and the public regarding the Proposed Project. A copy of the acknowledgement of receipt of the application is included in **Appendix E**.

The draft scoping report was released for public review between **15 September** and **17 October 2016**. Subsequently the scoping report was finalised and submitted to the DEA on 28 October 2016 for their review and approval. The submission of the final scoping report was within 44 days of receipt of the application by the DEA as required by GNR 982.

The approval of the final scoping report and the plan of study for the environmental impact assessment was received on **1 December 2016** and is included in **Appendix D**.

4.2 AUTHORITY CONSULTATION

A pre-application meeting was held on 23 August 2016 with the DEA in order to discuss the proposed project. The minutes of this meeting are included in **Appendix F**. In addition, WSP | Parsons Brinckerhoff notified a number of commenting authorities of the Proposed Project via a notification letter, these included:

- Northern Cape Department of Environment and Nature Conservation
- Department of Water and Sanitation: Northern Cape Region;
- Department of Environmental Affairs: Biodiversity and Conservation;
- Heritage Western Cape;
- South African Heritage Resources Agency;
- Regional Land Claims Commission: Northern Cape;
- SKA;
- Karoo Hoogland Local Municipality; and
- Namakwa District Municipality.

WSP | Parsons Brinckerhoff received comments on the draft scoping report from the DEA on **13 October 2016.** The comments and responses have been outlined in **Table 4-1** and included in **Appendix G**.

Table 4-1: Comments received from the Department of Environmental Affairs regarding the Draft Scoping Report

COMMENT	RESPONSE
Please ensure that all relevant listed activities are applied for, are specific and that it can be linked to the development activity or infrastructure as described in the project description.	All relevant listed activities have been included in the application form submitted to the DEA on 15 September 2016.
If the activities applied for in the application form differ from those mentioned in the final SR, an amended application form must be	The activities listed in the final scoping report were the same as those applied for

COMMENT	RESPONSE
submitted. Please note that the Department's application form template has been amended and can be downloaded from the following link https://www.environment.gov.za/documents/forms.	in the application form. The requirement to amend the application form in the event that activities are added or removed at any time through the S&EIR process is noted.
Please ensure that the application form is signed by the applicant and that the land owner consent form has been signed.	The application form was signed by the applicant and the land owner consent form was signed by the relevant land owner.
It is noted that the development footprint falls across the Northern and Western Cape Provinces. Please ensure that all relevant activities have been identified and are included in the application form and will be assessed during the EIAr process.	The development footprint of the Maralla West development is located in both the Northern and Western cape provinces. The activities listed in this EIR have been updated to ensure that all the relevant activities have been included. WSP | Parsons Brinckerhoff amended the application form accordingly and have submitted it together with the final scoping report
It is imperative that the relevant authorities are continuously involved throughout the EIA process as the development property possibly falls within geographically designated areas in terms of numerous GN R.985 Activities. Written comments must be obtained from the relevant authorities and submitted to this Department. In addition, a graphical representation of the proposed development within the respective geographical areas must be provided.	The GNR 985 activities included in the application form are only applicable to the Northern Cape. A graphical representation of the proposed development within the respective geographical area has been provided in Chapter 2 of this report.
The Environmental Assessment Practitioner is requested to provide additional information detailing the specifications of the proposed dangerous goods (GN R. 985 Activity 10) i.e. quantities, type of goods etc. In addition the impacts associated with this activity must be assessed.	The dangerous goods applicable to GNR 985 Activity 10 will include cement and diesel that will be required on site in quantities of more than 30m^3. Impacts include the potential contamination of soil and surface resources and have been assessed within Chapter 9 of this report.
The final SR must provide evidence that all identified and relevant competent authorities have been given an opportunity to comment on the proposed development; particularly the Square Kilometre Array South Africa, and the South African Astronomical Observatory.	Proof of correspondence with stakeholders during the scoping phase is included in the comment and response report. The project database included the Square Kilometre Array and the South African Astronomical Observatory from the inception of the project.
The Public Participation Report must contain clear and legible copies of the newspaper adverts.	Copies of the Newspaper adverts have been included in the Public Participation Report and as an appendix to this EIR.
Please ensure that all issues raised and comments received during the circulation of the SR from registered I&APs and organs of state which have jurisdiction (including this Department's Biodiversity Section) in respect of the proposed development are adequately addressed in the Final SR. Proof of correspondence with the various stakeholders must be included in the Final SR. Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments. The Public Participation Process must be conducted in terms of Regulation 39, 40 41, 42, 43 and 44 of the EIA Regulations 2014.	The comments and response report has been updated to include all correspondence received to date and is included in **Appendix H**.

COMMENT	RESPONSE
A comments and response trail report (C&R) must be submitted with the final SR. The C&R report must incorporate all historical comments for this development. The C&R report must be a separate document from the main report and the format must be in the table format as indicated in Annexure 1 of this comments letter.	The comments and response report has been updated to include all correspondence received to date and is included in **Appendix H**.
Please provide a description of any identified alternatives for the proposed activity that are feasible and reasonable, including the advantages and disadvantages that the proposed activity or alternatives will have on the environment and on the community that may be affected by the activity as per Appendix 2 of the EIA Regulations, 2014. Alternatively, you should submit written proof of an investigation and motivation if no reasonable or feasible alternatives exist in terms of Appendix 2.	The investigation undertaken to identify and motivate why no reasonable or feasible alternatives exist has been outlined in Chapter 7 of this report. In addition, advantages and disadvantages have been included for all alternatives where appropriate.
Should the appointed specialists specify contradicting recommendations, the EAP must clearly indicate the most reasonable recommendation and substantiate this with defendable reasons; and where necessary, include further expertise advice.	WSP | Parsons Brinckerhoff has taken note of this requirement. At this stage no contradictions have been noted.
Where specialist studies are conducted in house or by a specialist other than a suitably qualified specialist in the relevant field, such specialist reports must be peer reviewed by a suitably qualified external specialist in the relevant field. The terms of reference for the peer review must include: • A CV clearly showing expertise of the peer reviewer; • Acceptability of the terms of reference; • Is the methodology clearly explained and acceptable; Evaluate the validity of the findings (review data evidence); • Discuss the suitability of the mitigation measures and recommendations; • Identify any short comings and mitigation measures to address the short comings; • Evaluate the appropriateness of the reference literature; • Indicate whether a site inspection was carried out as part of the peer review; and • Indicate whether the article is well-written and easy to understand.	Peer reviewers have been identified and appointed for all relevant in-house specialist studies. The following peer reviews are currently underway and will be appended to the Final EIR: → Land capability and Wetlands → Noise Specialist Study → Social Study The Traffic Specialist Study Peer Review has been completed and is included in **Appendix I** The CV for each independent specialist have been included within **Appendix J**
Therefore, peer reviewer's details must be included in the final scoping report for the following specialist reports: Noise specialist study, traffic specialist study, social study, soil, land capability specialist study and wetland specialist study.	Peer reviewers have been identified and appointed for all relevant in-house specialist studies. Curriculum Vitae for all the relevant Peer Reviewers have been included in **Appendix J.**
It is noted that the property is affected by numerous watercourses and NFEPA wetlands, and that activities that may trigger Section 19 and Section 21 of the National Water Act No. 36 of 1998 were applied for/included in the application form. Please note that a separate hydrological impact assessment must be conducted to assess the impacts of the proposed development on the surface hydrology of the area. The terms of reference for the study must include, inter alia the following:	The requirements for the hydrological study have been included in the Surface Water Specialist Study included in **Appendix Q.**

COMMENT	RESPONSE
• Identification and sensitivity rating of all surface water courses for the impact phase of the proposed development; • Identification, assessment of all potential impacts to the water courses and suggestion of mitigation measures; and, • Recommendations on the preferred placement of the parabolic troughs and all associated infrastructure and preference must be provided to the avoidance of the watercourses on the property.	
Due to the number of similar applications in the area, all the specialist assessments must include a cumulative environmental impact assessment for all identified and assessed impacts. The cumulative impact assessment must indicate the following: • Identified cumulative impacts must be clearly defined, and where possible the size of the identified impact must be quantified and indicated, i.e. hectares of cumulatively transformed land. • Detailed process flow and proof must be provided, to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusion and mitigation measures were drafted for this project. • The cumulative impacts significance rating must also inform the need and desirability of the proposed development. • A cumulative impact environmental statement on whether the proposed development must proceed.	A detailed cumulative assessment is included in Chapter 10 of this report.
The terms of reference for the ecological assessment must also investigate the following: • The property falls within the National Protection Areas Expansion Strategy Focus Area (NPAES). The ecological study must assess the impact on the proposed development on the integrity of the NPAES in the area. • Must indicate the location of both private and government nature protection areas in the area. • Must indicate and describe the competing land uses in the area	The additional terms of reference was forwarded to the Biodiversity specialist and has been incorporated in the Biodiversity Specialist Study included in **Appendix L**.
The Bat and Avifauna specialist assessments must assess and make recommendations for definite measurements for the preferred hub heights and rotor diameter	The additional terms of reference was forwarded to the Avifauna and bat specialists and has been incorporated in the Avifauna and Bat Specialist Studies included in **Appendix M and N**.
The final SR must investigate and identify all traffic impacts and geotechnical impacts associated with the proposed development.	Traffic and geotechnical impacts were included in the final scoping report. A Traffic Impact Assessment is included in **Appendix O**. Detailed Geotechnical Assessments are generally only undertaken once a project has been identified as a preferred bidder. Preliminary Geotechnical aspects have been referenced in the EMPr. Potential environmental and social implications,

COMMENT	RESPONSE
	such as blasting requirements, have also been addressed accordingly in the EMPr.
The final Scoping Report must indicate all private and government nature protection areas in the area, including any Important Bird Areas.	Maps illustrating private and government nature protection areas and Important Bird Areas are included in this EIR.
The final Scoping Report must indicate and describe the competing land uses in the area including the proposed project. This must further motivate the desirability of locating the wind energy facility at the preferred location.	A discussion regarding land uses in the area is included Section 8.4 of this report.
In accordance with Appendix 2 of the EIA Regulations 2014, the details of- • the EAP who prepared the report; and • the expertise of the EAP to carry out Scoping and Environmental Impact assessment procedures; must be submitted.	This has been included in Section 1.2 of this report. In addition, the CV of the Project Manager and Project Director for the project have been included in **Appendix A**.
You are further reminded that the final SR to be submitted to this Department must comply with all the requirements in terms of the scope of assessment and content of Scoping reports in accordance with Appendix 2 and Regulation 21(1) of the EIA Regulations, 2014.	WSP | Parsons Brinckerhoff takes note of this requirement.
Further note that in terms of Regulation 45 of the EIA Regulations 2014, this application will lapse if the applicant fails to meet any of the timeframes prescribed in terms of these Regulations, unless an extension has been granted in terms of Regulation 3(7).	WSP | Parsons Brinckerhoff takes note of this requirement.
You are hereby reminded of Section 24F of the National Environmental Management Act, Act No 107 of 1998, as amended, that no activity may commence prior to an environmental authorisation being granted by the Department.	WSP | Parsons Brinckerhoff takes note of this requirement.

In addition to the above, WSP | Parsons Brinckerhoff received comments on the final scoping report from the DEA on **1 December 2016.** The comments and responses have been outlined in **Table 4-2** and included in **Appendix D**.

Table 4-2: Comments received from the Department of Environmental Affairs regarding the Final Scoping Report

COMMENT	RESPONSE
All comments and recommendations made by all stakeholders and Interested and Affected Parties (I&APs) in the draft SR and submitted as part of the final SR must be taken into consideration when preparing an Environmental Impact Assessment report (EIAr) in respect of the proposed development. Please ensure that all mitigation measures and recommendations in the specialist studies are addressed and included in the final EIAr and Environmental Management Programme (EMPr).	Please refer to the comment and response report (**Appendix H**) and the EMPr (**Appendix W**) for further details.
Please ensure that comments from all relevant stakeholders are submitted to the Department with the final EIAr. This includes but is not limited to: • The Northern Cape Department of Environment and Nature Conservation;	All existing comments received have been included in the comment and response report (**Appendix H**). All the relevant stakeholders have been informed of the draft EIR public review period. Any additional comments received during the public review period will be

COMMENT	RESPONSE
• The Department of Agriculture, Forestry and Fisheries (DAFF); • The provincial Department of Agriculture, the South African Civil Aviation Authority (SACAA); • The Department of Transport, the District Municipality; • The Karoo Hoogland Local Municipality; • The Department of Water and Sanitation (DWS); • The South African National Roads Agency Limited (SANRAL); • The South African Heritage Resources Agency (SAHRA); • The Endangered Wildlife Trust (EWT); • Birdlife SA; • The Department of Mineral Resources; • The Department of Rural Development and Land Reform; • The Department of Environmental Affairs: Directorate Biodiversity and Conservation; and • The South African Astronomy Observation (SAAO).	included in the comment and response report and included in the final EIR.
Please be advised that the contact person for renewable projects at the SAAO office is Dr Ramotholo Sefako and he can be contacted on Tel: (011) 447 0025 or E-mail: rrs@saao.ac.za.	WSP | Parsons Brinckerhoff takes note of these contact details. These details have been added to the stakeholder database (**Appendix P**).
You are also required to address all issues raised by Organs of State and I&APs prior to the submission of the EIAr to the Department.	All existing comments received have been included and responded to in the comment and response report (**Appendix H**). All the relevant stakeholders have been informed of the draft EIR public review period. Any additional comments received during the public review period will be included in the comment and response report and included in the final EIR.
The EAP must, in order to give effect to Regulation 8, give registered I&APs access to, and an opportunity to comment on the report in writing within 30 days before submitting the final EIAr to the Department.	I&APs have been afforded 30 days to review the draft EIR. The public review period runs from 2 February 2016 to 2 March 2017.
In addition, the following additional information is required for the EIAr:	
The EIAr must provide an assessment of the impacts and mitigation measures for each of the listed activities applied for.	Please refer to Chapter 9 of this report.
The listed activities represented in the EIAr and the application form must be the same and correct.	All relevant listed activities included in the draft EIR and included in the application form submitted to the DEA on 15 September 2016.
The study area for the development is affected by the National Protected Areas Expansion Strategy Focus Area (NPAES). As such the Environmental Assessment Practitioner (EAP) must properly identify the relevant sub-activities for GN R. 985 Activities 4, 10, 14, 18 and 23. The application form must be amended to reflect the correct activities.	Activities 4, 10, 12, 14, 18 and 23 of GNR 985 have been updated to reflect the NPAES. The amended Application Form will be submitted with the Final EIR

COMMENT	RESPONSE
The EIAr must provide a description of all applicable activities for the proposed development. It is noted that whilst the SR states that certain activities are potentially applicable, this must be assessed and confirmed in the EIAr. As such, an amended application form may be required to be submitted with the EIAr.	Activities 4, 10, 12, 14, 18 and 23 of GNR 985 have been updated to reflect the NPAES. The amended Application Form will be submitted with the Final EIR
The EIAr must provide the technical details for the proposed facility in a table format as well as their description and/or dimensions. A sample for the minimum information required is listed under point 2 of the EIA information required for wind energy facilities below.	Please refer to Table 7.1 in Section 7.2 of this report.
The EIAr must provide the four corner coordinate points for the proposed development site (note that if the site has numerous bend points, at each bend point coordinates must be provided) as well as the start, middle and end point of all linear activities.	Please refer to Figure 7.5 in Section 7.4 of this report.
The EIAr must provide the following: • Clear indication of the envisioned area for the proposed wind energy facility; i.e. placing of wind turbines and all associated infrastructure should be mapped at an appropriate scale. • Clear description of all associated infrastructure. This description must include, but is not limited to the following: ○ Power lines; ○ Internal roads infrastructure; and; ○ All supporting onsite infrastructure such as laydown area, guard house and control room etc. ○ All necessary details regarding all possible locations and sizes of the proposed satellite substation and the main substation.	Please refer to Chapter 7 and Chapter 11 of this report.
The EIAr must also include a comments and response report in accordance with Appendix 2 h (iii) of the EIA Regulations, 2014.	The comment and response report is included in **Appendix H**.
The EIAr must include the detail inclusive of the PPP in accordance with Regulation 41 of the EIA Regulations.	The PPP undertaken for this S&EIR Process is outlined in Chapter 5 of this report.
Details of the future plans for the site and infrastructure after decommissioning in 20-30 years and the possibility of upgrading the proposed infrastructure to more advanced technologies.	At this stage in the process, post De-commissioning options have not yet been defined. It remains a possibility that technologies will evolve over time and the option to upgrade the facility is noted. However, in the event that upgrading the facility is not considered the site will be demolished and rehabilitated to its current state.
It is imperative that the relevant authorities are continuously involved throughout the EIAr process as the development property possibly falls within geographically designated areas in terms of GN R. 985. Written comments must be obtained and submitted to this Department. <u>In addition, a graphical representation of the proposed development within the respective geographical areas must be provided.</u>	The authority consultation process is discussed in Section 4.2 and Section 5.3. All written comments from the relevant provisional commenting authority are included in the comment and response report included in **Appendix H**. A graphical representation of the location of the project is included in **Figure 3-1**

COMMENT	RESPONSE
The impacts associated with activity GN R. 985 Activity 10 must be adequately assessed. Areas where dangerous goods are to be stored must be identified and assessed.	The dangerous goods referred to above will include cement and diesel that will be required on site in quantities of more than $30m^3$. Impacts associated with this activity are assessed in Sections 9.3 and 9.7.
Please note that this Department will not issue a favourable authorisation for a development layout that encroaches and/or overlaps preferred layouts of approved and valid environmental authorisations.	Please refer to **Appendix Y** for a letter to prove that the previous Environmental authorisation has lapsed.
Further to the above, the holders of all valid EA's adjacent to the site must be notified of the proposed development and comments must be obtained from these developers.	The neighbouring developers have been notified through the public participation process. No comments have been received as yet.
It is noted that the property is affected by numerous watercourses and NFEPA wetlands and that activities, which may trigger Section 19 and Section 21 of the National Water Act No. 36 of 1998, were applied for/included in the application form. **Please note that a separate hydrological impact assessment** must be conducted to assess the impacts of the proposed development on the surface hydrology of the area. The terms of reference for the study must include, inter alia the following: • Identification and sensitivity rating of all surface water courses for the impact phase of the proposed development; • Identification, assessment of all potential impacts to the water courses and suggestion of mitigation measures; and, • Recommendations on the preferred placement of the parabolic troughs and all associated infrastructure and preference must be provided to the avoidance of the watercourses on the property.	Please refer to **Appendix Q** for the separate Surface Water specialist study.
The terms of reference for the ecological assessment must also investigate the following: • The property falls within the National Protection Areas Expansion Strategy Focus Area (NPAES). The ecological study must assess the impact of the proposed development on the integrity of the NPAES in the area. • Must indicate the location of both private and government nature protection areas in the area. • Must indicate and describe the competing land uses in the area.	Please refer to **Appendix L** for the Biodiversity Specialist Study.
The terms of reference for the visual assessment must also investigate the following: • Assess and rate the cumulative impact of multiple WEFs in the landscape. • The South African Astronomy Observatory must be thoroughly engaged and their comments included as part of the EIAr.	Please refer to **Appendix T** for the Visual Specialist Study.
A significant amount of materials and equipment will be delivered to the site during the construction phase of the development and will thus have impacts on the environment. The impacts of this activity must be fully identified and assessed. The terms of	Please refer to **Appendix O** for the Transport Specialist Study.

COMMENT	RESPONSE
reference for the traffic impact assessment must be expanded to include the following: • Evaluate the impacts of the proposed development on existing road network and traffic volumes. The study must determine the specific traffic needs during the different phases of implementation, namely wind turbine construction and installation, operation and decommissioning; • Identify the position and suitability of the preferred access road alternative; Evaluate the roadway capacity of the road network; • Confirm the associated clearances required for the necessary equipment to be transported from the point of delivery to the various sites; • Confirm freight and transport requirements during construction, operation and maintenance; • Propose origins and destinations of equipment; and • Determine (Abnormal) Permit requirements if any.	
The bat and avifauna! specialist assessments must assess and make recommendations for definite measurements for the preferred hub heights and rotor diameter.	Please refer to **Appendix M and N** for the Avifauna and Bat Specialist Studies.
The bat specialist assessment must take into consideration the latest guidelines for the delineation of buffers by the South African Bat Assessment Advisory Panel.	Please refer to **Appendix N** for the Bat Specialist Study
The approach of using a desktop assessment for the socio-economic impact assessment is not supported. A comprehensive socio-economic impact assessment with the following terms of reference must be undertaken: • Clearly describe the potential social issues associated with the proposed facility; • Assess the socio-economic profile of the region and the social characteristics of the receiving environment; • Comparison of similar large-scale projects and applying the lessons learnt to the proposed project; • Analyse the potential socio-economic impacts of the proposed project and provide a description and the significance rating for the construction, operational and decommissioning phases; • Meet with relevant stakeholders and document their socio-economic concerns; and, Provide implementable guidelines for limiting or mitigating negative impacts and optimising benefits of the proposed development.	A site visit was undertaken in January 2017. Please refer to **Appendix V** for the Socio-Economic Specialist Study.
The ecological assessment must provide a cumulative assessment of the total loss of land within the NPAES and the CBAs.	Please refer to **Appendix L** for the Biodiversity Specialist Study. Also refer to Section 10 of this report for the Cumulative Impact Assessment.
It is noted that the ecological assessment was conducted in the incorrect season. As such, the ecological assessment must be	Please refer to **Appendix L** for the Biodiversity Specialist Study.

COMMENT	RESPONSE
conducted within the correct season. This also applies to all other specialist studies to be conducted.	A preliminary site visit to the study area was conducted on the 4th of April 2016 and a follow-up site visit on the 8th and 9th of September 2016. The primary purpose of the initial site visit was to investigate and identify sensitive features within the site as well as provide a preliminary characterization of the habitats and ecosystems within the site for the Scoping phase. The follow-up site visit was in the wet season and was used to verify the sensitivity and characteristics of areas identified as potentially sensitive, especially the highest-lying ground which is of limited extent and most vulnerable to cumulative impact. Apart from the above site visits, the adjacent areas have been sampled on many occasions over a period of several years. This includes the project areas of the adjacent Rietkloof and Brandvallei projects as well as the area between the site and Komsberg substation. This information is used to inform the current study as appropriate and contributes towards reducing any remaining uncertainty associated with the study
All turbines within the high ecological areas, the high avifauna! areas as well as the high bat areas must be removed or relocated.	Please refer to **Appendix M and N** for the Avifauna and Bat Specialist Studies. In addition, please refer to Section 11.2 for a detailed discussion on the sensitivity mapping process and its influence over the turbine layout.
Should in-house specialists be used for any specialist study, then the specialist study must be peer reviewed by external specialists. The format of the peer-review must address the following: • Acceptability of the ToR; • Is the methodology clearly explained and acceptable; • Evaluate the validity of the findings (review data evidence); • Discuss the mitigation measures and recommendations; • Evaluate the appropriateness of the reference literature; • Is the article well-written and easy to understand; and • Identify any short comings.	Peer reviewers have been identified and appointed for all relevant in-house specialist studies. The following peer reviews are currently underway and will be appended to the Final EIR: → Land capability and Wetlands → Noise Specialist Study → Social Study The Traffic Specialist Study Peer Review has been completed and is included in **Appendix I** The CV for each independent specialist have been included within **Appendix J.**
Information on services required on the site, e.g. sewage, refuse removal, water and electricity. Who will supply these services and has an agreement and confirmation of capacity been obtained? Proof of these agreements must be provided.	For such agreements to be in place, the project must first achieve preferred bidder status. These agreement will be negotiated once preferred bidder status has been achieved.
The EIAr must provide a detailed description of the need and desirability, not only providing motivation on	Please refer to Chapter 6 of this report.

COMMENT	RESPONSE
the need for clean energy in South Africa of the proposed activity. The need and desirability must also indicate if the proposed development is needed in the region and if the current proposed location is desirable for the proposed activity compared to other sites. The need and desirability must take into account cumulative impacts of the proposed development in the area.	
Due to the number of similar applications in the area, all the specialist assessments must include a cumulative environmental impact assessment for all identified and assessed impacts. The cumulative impact assessment must indicate the following: • Identified cumulative impacts must be clearly defined, and where possible the size of the identified impact must be quantified and indicated, i.e. hectares of cumulatively transformed land. • Detailed process flow and proof must be provided, to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusion and mitigation measures were drafted for this project. • The cumulative impacts significance rating must also inform the need and desirability of the proposed development. • A cumulative impact environmental statement on whether the proposed development must proceed.	A detailed cumulative assessment is included in Chapter 10 of this report.
A copy of the final site layout map. All available biodiversity information must be used in the finalisation of the layout map. Existing infrastructure must be used as far as possible e.g. roads. The layout map must indicate the following: • Wind turbine positions and its associated infrastructure; • Permanent laydown area footprint; • Internal roads indicating width (construction period width and operation period width) and with numbered sections between the other site elements which they serve (to make commenting on sections possible); • Wetlands, drainage lines, rivers, stream and water crossing of roads and cables indicating the type of bridging structures that will be used; • The location of sensitive environmental features on site e.g. CBAs, heritage sites, wetlands, drainage lines etc. that will be affected by the facility and its associated infrastructure; • Substation(s) and/or transformer(s) sites including their entire footprint; • Connection routes (including pylon positions) to the distribution/transmission network; • All existing infrastructure on the site, especially roads; • Buffer areas; • Buildings, including accommodation; and • All "no-go" areas.	Please refer to the Site Development Proposal Map included at the beginning of this report. This map is also included in **Appendix X.**

COMMENT	RESPONSE
An environmental sensitivity map indicating environmental sensitive areas and features identified during the EIA process.	Please refer to Section 11.2 for the sensitivity map. This map is also included in **Appendix X.**
A map combining the final layout map superimposed (overlain) on the environmental sensitivity map.	Please refer to Section 11.2 for the sensitivity map overlain by the revised turbine layout. This map is also included in **Appendix X.**
A shapefile of the preferred development layout/footprint must be submitted to this Department. The shapefile must be created using the Hartebeesthoek 94 Datum and the data should be in Decimal Degree Format using the WGS 84 Spheroid. The shapefile must include at a minimum the following extensions i.e. .shp; .shx; .dbf; .prj; and, .xml (Metadata file). If specific symbology was assigned to the file, then the .avi and/or the .lyr file must also be included. Data must be mapped at a scale of 1:10 000 (please specify if an alternative scale was used). The metadata must include a description of the base data used for digitizing. The shapefile must be submitted in a zip file using the EIA application reference number as the title. The shape file must be submitted to: **Postal Address:** Department of Environmental Affairs Private Bag X447 Pretoria 0001 **Physical address:** Environment House 473 Steve Biko Road Pretoria For Attention: Muhammad Essop Integrated Environmental Authorisations Strategic Infrastructure Developments Telephone Number: (012) 399 9406 • Email Address: MEssop@environment.gov.za	WSP | Parsons Brinckerhoff have taken note of this requirement.
The Environmental Management Programme (EMPr) to be submitted as part of the EIAr must include the following: • All recommendations and mitigation measures recorded in the EIAr and the specialist studies conducted. • The final site layout map. • Measures as dictated by the final site layout map and micro-siting. • An environmental sensitivity map indicating environmental sensitive areas and features identified during the EIA process. • A map combining the final layout map superimposed (overlain) on the environmental sensitivity map.	Please refer to the EMPr included in **Appendix W**.

COMMENT	RESPONSE
• An alien invasive management plan to be implemented during construction and operation of the facility. The plan must include mitigation measures to reduce the invasion of alien species and ensure that the continuous monitoring and removal of alien species is undertaken. • A plant rescue and protection plan which allows for the maximum transplant of conservation important species from areas to be transformed. This plan must be compiled by a vegetation specialist familiar with the site and be implemented prior to commencement of the construction phase. • A re-vegetation and habitat rehabilitation plan to be implemented during the construction and operation of the facility. Restoration must be undertaken as soon as possible after completion of construction activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats. • An open space management plan to be implemented during the construction and operation of the facility. • A traffic management plan for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted. This plan must include measures to minimize impacts on local commuters e.g. limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time and avoid using roads through densely populated built-up areas so as not to disturb existing retail and commercial operations. • A transportation plan for the transport of components, main assembly cranes and other large pieces of equipment. • A storm water management plan to be implemented during the construction and operation of the facility. • The plan must ensure compliance with applicable regulations and prevent off-site migration of contaminated storm water or increased soil erosion. The plan must include the construction of appropriate design measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures must promote the dissipation of storm water run-off. • A fire management plan to be implemented during the construction and operation of the facility. • An erosion management plan for monitoring and rehabilitating erosion events associated with the facility. Appropriate erosion mitigation must form part of this plan to prevent and reduce the risk of any potential erosion. • An effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage. This must include precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or storm water systems. • Measures to protect hydrological features such as streams, rivers, pans, wetlands, dams and their catchments, and other	

COMMENT	RESPONSE
environmental sensitive areas from construction impacts including the direct or indirect spillage of pollutants. • The EAP must provide detailed motivation if any of the above requirements is not required by the proposed development and not included in the EMPr.	
Please ensure that all the relevant Listing Notice activities are applied for, that the Listing Notice activities applied for are specific and that they can be linked to the development activity or infrastructure in the project description. You are hereby reminded that should the EIAr fail to comply with the requirements of this acceptance letter, the EIAr will be rejected.	WSP | Parsons Brinckerhoff has taken note of this requirement.
The applicant is hereby reminded to comply with the requirements of Regulation 45 with regard to the time period allowed for complying with the requirements of the Regulations, and Regulations 43 and 44 with regard to the allowance of a comment period for interested and affected parties on all reports submitted to the competent authority for decision-making. The reports referred to are listed in Regulation 43(1).	WSP | Parsons Brinckerhoff has taken note of this requirement.
Furthermore, it must be reiterated that, should an application for Environmental Authorisation be subject to the provisions of Chapter II, Section 38 of the National Heritage Resources Act, Act 25 of 1999, then this Department will not be able to make nor issue a decision in terms of your application for Environmental Authorisation pending a letter from the pertinent heritage authority categorically stating that the application fulfils the requirements of the relevant heritage resources authority as described in Chapter II, Section 38(8) of the National Heritage Resources Act, Act 25 of 1999. Comments from SAHRA and/or the provincial department of heritage must be provided in the EIAr.	Comments from SAHRA are included in the comment and response report included in **Appendix H**.
You are requested to submit two (2) electronic copies (CD/DVD) and two (2) hard copies of the EIAr to the Department as per Regulation 23(1) of the EIA Regulations, 2014.	WSP | Parsons Brinckerhoff has taken note of this requirement.
Please also find attached information that must be used in the preparation of the EIAr. This will enable the Department to speedily review the EIAr and make a decision on the application.	WSP | Parsons Brinckerhoff has taken note of these requirements.
You are hereby reminded of Section 24F of the National Environmental Management Act, Act No 107 of 1998, as amended, which stipulates that no activity may commence prior to an Environmental Authorisation being granted by the Department.	WSP | Parsons Brinckerhoff has taken note of this requirement.
The EIAr must also include a comments and response report in accordance with Appendix 2 h (iii) of the EIA Regulations, 2014.	Please refer to the Comment and Response Report included in **Appendix H**.
A. EIA INFORMATION REQUIRED FOR WIND ENERGY FACILITIES	
1. General site information The following general site information is required: • Descriptions of all affected farm portions • 21 digit Surveyor General codes of all affected farm portions • Copies of deeds of all affected farm portions • Photos of areas that give a visual perspective of all parts of the site	As requested this information has been included at the beginning of this report.

COMMENT	RESPONSE

• Photographs from sensitive visual receptors (tourism routes, tourism facilities, etc.)
• Facility design specifications including:
    ○ Type of technology
    ○ Structure height
    ○ Surface area to be covered (including associated infrastructure such as roads)
    ○ Structure orientation
    ○ Laydown area dimensions (construction period and thereafter) Generation capacity
• Generation capacity of the facility as a whole at delivery points
This information must be indicated on the first page of the EIAr. It is also advised that it be double checked as there are too many mistakes in the applications that have been received that take too much time from authorities to correct.	

2. Sample of technical details for the proposed facility: • Location of the site • Facility area • SG Codes • Site access • Export capacity • Proposed technology • Hub height from ground level • Rotor diameter • Area occupied by substations • Area occupied by both permanent and construction laydown areas • Area occupied by buildings • Width and length of internal roads • Proximity to grid connection • Type and height of fencing	As requested this information has been included at the beginning of this report.
3. Site maps and GIS information Site maps and GIS information should include at least the following: • All maps/information layers must also be provided in ESRI Shapefile format • All affected farm portions must be indicated • The exact site of the application must be indicated (the areas that will be occupied by the application)	These maps have been included at the beginning of this report and in **Appendix X**.

COMMENT	RESPONSE
• A status quo map/layer must be provided that includes the following: ○ Current use of land on the site including: ▪ Buildings and other structures ▪ Agricultural fields ▪ Grazing areas ▪ Natural vegetation areas (natural veld not cultivated for the preceding 10 years) with an indication of the vegetation quality as well as fine scale mapping in respect of Critical Biodiversity Areas and Ecological Support Areas ▪ Critically endangered and endangered vegetation areas that occur on the site ▪ Bare areas which may be susceptible to soil erosion ▪ Cultural historical sites and elements ○ Rivers, streams and water courses ○ Ridgelines and 20m continuous contours with height references in the GIS database ○ Fountains, boreholes, dams (in-stream as well as off-stream) and reservoirs ○ High potential agricultural areas as defined by the Department of Agriculture, Forestry and Fisheries ○ Buffer zones (also where it is dictated by elements outside the site): ▪ 500m from any irrigated agricultural land ▪ 1km from residential areas ○ Indicate isolated residential, tourism facilities on or within 1km of the site • A slope analysis map/layer that include the following slope ranges: ○ Less than 8% slope (preferred areas for WIND TURBINE and infrastructure) ○ between 8% and 12% slope (potentially sensitive to WIND TURBINE and infrastructure) ○ between 12%and 14% slope (highly sensitive to WIND TURBINE and infrastructure) ○ steeper than 18% slope (unsuitable for WIND TURBINE and infrastructure) • A site development proposal map(s)/layer(s) that indicate: ○ Foundation footprint ○ Permanent laydown area footprint ○ Construction period laydown footprint	

COMMENT	RESPONSE
○ Internal roads indicating width (construction period width and operation period width) and with numbered sections between the other site elements which they serve (to make commenting on sections possible) ○ River, stream and water crossing of roads and cables indicating the type of bridging structures that will be used ○ Substation(s) and/or transformer(s) sites including their entire footprint. ○ Cable routes and trench dimensions (where they are not along internal roads) ○ Connection routes to the distribution/transmission network (the connection must form part of the EIA even if the construction and maintenance thereof will be done by another entity such as ESKOM) ○ Cut and fill areas at WIND TURBINE sites along roads and at substation/transformer sites indicating the expected volume of each cut and fill ○ Borrow pits ○ Spoil heaps (temporary for topsoil and subsoil and permanently for excess material) ○ Buildings including accommodation ○ With the above information authorities will be able to assess the strategic and site impacts of the application.	
4. Regional map and GIS information The regional map and GIS information should include at least the following: • All maps/information layers must also be provided in ESRI Shapefile format • The map/layer must cover an area of 20km around the site • Indicate the following: ○ roads including their types (tarred or gravel) and category (national, provincial, local or private) ○ Railway lines and stations ○ Industrial areas ○ Harbours and airports ○ Electricity transmission and distribution lines and substations ○ Pipelines ○ Waters sources to be utilised during the construction and operational phases ○ A visibility assessment of the areas from where the facility will be visible	This map has been included at the beginning of this report and in **Appendix X**.

COMMENT	RESPONSE
○ Critical Biodiversity Areas and Ecological Support Areas ○ Critically Endangered and Endangered vegetation areas ○ Agricultural fields ○ Irrigated areas ○ An indication of new road or changes and upgrades that must be done to existing roads in order to get equipment onto the site including cut and fill areas and crossings of rivers and streams.	
5. Important stakeholders Amongst other important stakeholders, comments from the National Department of Agriculture, Forestry and Fisheries must be obtained and submitted to the Department. Any application, documentation, notification etc. should be forwarded to the following officials: Ms Mashudu Marubini Delegate of the Minister (Act 70 of 1970) E-mail: MashuduMa@daff.gov.za Tel 012- 319 7619 Ms Thoko Buthelezi Agriland Liaison office E-mail: ThokoB@daff.gov.za Tel 012-319 7634 All hardcopy applications I documentation should be forwarded to the following address: **Physical address:** Delpen Building Cnr Annie Botha and Union Street Office 270 Attention: Delegate of the Minister Act 70 of 1970 **Postal Address:** Department of Agriculture, Forestry and Fisheries Private Bag X120 Pretoria 0001 Attention: Delegate of the Minister Act 70 of 1970 In addition, comments must be requested from Eskom regarding grid connectivity and capacity. Request for comment must be submitted to:	These stakeholders have been included in the Stakeholder Database (**Appendix P**).

COMMENT	RESPONSE
Mr John Geeringh Eskom Transmission Megawatt Park D1Y38 PO Box 1091 JOHANNESBURG 2000 Tel: 011 516 7233 Fax: 086 661 4064 John.geeringh@eskom.co.za	
B. AGRICULTURE STUDY REQUIREMENTS	
Detailed soil assessment of the site in question, incorporating a radius of 50 m surrounding the site, on a scale of 1:10 000 or finer. The soil assessment should include the following: • Identification of the soil forms present on site • The size of the area where a particular soil form is found • GPS readings of soil survey points • The depth of the soil at each survey point • Soil colour • Limiting factors • Clay content • Slope of the site • A detailed map indicating the locality of the soil forms within the specified area, • Size of the site	Please refer to the Soil and Land Capability Specialist Study included in **Appendix K**.
Exact locality of the site	
Current activities on the site, developments, buildings	
Surrounding developments I land uses and activities in a radius of 500 m of the site	
Access routes and the condition thereof	
Current status of the land (including erosion, vegetation and a degradation assessment)	
Possible land use options for the site	
Water availability, source and quality (if available)	
Detailed descriptions of why agriculture should or should not be the land use of choice	
Impact of the change of land use on the surrounding area	
A shape file containing the soil forms and relevant attribute data as depicted on the map.	
C. ASTRONOMY GEOGRAPHIC ADVANTAGE ACT, 2007 (ACT NO.21 OF 2007)	
The purpose of the Act is to preserve the geographic advantage areas that attract investment in astronomy. The entire Northern Cape Province excluding the Sol Plaatjie Municipality had been declared an astronomy advantage area. The Northern Cape	Although the proposed project is not within the Core SKA area, any renewable energy project being proposed within the Northern Cape should receive comment from SKA,

COMMENT	RESPONSE
optical and radio telescope sites were declared core astronomy advantage areas. The Act allowed for the declaration of the Southern Africa Large Telescope (SALT), MeerKAT and Square Kilometre Array (SKA) as astronomy and related scientific endeavours that had to be protected.	regardless of the proposed technology. Comments from the SKA, obtained during the scoping process stated that the Maralla West WEF will have no impact on the SKA.
You are requested to indicate the applicability of the Astronomy Geographic Advantage Act, Act No. 21 of 2007 on the application in the BAR/EIR. You must obtain comments from the Southern African Large Telescope (SALT) if the proposed development is situated within a declared astronomy advantage area.	

4.3 STAKEHOLDER CONSULTATION

Stakeholders were identified and will continue to be identified through several mechanisms. These include:

- Utilising existing databases from other projects in the area;
- Networking with local business owners, non-governmental agencies, community based organisations, and local council representatives;
- Field work in and around the project area;
- Advertising in the press:
  - The Courier published on 9 September 2016; and
  - Die Noordwester published on 8 September 2016.
- Placement of community notices:
  - Site boundary;
  - Laingsburg OK;
  - Laingsburg Tourism Hub;
  - Laingsburg Public Library;
  - Black Mountain Recreation Club;
  - Laingsburg Local Municipality Offices;
  - Sutherland OK; and
  - Sutherland Local Municipality Offices.
- Attendance registers at meetings.

All Stakeholders (including the landowners and adjacent landowners) identified to date have been registered on the project stakeholder database. The EAP endeavoured to ensure that individuals/organisations from referrals and networking were notified of the Proposed Project. Stakeholders were identified at the horizontal (geographical) and vertical extent (organisations level). A list of stakeholders captured in the project database is included in **Appendix P**

Table 4-3 provides a breakdown of stakeholders currently registered on the database while **Figure 4-1** illustrates the number of stakeholders per representative sector.

Table 4-3: Breakdown of Stakeholders Currently Registered on the Database

REPRESENTATIVE SECTOR	FURTHER EXPLANATION	NO. OF STAKEHOLDERS
Government departments	All tiers of government, namely, national, provincial, local government and parastals. Inclusive of: → Department of Energy → Department of Agriculture, Forestry and Fisheries → Department of Rural Development and Land Reform → Department of Water and Sanitation → Department of Mineral Resources → Department of Public Works → Department of Environmental Affairs → Department of Environmental Affairs: Biodiversity and Conservation → Western Cape Department of Transport and Public Works → Breede-Gouritz Catchment Management Agency → CapeNature → Department of Environmental Affairs and Development Planning → South African National Parks → Square Kilometre Array South Africa → National Energy Regulator South Africa → Eskom → South African National Energy Development Institute → South African Civil Aviation Authority → Astronomy Management Authority → South African Astronomical Observatory → Laingsburg Local Municipality → Namakwa District Municipality → Karoo Hoogland Local Municipality → Central Karoo District Municipality → Heritage Western Cape → Civil Aviation Authority	46
Business and consultants	Local and neighbouring businesses in the area. Representatives of consulting organisations that provide services in the area	6
Non-governmental organisations (NGOs) and	Agricultural unions, churches, and environmental NGOs	6

REPRESENTATIVE SECTOR	FURTHER EXPLANATION	NO. OF STAKEHOLDERS
community based organisations		
General public	Local communities, farmers, the landowner of the site, adjacent landowners and occupiers and other such individuals who may have an interest in the project	21

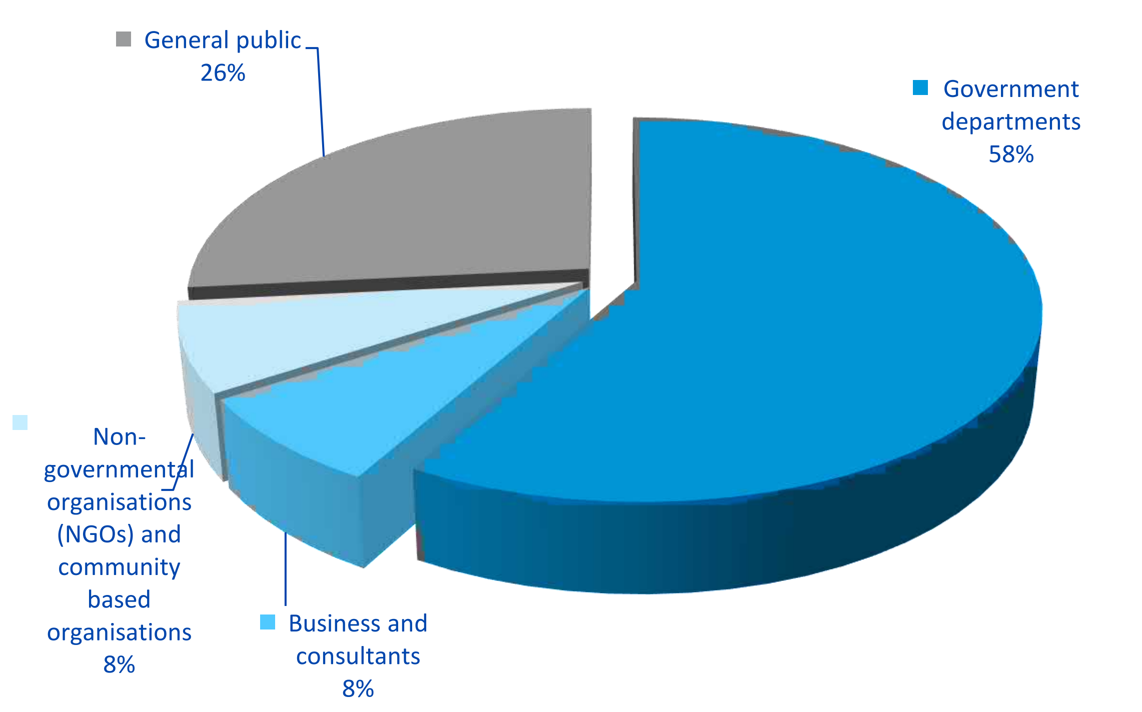

Figure 4-1: Pie chart showing the Breakdown of the Stakeholders currently Registered on the Database per representative sector

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 included in **Appendix H.** The following key issues were highlighted during the scoping phase:

- Impacts on avifauna;
- Impacts on the biodiversity of the area with specific reference to Critical Biodiversity Areas;
- Cumulative impact of the authorised renewable projects in the surrounding areas;
- Impacts on the cultural heritage value of the area;

- Impacts on the sense of place with specific reference to the visual impact of the turbine structures;
- Socio-economic development; and
- Job creation.

4.4 SCOPING STUDY FINDINGS

The scoping phase identified a number of impacts associated with the Maralla West WEF. The findings of the preliminary significance ratings undertaken during the scoping phase are included in **Table 4-4**.

Table 4-4: Summary of Scoping Phase Impact Assessment Process for Maralla West WEF

Environmental Receptor	Impact	Phase	Character	Significance	Fatal Flaw (Yes/No)	Mitigation Required (Yes/No)	EIA Phase Study Required (Yes/No)
Topography	Change in the site micro-topography	C, O	Negative	**Very Low**	No	No	No
	Change in study area macro-topography	C, O	Negative	**Very Low**	No	No	
Geology	Disturbance to underlying geology	C	Negative	**Very Low**	No	Yes	No
Climate	Climatic impacts such as greenhouse effect and perceived global warming, as well as the phenomenon of acid rain.	C / O	Negative	**Very Low**	No	Yes	No
	Contribution of cleaner energy to the National Grid	O	Positive	**High**	No	Yes	
Soils and Land Capability	Reduction in land available for grazing animals	C	Negative	**Medium**	No	Yes	Yes
		O	Negative	**Medium**			
	Soil erosion resulting in degradation of soil structure	C / D	Negative	**Very Low**	No	Yes	
	Degradation of soil due to contamination	C / O	Negative	**Very Low**	No	Yes	
Natural Vegetation and Animal Life	Disturbance, loss and transformation of vegetation and listed or protected plant species	C	Negative	**High**	No	Yes	Yes
	Impacts on fauna	C	Negative	**High**	No	Yes	
		O	Negative	**Medium**			
	Increased risk of erosion	O	Negative	**High**			
	Proliferation of alien invasive plant species	O	Negative	**Medium**	No	Yes	
	Impacts on Critical Biodiversity Areas and broad-scale ecological processes	O	Negative	**Medium**	No	Yes	
	Effect on South Africa's commitment to conservation	O	Negative	**Medium**	No	Yes	

Avifauna	Temporary displacement of avifauna due to construction and decommissioning of the wind energy facility.	C / D	Negative	**Low**	No	Yes	Yes
	Priority species mortality due to collision with turbines	O	Negative	**Medium**	No	Yes	
	Permanent displacement of priority species due to habitat transformation	O	Negative	**Low**	No	Yes	
Bats	Destruction of bat roosts due to earth works	C	Negative	**High**	No	Yes	Yes
	Loss of foraging habitat	C / D	Negative	**Medium**	No	Yes	
	Bat Mortalities due to direct blade impact or barotrauma during foraging (not migration)	O	Negative	**High**	No	Yes	
	Bat Mortalities due to direct blade impact or barotrauma during foraging during migration	O	Negative	**High**	No	Yes	
	Artificial lighting	O	Negative	**Medium**	No	Yes	
Surface Water	Surface water contamination	C / D	Negative	**Very Low**	No	Yes	Yes
	Potential increase in wetland sedimentation	C / D	Negative	**Very Low**	No	Yes	
	Increase in surface water flow due to the loss of vegetation cover and soil compaction	C	Negative	**Very Low**	No	Yes	
	Impact on watercourses and wetlands	C / O / D	Negative	**Medium**	No	Yes	
Groundwater	Groundwater contamination associated with the spill or loss of containment of chemicals	C, D	Negative	**Very Low**	No	Yes	No
Heritage	Physical disturbance of archaeological sites	C, O, D	Negative	**Low**	No	Yes	Yes
Palaeontology	Physical disturbance of palaeontological sites	C	Negative	**Very Low**	No	Yes	Yes
	Cumulative impacts	C	Negative	**Very Low**	No	Yes	
Visual	Visual impact on the physical landscape	C / O	Negative	**Low**	No	Yes	Yes
	Visual Intrusions on the sense of place, including scenic landscapes	O	Negative	**Medium**	No	Yes	

	Visual impact during construction and decommissioning	C / D	Negative	**Medium**	No	Yes	
	Visual impacts of wind turbines on inhabitants and motorists	D	Negative	**High**	No	Yes	
	Visual impacts of substation and O&M buildings on inhabitants and motorists	O	Negative	**Medium**	No	Yes	
	Visual impact of lighting and flicker effect of the wind turbines	*Currently not enough detail to assess, will be addressed in EIA*					
	Cumulative visual impacts	O	Negative	**High**	No	Yes	
Traffic	Increased traffic generation around the study area by construction vehicles	C, D	Negative	**Medium**	No	Yes	Yes
	Deterioration of the surrounding road network due to an increase of traffic around the site	O	Negative	**Medium**	No	Yes	
	Transportation of abnormal loads during the construction phase	C	Negative	**Medium**	No	Yes	
Noise	Impact on sensitive receptors due to close proximity to construction activities	C	Negative	**Medium**	No	Yes	Yes
	Impact on sensitive receptors due to close proximity to wind turbines	O	Negative	**Medium**	No	Yes	
Socio-economic	Employment Opportunities and Skills Development	C	Positive	**Medium**	No	Yes	Yes
		O	Positive	**Low**	No	Yes	
		D	Positive	**Low**	No	Yes	
	Local Economic Development Opportunities	C	Positive	**Medium**	No	Yes	
		O	Positive	**Low**	No	Yes	
		D	Negative	**Low**	No	Yes	
	Disruption due to influx of job seekers	C	Negative	**Medium**	No	Yes	
		D	Negative	**Low**	No	Yes	
	Increase In Communicable Diseases and Reduced Public Health	C	Negative	**Low**	No	Yes	

	Change in Landscape and Sense of Place	C	Negative	**Low**	No	Yes	
		O	Negative	**Medium**	No	Yes	
		D	Positive	**High**	No	Yes	
	Damage To And Loss Of Farmland	C	Negative	**Low**	No	Yes	
	Increase risk to neighbouring land users	C	Negative	**Medium**	No	Yes	
	Impact on Tourism	O	Negative	**Low**	No	Yes	
	Potential impact on adjacent property values	O	Negative	**Medium**	No	Yes	
	Establishment of infrastructure to generate renewable energy	O	Positive	**Medium**	No	Yes	
	Cumulative Development Effects on Increased Local Economic and Skills Development	C / O	Positive	**Medium**	No	Yes	
	Cumulative Development Effects on the Loss of Regional Agricultural Potential	C	Negative	**Low**	No	Yes	
	Cumulative Development Effects on the Increase in Communicable Diseases and Reduced Public Health	C	Negative	**Low**	No	Yes	
	Cumulative Development Effects on the Change in Sense of Place	C / O	Negative	**Medium**	No	Yes	
	Cumulative Development Effects on the Change in Tourism Activities	O	Positive	**Medium**	No	Yes	
	Cumulative Development Effects on the increased pressure on local services	C / O	Negative	**Medium**	No	Yes	

4.5 SCOPING RECOMMENDATIONS

The scoping report identified and evaluated the feasibility of a range of site and technology options. **Table 4-5** provides a summary of the scoping phase alternatives assessment.

Table 4-5: Alternatives Summary

ALTERNATIVE CATEGORY	ALTERNATIVE IDENTIFIED IN SCOPING	ASSESSMENT IN EIA PHASE (YES/NO)
Alternative Locations	Alternative development regions i.e. falling outside the Komsberg REDZ	No
	Alternative development sites i.e. within the Komsberg REDZ study area	No
	Maralla West Site	**Yes**
Technology Alternatives	**Wind Technology**	**Yes**
Layout and Design Alternatives	Initial Turbine layout (125 Turbines)	No
	Revised Turbine Layout (70 Turbines)	**Yes**
Access Road Alternatives	**New access road**	**Yes**
Internal Access Road Alternatives	**None identified**	**Yes**

5 EIA METHODOLOGY

The EIA process was initiated in accordance with Appendix 3 of GNR 982 pertaining to applications subject to an S&EIR process.

5.1 DETAILED ENVIRONMENTAL ASSESSMENT

SPECIALIST STUDIES

Based on the findings outlined in Chapter 4, no detailed studies are required with regards to topography, geology (including geotechnical aspects), climate or ground water. However, mitigation and management measures have been included in the EMPr for these aspects.

Table 5-1 provides a list of the Specialists that will be involved in the detailed studies required for this project during the EIA Phase and their areas of expertise.

Table 5-1: Details of the Specialist Consultants

SPECIALIST FIELD	COMPANY NAME	TEAM MEMBERS
Soil, Land Capability and Wetlands	WSP Environmental (Pty) Ltd	Bruce Wickham, Colin Holmes and Greg Matthews
Biodiversity	Simon Todd Consulting	Simon Todd
Bats	Animalia	Werner Marais and Monika Moir
Avifauna	Chris van Rooyen Consulting	Chris van Rooyen, Albert Froneman
Heritage	ACO Associates	Tim Hart, Lita Webley, David Halkett
Palaeontology	Natura Viva	John Almond
Visual	-	Belinda Gebhardt
Noise	WSP Environmental (Pty) Ltd	Kirsten Collett
Social	WSP Environmental (Pty) Ltd	Danielle Sanderson and Hillary Konigkramer
Traffic	WSP Group Africa (Pty) Ltd	Christo Bredenhann

PEER REVIEWS

As part of their comments on the draft scoping report the DEA has requested that where specialist studies are conducted in-house or by a specialist other than a suitably qualified specialist in the relevant field, such specialist reports must be peer reviewed by a suitably qualified external specialist in the relevant field. **Table 5-2** outlines the studies that require peer review and the specialists that have been appointed to conduct the required peer reviews. The CVs of the peer reviewers have been included in **Appendix J**. The peer reviews together with the updated specialist reports (where required) will be included in the Final EIR

Table 5-2: Peer Reviewers

IN-HOUSE STUDY	PEER REVIEWER
Noise Impact Assessment	Terry Mackenzie-Hoy – Machoy Consulting Acoustics, Noise Control and Electrical Engineers
Soil, Land Capability and Wetland Impact Assessment	Michiel Jonker – Ecotone Freshwater Consultants (Wetlands) Garry Paterson – Agricultural Research Council (Soils and Land Capability)
Social Impact Assessment	Tony Barbour - Environmental Consultant and Researcher

In-House Study	Peer Reviewer
Traffic Impact Assessment	Andrew Bulman – Urban EQ Consulting Engineers

CUMULATIVE ASSESSMENT

Due to the number of renewable energy applications in the area, the DEA has requested that all the specialist assessments include a detailed cumulative environmental impact statement. The identified cumulative impacts must be clearly defined and where possible the size of the identified impact must be indicated, i.e. hectares of cumulatively transformed land. The significance of the identified cumulative impacts must be rated with the significance rating methodology approved with the acceptance of the scoping report. In addition, the specialist studies must provide proof that other specialist reports conducted for renewable energy projects in the area were reviewed and must indicate how the recommendations, mitigation measures and conclusions have been taken into consideration when drafting the conclusion and mitigation measures for this project.

5.2 IMPACT ASSESSMENT METHODOLOGY

The EIA uses a methodological framework developed by WSP | Parsons Brinckerhoff to meet the combined requirements of international best practice and the NEMA, Environmental Impact Assessment Regulations, 2014 (GN No. 982) (the "EIA Regulations").

As required by Appendix 3 of the EIA Regulations (2014), the determination and assessment of impacts will be based on the following criteria:

→ Nature of the Impact
→ Significance of the Impact
→ Consequence of the Impact
→ Extent of the impact
→ Duration of the Impact
→ Probability if the impact
→ 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:

→ Magnitude: to what extent environmental resources are going to be affected;
→ 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
→ 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:

a) 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.

b) The physical extent:

SCORE	DESCRIPTION
1	the impact will be limited to the site;
2	the impact will be limited to the local area;
3	the impact will be limited to the region;
4	the impact will be national; or
5	the impact will be international;

c) 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

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

e) 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).

f) 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;

g) The status, which is described as either positive, negative or neutral;

h) The degree to which the impact can be reversed;

i) The degree to which the impact may cause irreplaceable loss of resources; and

j) The degree to which the impact can be mitigated.

The significance is determined by combining the criteria in the following formula: S = (E+D+M)*P, where:

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The significance weightings for each potential impact are as follows:

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 EIR

5.3 STAKEHOLDER ENGAGEMENT

STAKEHOLDER AND AUTHORITY CONSULTATION

There will continue to be ongoing communication between WSP | Parsons Brinckerhoff and stakeholders throughout the S&EIR process. These interactions include the following:

- A letter will be sent out to all registered stakeholders providing them with an update of the proposed project once the final scoping report has been approved;
- Interactions with stakeholders will be recorded in the comment and response report;
- Feedback to stakeholders will take place both individually and collectively; and
- Written responses (email, faxes or letters) will be provided to stakeholders acknowledging issues and providing information requested (dependent on availability).
- As per the GNR 982, particular attention will be paid to landowners, and neighbouring communities, specifically where literacy levels and language barriers may be an issue.

PUBLIC REVIEW OF THE DRAFT IMPACT ASSESSMENT REPORT

The draft EIR will be placed on public review for a period of 30 days from **2 February 2017** to **2 March 2017**, at the following venues:

- Laingsburg Public Library;
- Sutherland Public Library;
- Maitjiesfontein Community Centre; and
- WSP | Parsons Brinckerhoff Website.

All registered stakeholders and authorising/commenting state departments will be notified of the public review period as well as the locations of the draft EIR via email, sms, and the stakeholder meetings.

STAKEHOLDER MEETINGS

FOCUS MEETINGS

Informal one-on-one stakeholder meetings will be held, as required, in order to present the findings of the impact assessment to key stakeholders and to ask the stakeholder to raise concerns or queries. The one-on-one stakeholder meetings will be facilitated at appropriate venues during the draft EIR review period (30 days). WSP | Parsons Brinckerhoff will facilitate the meetings and will be accompanied by the applicant during all meetings.

PUBLIC MEETINGS

Table 5-3 outlines the meetings that are to be held during the draft EIR review period. The meetings will present the findings of the impact assessment and provide opportunities for stakeholders to raise issues, concerns and queries. The meetings will be facilitated by WSP | Parsons Brinckerhoff's EIA team and will be attended by BioTherm representatives. Invitations to the meetings will be sent out in the form of emails and sms's.

Table 5-3: Meetings to be held during the Draft Environmental Impact Report Review Period

DATE	TIME	VENUE
23 February 2017	16:30 – 18:30	Matjiesfontein Community Hall
24 February 2017	09:00 – 11:00	NG Church Hall , Sutherland

COMMENT AND RESPONSE REPORT

All concerns, comments, viewpoints and questions (collectively referred to as ‘issues’) will continue to be documented and responded to adequately in the Comment and Response Report. The Comment and Response Report records the following:

- List of all issues raised;
- Record of who raised the issues;
- Record of where the issues were raised;
- Record of the date on which the issue was raised; and
- Response to the issues.

The updated Comment and Response Report has been included in **Appendix H.**

SUBMISSION AND DECISION-MAKING

The EAP must submit the final EIR to the competent authority within 106 days of the acceptance of the scoping report. Once submitted, the delegated competent authority (i.e. the DEA) will be allocated 107 days to review the final EIR in order to either grant or refuse and environmental authorisation.

The final EIR will be placed on stakeholder review for a reasonable time period during the DEA’s final review and decision-making process. The delegated competent authority must issue their decision within this specified timeframe.

NOTIFICATION OF ENVIRONMENTAL AUTHORISATION

All stakeholders will receive a letter at the end of the process notifying them of the authority’s decision, thanking them for their contributions, and explaining the appeals procedure as outlined in the national Appeal Regulations, 2014 (GNR 993 of 2014).

6 NEED AND JUSTIFICATION

6.1 NATIONAL RENEWABLE ENERGY REQUIREMENT

In 2010 South Africa had 44157MW of power generation capacity installed. Current forecasts indicate that by 2025, the expected growth in demand will require the current installed power generation capacity to be almost doubled to approximately 74,000MW (SAWEA: 2010).

This growing demand, fuelled by increasing economic growth and social development within Southern Africa, is placing increasing pressure on South Africa's existing power generation capacity. Coupled with this, is the growing awareness of environmental impact, climate change and the need for sustainable development. Despite the worldwide concern regarding GHG emissions and climate change, South Africa continues to rely heavily on coal as its primary source of energy. Issues associated with the dependence on coal include:

- The fact that the resource is non-renewable;
- Consumption of coal for use in power generation reduces the availability of coal for other uses; and
- Burning of coal is one of the major producers of carbon dioxide (CO_2), which is commonly accepted as a contributor to climate change, deterioration in urban and rural air pollution and acid rain (Banks and Schaffler, 2006).

These issues associated with the burning of coal as well as the rising prices for other fossil-fuels (such as oil), geopolitical developments and environmental concerns have led to growing demand for renewable energy sources. There is therefore an increasing need to establish a new source of generating power in SA within the next decade.

The use of renewable energy technologies, as one of a mix of technologies needed to meet future energy consumption requirements is being investigated as part of Eskom's long-term strategic planning and research process. It must be remembered that wind energy is plentiful, renewable, widely distributed, clean and reduces greenhouse gas emissions when it displaces fossil-fuel derived from electricity. In this light, renewable wind energy can be seen as desirable.

The South African Government, through the promulgation of the IRP 2010, and incorporated into the REIPPPP implemented by the DoE, has committed to a target of 17.8 GW of renewables by 2030. This means that by 2030 approximately 42% of all new power generation will be derived from renewable energy forms. Currently South Africa is heavily dependent on coal as its primary source of energy. In addition, it contributes towards socio-economic and environmentally sustainable growth, while stimulating the renewable industry in South Africa.

The REIPPPP has contributed to stimulating local manufacturing and job creation and has led to significant investments in social development in the communities surrounding renewable energy projects. Former South African Wind Energy Association (SAWEA) Chief Executive Officer (CEO), Johan van den Berg, recently stated that:

"Approximately R19.3bn will be ploughed into social development and a further R6bn will go into enterprise development over the twenty-year lives of the projects. Local communities will earn a further R29.2bn through their direct shareholding in the projects. By March 2016 over R30bn had been spent on local content and a further R65.7bn is expected to be spent by projects that have yet to commence construction. Twelve new industrial facilities have been established as a direct result of the programme. Since 2013, the construction and operation of renewable energy projects has already created 111 835 job years for South African citizens."

6.2 WIND ENERGY POTENTIAL IN SOUTH AFRICA

Wind Energy has been successful in a number of Provinces across South Africa, especially along the Western Cape's West Coast. According to the March 2016 IPPPP an Overview, by March 2016:

- 31% of the 2020 7GW capacity target and 12% of the 2030 17.8GW target had been procured.
- 6.4GW had been procured from 102 IPPs in Bidding Window 1 to Bidding Window 4, with 2.2GW of the procured capacity already constructed and fully operational.
- Of the total 6 360 MW determined for wind energy, 3 357 MW or 53% of the determined capacity has already been procured and 970 MW already operational.

6.3 REGIONAL AND SITE SUITABILITY

The proposed project is to be developed approximately 34 km South of Sutherland in the Northern Cape and will comprise of a single site located on the Remainder of Farm Drie Roode Heuwels 180, the Remainder of Farm Annex Drie Roode Heuwels 181, Portion 1 and 2 of Farm Wolven Hoek 182. This specific project site has been identified by BioTherm through a pre-feasibility desktop analysis on the estimation of the wind energy resource. This region of the Northern Cape has some of the highest wind resource potentials, receiving an annual mean wind resource of approximately 8 m/s, making the site suitable for the development of a wind farm. This high resource ensures the best value for money is gained for the economy of South Africa.

Whilst there are many wind projects already authorised by the DEA, many stand little chance of ever being built due to there being a poor wind regime to be economically competitive and the site being in an area with unfeasible grid connections. Due to the distance to grid and high wind resources the project site is considered to be highly desirable from a development perspective and is considered by the BioTherm to stand an excellent chance of success in future bidding rounds.

Within the Northern Cape region, the reasons for the selection of the specific site by BioTherm is based on the following site selection process summary:

- Grid connection suitability is a key criterion. Long connection lines have increased environmental impacts as well as add increased costs to the project development. This project site has good grid connection potential as the project will connect to the existing Komsberg MTS Substation located approximately 10 km away from the site, thereby minimising the need for an extensive grid network upgrade or long powerline.
- The DoE have introduced REDZs across South Africa following the SEA process undertaken by CSIR. Maralla West falls within the Komsberg Wind REDZ, located within the Sutherland area in the Northern Cape.
- The project site has a rolling hill topography which is suitable for the development of a wind project.
- From a competition perspective, there are several ongoing EIA processes for renewable energy projects in the region; however only three 140MW projects have received preferred bidder designation in the region.
- The project site can be accessed easily via the tarred R354 national road. Upgrades of the regional gravel road will be done by the current preferred bidder projects to allow for direct access to site.

This site was selected based on the above criteria ahead of other regional farms due to the cumulative assessment of all criteria. This internal process ensured that the best practical / technically suitable environmental site option was selected.

Additional information on the site selection process is provided in **Section 7.4** (Alternatives).

6.4 LOCAL NEED

The proposed site falls within the Karoo Hoogland Local Municipality, which is located within the Namakwa District Municipality.

SOCIO-ECONOMICS

The unemployment levels for the Karoo Hoogland Local Municipality are 6.5% higher than national levels, with 33.2% of the potential labour force being unemployed in comparison to the national unemployment levels of 26.7% (as of the first quarter 2016) (Statistics South Africa, 2012 and 2016).

The Northern Cape Provincial Growth and Development Strategy highlights the need to ensure the availability of affordable energy, it also notes that, “development of energy sources such as solar energy, the natural gas fields, bio-fuels, etc., could be some of the means by which economic opportunity and activity is generated in the Northern Cape”. The Northern Cape Provincial SDF (2011) states that the energy sector could benefit the economy significantly through created economic spin-offs or multiplier effects and it is widely acknowledged that the Northern Cape province’s comparative advantage lies, among others, in solar resource. The proposed project would therefore be advantageous for the province.

EMPLOYMENT

According to the REIPPPP Focus on Northern Province, Provincial Report 2016, employment creation remains a top priority in the Northern Cape. IPP investments in Bidding Window 1 to Bidding Window 4 within the province alone have contributed new employment opportunities for South African citizens estimated to be more than 66 000 job years[1] over the construction and projected operational life of the plants. Notably, 8 842 or 38% of these new employment opportunities have been retained within local communities associated with the respective IPP plants. To date, the opportunities for people from local communities have significantly exceeded expectations, achieving 96.4% of what is planned across all 6 Bidding Windows. During the construction phase (approximately 2 – 4 years) the number of people employed on site typically spike and then taper off to a lower and steadier employment number over the extended 20 year operational life of a project. Operational jobs will accrue over 20 years. At this early stage, already 913 job years had been realised by the IPPs that started operation. Approximately 59% of the total jobs created under the overall REIPPPP in Bidding Window 1 to Bidding Window 4 will be created by IPP projects located in the Northern Cape Province.

The Karoo- Hoogland Local Municipality has a total population of 12 588 people, with an unemployment rate of 22,1 %. Currently there are 3 REIPPP projects operational within the area, all of which are wind energy projects. PV and 2 are CSP projects. The REIPPP operational projects have had the following impacts on the local municipality to date:

- Socio-economic development: R 2 417 million (20.3% of the total for the Northern Cape)
- Employment/ Job Creation: 5 977 job years (9.0% of the total for the Northern Cape)
- Community Trust (community equity/ shareholding): R 346 million (1.9% of the total for the Northern Cape)

The development of the proposed wind facilities will aid in socio-economic development of the area and assist in economic growth within the province as a whole. A percentage of revenue generated will also be spent on Economic upliftment and development in the local communities.

[1] Job year= equivalent of a full time employment opportunity for one person for one year.

7 PROJECT DESCRIPTION

7.1 WIND ENERGY POWER GENERATION PROCESS

Wind power is the conversion of wind energy into a useful form of energy, such as electricity, using modern and highly reliable wind turbines. Wind Power is non-dispatchable, meaning that for economic operation, all of the available output must be taken when it is available.

Wind turbines, like windmills, are mounted on a tower to harness wind energy at an increased level above the ground where wind is faster and less turbulent. The kinetic energy of the wind is used to turn the blades of the turbine to generate electricity. Wind turbines are able to operate at varying wind speeds, with the amount of energy the wind transfers to the rotor depending on the density of the air, the rotor area and the wind speed.

The electricity generated by the wind turbines is passed through the step-up transformer and then transmitted via either underground or overhead cables to a central substation, which connects the wind energy facility to a high voltage network. Wind turbines are designed to operate automatically with minimal maintenance for approximately 20-25 years.

Figure 7-1 illustrates the following main components of a wind turbine:

→ The **rotor consists of three** blades which are attached to a hub. The blades collect energy from the wind and converts the wind energy into rotational shaft motion/energy to turn the generator;

→ The **nacelle** houses the equipment at the top of the tower as well as a gearbox, a generator that converts the turning motion/mechanical energy of the blades into electricity and coupling and brake;

→ The **tower** supports the nacelle and rotor and allows the blades to be distanced safely off the ground so as to reach the stronger winds found at higher elevations;

→ **Turbine step-up transformer** which can be indoor or outdoor, depending on the turbine model whose function is to increase the voltage capacity of the electricity generated by the turbine to a higher, grid-equivalent.

→ **The foundation unit** ensures the stability of the turbine structure.

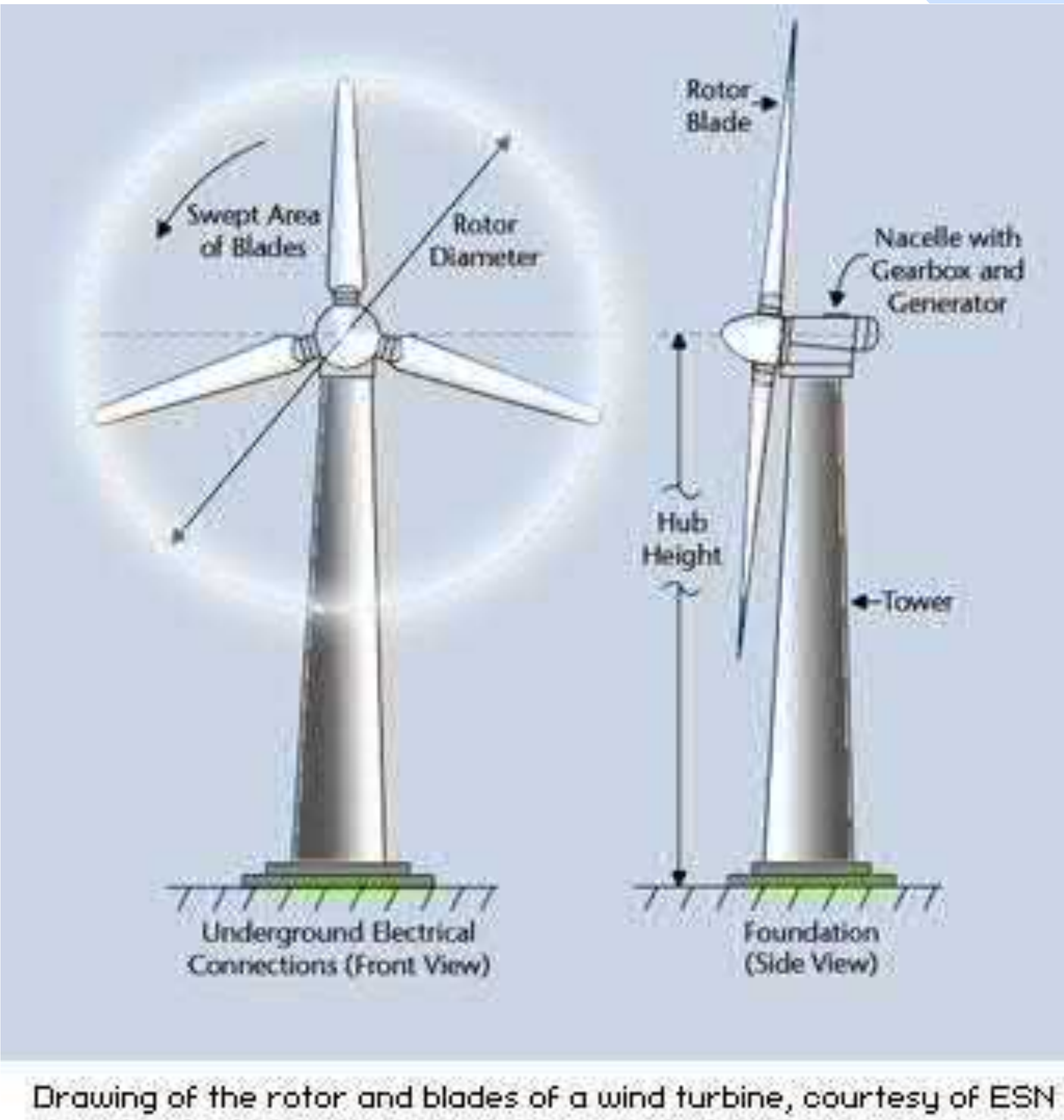

Figure 7-1: Illustration of the main components of a wind turbine

7.2 PROJECT INFRASTRUCTURE

The proposed project is for the construction and operation of a wind energy facility that can produce up to 250 MW of power. A technical summary of the facility and its associated infrastructure is included in **Table 7-1**

Table 7-1: Details of the proposed wind energy facility and associated infrastructure

TECHNICAL DETAILS OF THE PROPOSED FACILITY	
Generation Capacity	Up to 250 MW
Number of turbines	Up to 125 (The revised layout has reduced the number of turbines to 56)
Area of buildable area	Approximately 200 ha

TECHNICAL DETAILS OF THE PROPOSED FACILITY	
Area occupied by each turbine	0.5 ha (85m x 60m)
Turbine hub height	Up to 120m
Rotor Diameter	Up to 150m
Turbine Foundation	20m diameter x 3m deep – 500 to 650m^3 concrete. Excavation area approx. 1000 m^2 in sandy soils due to access requirements and safe slope stability requirements.
Electrical turbine transformers	0.5ha (85m x 60m)
Area of preferred Operations and Maintenance building assessment site	O&M buildings will be in proximity of the Substation due requirements for power, water and access.
Footprint of Operations and Maintenance Building(s)	O&M building includes operations, on site spares storage and workshop. Typical areas indicated below: → Operations = 20 x 8 = 160m^2 → Work shop = 12 x 8 = 96m^2 → Stores = 15 x 8 = 120m^2
Area of preferred construction laydown areas	Construction camp typical area 60m x 40m = 2 400m^2 → Laydown or staging area 150m x 75m = 11 250m^2 → Laydown for concrete towers (only if required) = 40 000m^2 "
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 0.25ha. The maximum height of the cement silo will be 20m. This will be a temporary structure during construction.
Width of internal roads	Between 4.0m and 6.0m, however this may increase to 8m on bends
Length of internal roads	Approximately 60 km
Type and Height of fencing	Approximately 5m high palisade or mesh fencing where required
Sewage	Septic tanks (with potable toilets during the construction phase)
Footprint of internal onsite substation	150m x 150m
Onsite substation capacity	Up to 132kV
Specifications of onsite switching stations, transformers, invertors, onsite cables etc	The medium voltage collector system will comprise of cables (1kV up to and including 33kV) that will be run underground, except where a technical assessment suggests that overhead lines are applicable, in the facility connecting the turbines to the onsite substation.
Width of the powerline servitude	31m (15.5m either side)
Powerline tower types and height	Tower (suspension / strain) / Steel monopole structure, which may be self-supported or guyed suspension.
List of additional infrastructure to be built	Access roads and internal roads. Administration, control and warehouse buildings.

7.3 PROPOSED PROJECT DEVELOPMENT ACTIVITIES

DESIGN AND PLANNING PHASE

The main activities during the design and planning phase of the wind energy facility will include the following:

- Undertaking the EIA and obtaining Environmental Authorisation.
- Prior to the finalisation of the design layout (including the foundations and associated infrastructure) a final site survey and geotechnical survey will be undertaken. The geotechnical survey will identify any topographical constraints that may affect foundation requirement. The final layout will also take into consideration any environmental sensitivities identified during the EIA phase as well as any specific conditions outlined in the Environmental Authorisation (once received).

CONSTRUCTION PHASE

The main activities associated with the construction phase of the wind energy project will include the following:

- **Establishment of an Access Road to the site** – The site is already easily accessible via the tarred R354 national road, however the regional gravel road connecting the site to the R354 will need to be upgraded.
- **Establishment of internal roads** – Internal road access will be constructed onsite. These roads will be between 4 and 6 m in width. The length of the internal road network is approximately 60km.
- **Site Preparation** – Site preparation includes the clearance of vegetation and any bulk earthworks (including blasting if required) within the footprint of each construction area that may be required in terms of the facility design.
- **Transport of Components and Equipment to Site** – All construction material (i.e. masts, blades and associated infrastructure), 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 and tower sections) 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.
- **Establishment of a Laydown Area on Site** – Construction materials, machinery and equipment will be kept at relevant laydown and/or storage areas. A 1.1ha laydown and storage area has been proposed for this project, with an additional 4ha for concrete towers if required. The laydown area will limit potential environmental impacts associated with the construction phase by limiting the extent of the activities to one designated area.
- **Construct foundation** – Concrete foundations will be constructed at each turbine location. Foundation holes will be mechanically excavated to a depth of 3m, depending on the local geology. Concrete will be batched on site. The reinforced concrete foundation will have a footprint of approximately 550m^2.
- **Construction of the Turbine** – A large lifting crane will be brought onto site to lift each of the tower parts into place (**Figure 7-2** and **Figure 7-3**).
- **Construct IPP Substation and Invertors** – Invertors will be installed to facilitate the connection between the wind turbines and the Eskom Grid. The turbines will be connected to the substation via underground or overhead cabling. The substation will be constructed with a maximum footprint of approximately 150m x 150m.
- **Establishment of Ancillary Infrastructure** – Ancillary infrastructure will include a workshop, storage areas, office and a temporary laydown area for contractor's equipment.

→ **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.

Figure 7-2: Construction of the Turbine – Preparing to lift the Rotor

Figure 7-3: Construction of the Turbine – Lifting Equipment (i.e. Crane)

OPERATIONAL PHASE

The proposed wind facility is anticipated to have a minimum life of 20 years. The facility will operate 7 days a week. While the project is considered to be self-sufficient, maintenance and monitoring activities will be required. Potable water requirements for permanent staff will be limited and provided by bottled water.

DECOMMISSIONING PHASE

Following the initial 20-year operational period of the wind facility, the continued economic viability will be investigated. In the event that the facility is still deemed viable the life of the facility will be extended. The facility will only be decommissioned once it is no longer economically viable. In the event that a decision is made to completely decommission the facility all the components will be disassembled, reused and recycled or disposed. The site would be returned to its current use i.e. agriculture (Grazing).

7.4 ALTERNATIVES

In terms of the EIA Regulations, feasible alternatives are required to be considered within the scoping study. All identified, feasible alternatives are required to be evaluated in terms of social, biophysical, economic and technical factors.

A key challenge of the EIA process is the consideration of alternatives. Most guidelines use terms such as 'reasonable', 'practicable', 'feasible' or 'viable' to define the range of alternatives that should be considered. Essentially there are two types of alternatives:

→ Incrementally different (modifications) alternatives to the project; and

→ Fundamentally (totally) different alternatives to the project.

Fundamentally different alternatives are usually assessed at a strategic level, and EIA practitioners recognise the limitations of project-specific EIAs to address fundamentally different alternatives. Any discussions around this topic have been addressed as part of the Integrated Strategic Electricity Plan (ISEP) undertaken by Eskom, as well as the National Integrated Resource Plan (NIRP) from the National Energy Regulator of South Africa (NERSA). Environmental issues are integrated into the ISEP and the NIRP using the strategic environmental assessment approach, focussing on environmental life-cycle assessments, site-specific studies, water-related issues and climate change considerations. Project level alternatives such as site selection and technology alternatives have been addressed below.

SITE ALTERNATIVES

DEVELOPMENT AREA SELECTION

The selection of a potential wind project development area includes several key aspects including environmental constraints and opportunities, wind resource, grid connection suitability as well as competition, topography and access as shown in the process flow diagram in **Figure 7-4.**

Figure 7-4: Site Selection Process Flow Diagram

ENVIRONMENT

Environment is a key aspect that BioTherm considers when evaluating a wind project. The project should be developed in a sustainable and ecologically friendly manner ensuring its development has the least possible impact on the land on which it will be built. The regional farms were evaluated by BioTherm before the selection of these specific farms and it was concluded that development on these farms would result in minimal impact of regional fauna and flora. Certain farms in the region, which are located in the valley areas have increased biodiversity which are deemed sensitive and other farms show increased vegetation and larger water bodies.

WIND ENERGY RESOURCE

Wind resource is one of the main drivers of project viability across South Africa. This specific project site has been identified by BioTherm through a pre-feasibility desktop analysis based on the estimation of the wind energy resource. This region of the Western Cape Province in South Africa has one of the highest wind resource potentials. The project site receives an annual mean wind resource of approximately 8 m/s, this makes this region is ideally suited for the development of a wind farm. This high resource ensures the best value for money is gained for the economy of South Africa. The general area would experience a similar resource, but as resource is only one driver of site selection, the other aspects should be considered when holistically evaluating a project site.

GRID CONNECTION SUITABILITY

Long connection lines have increased environmental impacts as well as added increased costs to the project development. This project site has good grid connection potential as the project will connect to the existing Komsberg MTS Substation which is located approximately 2 km from the facility, thereby minimising the need for an extensive grid network upgrade or a long powerline.

TOPOGRAPHY, THE NEIGHBOURING COMPETITION AND ACCESS

The project site has a rolling hill topography which is suitable for the development of a wind project. The region does have several ongoing EIA developments, however, only three 140MW projects have been selected preferred bidder in the region.

The project development area site can be accessed easily via the tarred R354 national road which runs along the eastern boundary of the site. There is an existing gravel road which can be upgraded prior to construction and operations to allow for direct access to the project development area.

LAND AVAILABILITY

With the high wind resources in the area and good grid connection this area has been targeted for development from Developer for several years. This has resulted in large tracks of land being signed up and hence being unavailable for development. This results in limited land available for development. BioTherm, however, through speaking with local land owners identified parcels of land available and suitable for development.

STRATEGIC PLANNING CONSIDERATIONS

The project development area, including the Maralla West facility, falls within the Komsberg REDZ. The project development area is also located within a renewable energy hub that has developed within the Sutherland area.

This project development area was selected based on the above criteria ahead of other regional farms due to the cumulative assessment of all criteria. This internal process ensured that the best practical / technically suitable environmental site option was selected.

SITE SELECTION

Maralla West is situated within the project development area, which was subjected to the high level site selection process already described above. 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 major advantages and disadvantages of the site selected for the Maralla West WEF are provided in **Table 7-2.** **Table** 7-3 provides details of a high-level investigation undertaken by BioTherm in terms of possible alternative sites. This table provides further motivation as to why no reasonable or feasible alternatives exist.

This EIR only investigates the identified Maralla West WEF site.

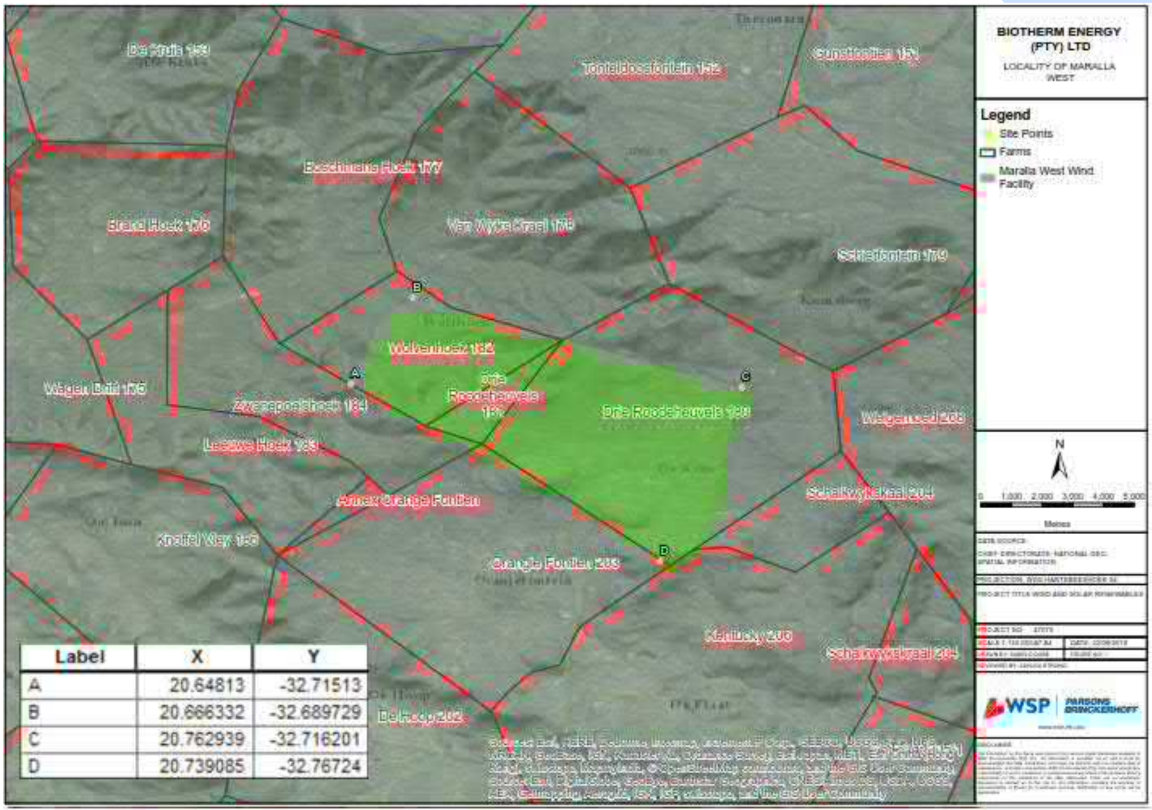

Figure 7-5: Location of the Proposed Maralla West Project

Table 7-2: Advantages and Disadvantage of the Maralla West WEF Site Location

ADVANTAGES	DISADVANTAGES
→ The project site receives an annual mean wind resource of approximately 8 m/s, this makes this region ideally suited for the development of a wind farm. → This project site has good grid connection potential as the project will connect to the existing Komsberg MTS Substation which is located approximately 26 km from the facility. → The project site has a rolling hill topography which is suitable for the development of a wind project. → Located within the Komsberg REDZ.	→ The project site is located within a region where critical biodiversity areas have been identified. → There are nests of raptors just outside the property boundary. → Wetland and surface water features have been identified on site.

Table 7-3: High-level Investigation of Alternative Sites

PROJECT NAME	LOCATION	PROVINCE	WIND SPEED	CAPACITY	HECTARES	FEASIBILITY FATAL FLAWS IDENTIFIED
Sweet Valley	Memel	Free State	7.2	140MW	10,000	**Environmental Sensitivity**: BirdLife SA screened site. Site in Important Bird and Biodiversity Area. Rudd's Lark, Crowned Cranes (Endangered) and Wattled Cranes. Within 10km of Seekoeivlei Nature Reserve Ramsar site.

PROJECT NAME	LOCATION	PROVINCE	WIND SPEED	CAPACITY	HECTARES	FEASIBILITY FATAL FLAWS IDENTIFIED
Newcastle Wind	Newcastle	KwaZulu Natal	7.5	140MW	6000	**Environmental Sensitivity and Land:** BirdLife SA screened site. Site in Important Bird and Biodiversity Area. There is a single land owner, however, there are issues with the Title Deeds and therefore some areas will be subject to a long legal processes.
Utrecht Wind	Utrecht	KwaZulu Natal	7	140MW	11,500	**Environmental Sensitivity**: BirdLife SA screened site. Site in Important Bird and Biodiversity Area. The Blood River Vlei (good habitat for Grey Crowned Cranes and many other water birds) is about 10km south of the Utrecht site.
Britannia Bay	Vredenburg	Western Cape	8	140MW	268	**Land:** 268ha secured. Neighbouring land all secured. No room for expansion.
Kuruman Wind	Kuruman	Northern Cape	7.2	140MW	12,000	**Grid:** High connection costs.
Springbok East	Springbok	Northern Cape	7	140MW	13,000	**Grid:** High connection costs.
Springbok North	Springbok	Northern Cape	7	140MW	6000	**Grid and Land:** High connection costs. Numerous land owners
Humansdorp Wind	Humansdorp	Eastern Cape	7.5	140MW	8000	**Grid:** Eskom to update grid required. High grid connection costs.

TECHNOLOGY ALTERNATIVES

The technology identified for this project is wind energy. Due to the fact that the study area has very steep topography it is not suitable for solar energy such as photovoltaic or concentrating solar power projects. The major advantages and disadvantages of wind technology are provided in **Table 7-4**.

This EIR only investigates the identified wind technology

Table 7-4: Advantages and Disadvantages of Wind Technology

ADVANTAGES	DISADVANTAGES
→ The wind is a renewable and zero-rated cost resource and with modern technology it can be captured efficiently. → Once the wind turbine is built the energy it produces does not emit greenhouse gases or other pollutants.	→ The strength of the wind is not constant and it varies from zero to storm force. This means that wind turbines do not produce the same amount of electricity all the time. There will be times when they produce no electricity at all.

ADVANTAGES	DISADVANTAGES
→ Although wind turbines can be very tall each takes up only a small plot of land. This means that the land below can still be used. This is advantageous in agricultural areas as farming can still continue. → Many people find wind farms an interesting feature of the landscape.	→ Wind turbines generate noise which can increase ambient noise levels with potential to cause human and ecological disturbances. → Many people see large wind turbines as unsightly structures and not pleasant or interesting to look at. → It's widely reported that wind turbines pose a threat to wildlife, primarily birds and bats.

LAYOUT AND DESIGN ALTERNATIVES

An initial layout alternative was proposed for assessment during the scoping phase (**Figure 7-6**). The layout included the positions of 125 turbines within the Maralla West site. The area of the site is
6 060 ha in extent; this can adequately accommodate the up to 250 MW design capacity of Maralla West. Whilst the Renewable Energy Independent Power Producer Procurement Programme currently only tenders for project with a maximum generation capacity of 140MW, BioTherm is proposing to include additional megawatts in the light that the Department of Energy may increase the maximum wind generation capacities in future.

The results of the environmental sensitivity mapping undertaken during the scoping phase together with technical input from the applicant resulted in the initial footprint of the wind energy facility being revisited. The sensitivity map is included in **Figure 7-7**. **Figure 7-8** illustrates the revised turbine layout that has been investigated in more detail. It can be noted that high and very high sensitivity areas have been avoided as far as possible.

Figure 7-6: Initial layout plan for the Maralla West WEF Turbines (125 Turbines)

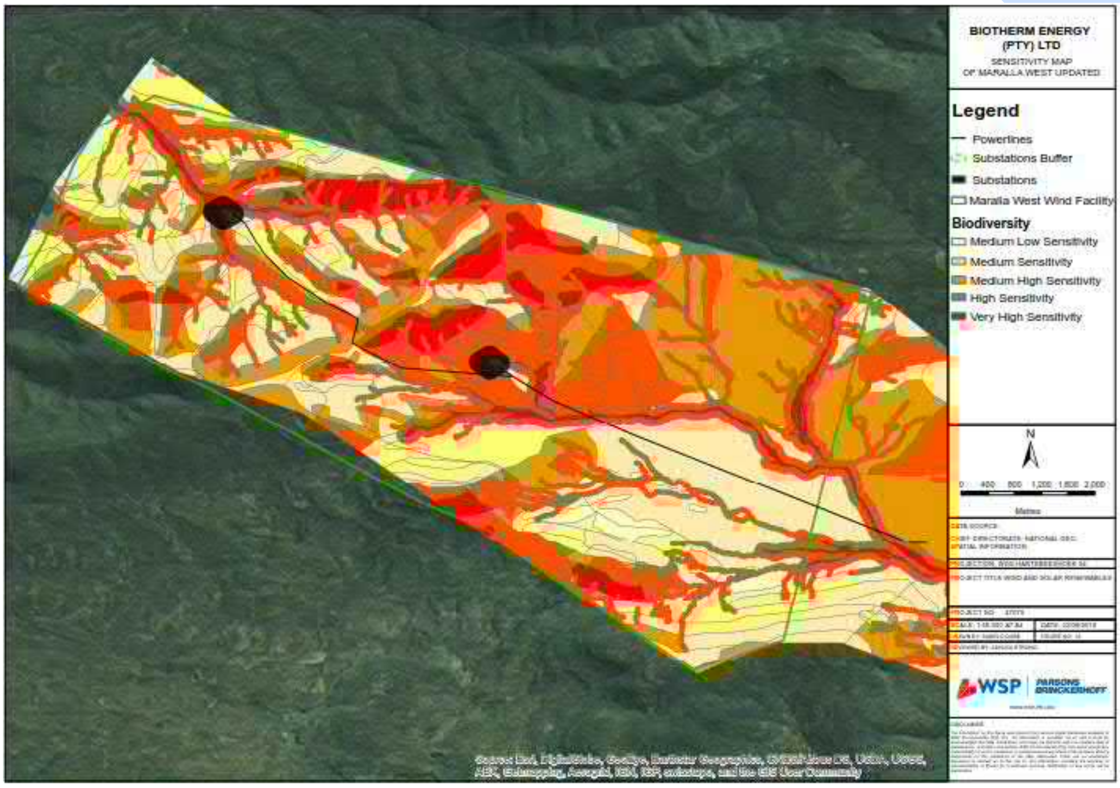

Figure 7-7: Maralla West WEF Environmental Sensitivity Map

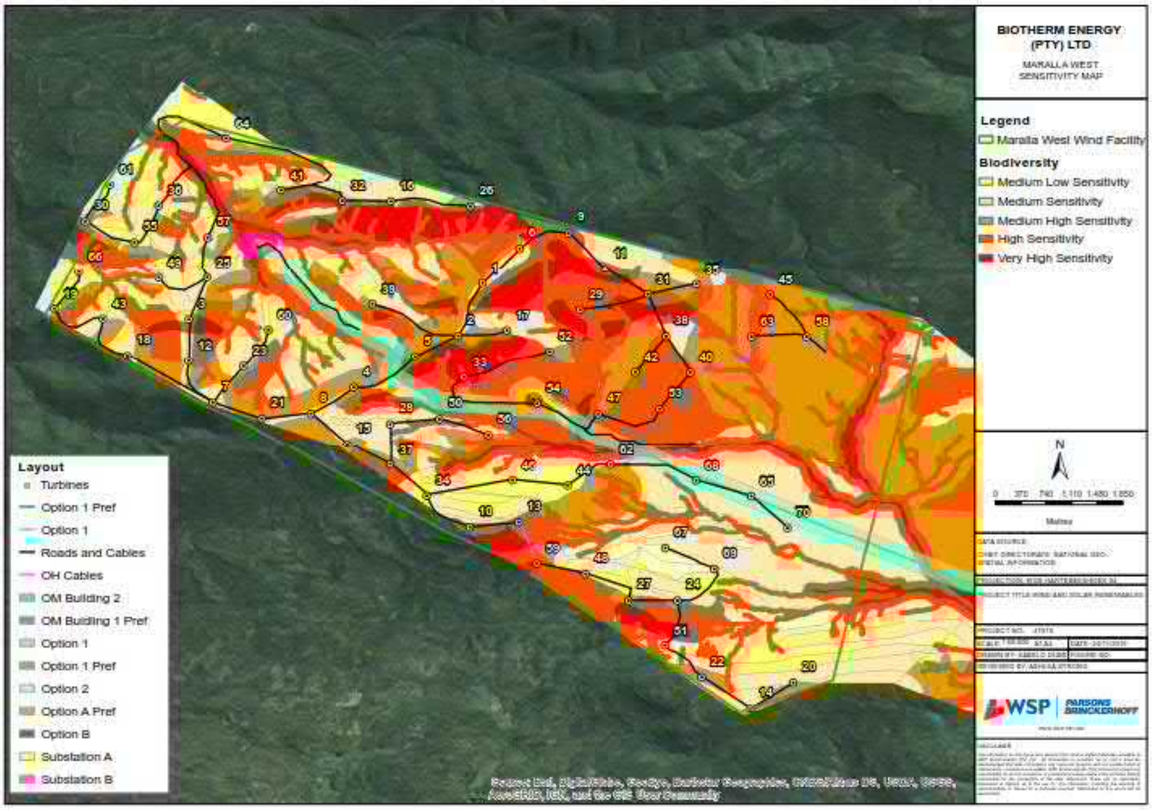

Figure 7-8: Revised layout plan for the Maralla West WEF Turbines (70 Turbines)

ACCESS ROAD ALTERNATIVES

Access routes have been included in the revised layout diagram included in **Figure 7-8**.

THE "DO-NOTHING" ALTERNATIVE

The 'do-nothing' alternative is the option of not implementing the proposed project.

South Africa currently relies almost completely on fossil fuels as a primary energy source (approximately 90%) with coal providing 75% of the fossil fuel based energy supply. Coal combustion in South Africa is the main contributor to carbon dioxide emissions, which is the main greenhouse gas that has been linked to climate change.

An emphasis has therefore been placed on securing South Africa's future power supply through the diversification of power generation sources. Furthermore, South Africa would have to invest in a power generation mix, and not solely rely on coal-fired power generation, to honour its commitment made under the Copenhagen Accord and to mitigate climate change challenges. Under the Accord, the country committed to reduce its carbon dioxide emissions by 34% below the "business as usual" level by 2020.

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 (see need and justification of the proposed project in Chapter 6). Accordingly, the no-go option is not the preferred option.

8 DESCRIPTION OF THE BASELINE ENVIRONMENT

8.1 TOPOGRAPHY

The topography of the site is relatively flat comprising open areas and mountainous slopes. In the mountainous area, the slope values average around 34.4 %, and 1.1 % on the floodplains of the main watercourses. The elevation of the Maralla West site ranges from 984 m to 1379 m and 1098 m to 1614 m, respectively (**Figure 8-1**). There are several natural gullies and watercourses, which drain the site in the direction of the slope (**Figure 8-1**), however these are ephemeral in nature, and seldom have water present in the channels. **Figure 8-2** illustrates the elevation profile of the Maralla West WEF site.

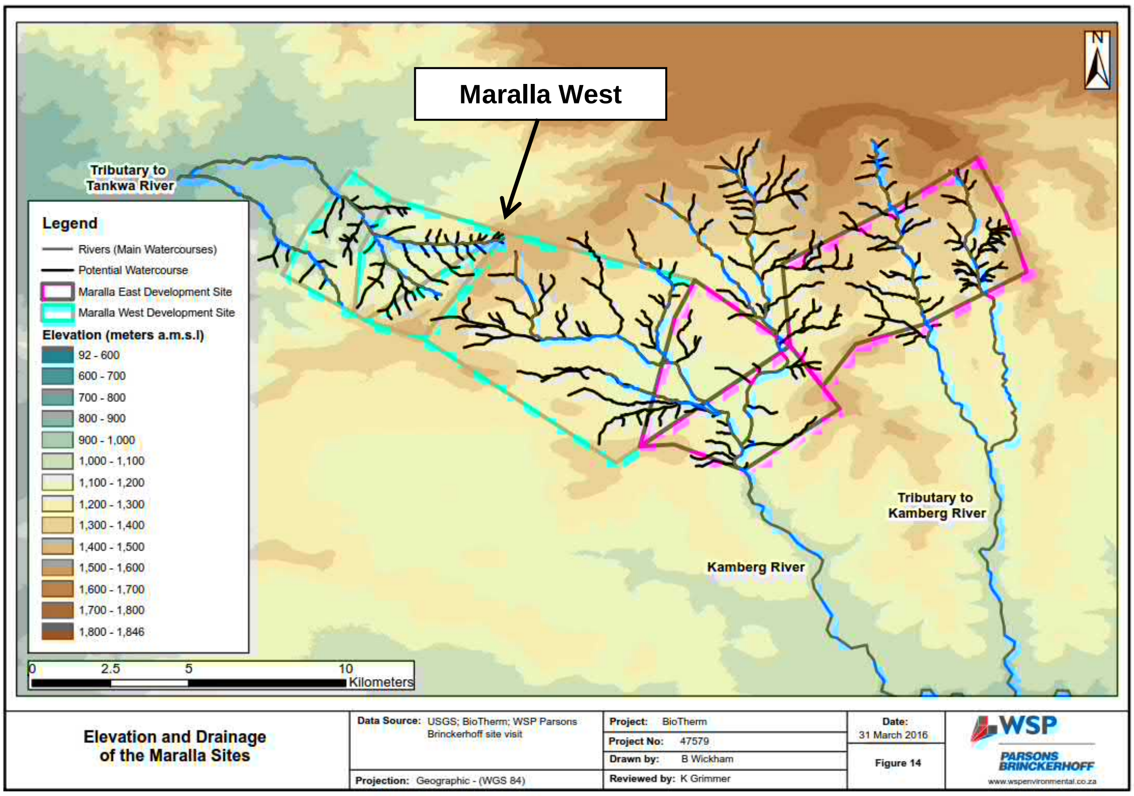

Figure 8-1: Elevation and Drainage for the Maralla West site

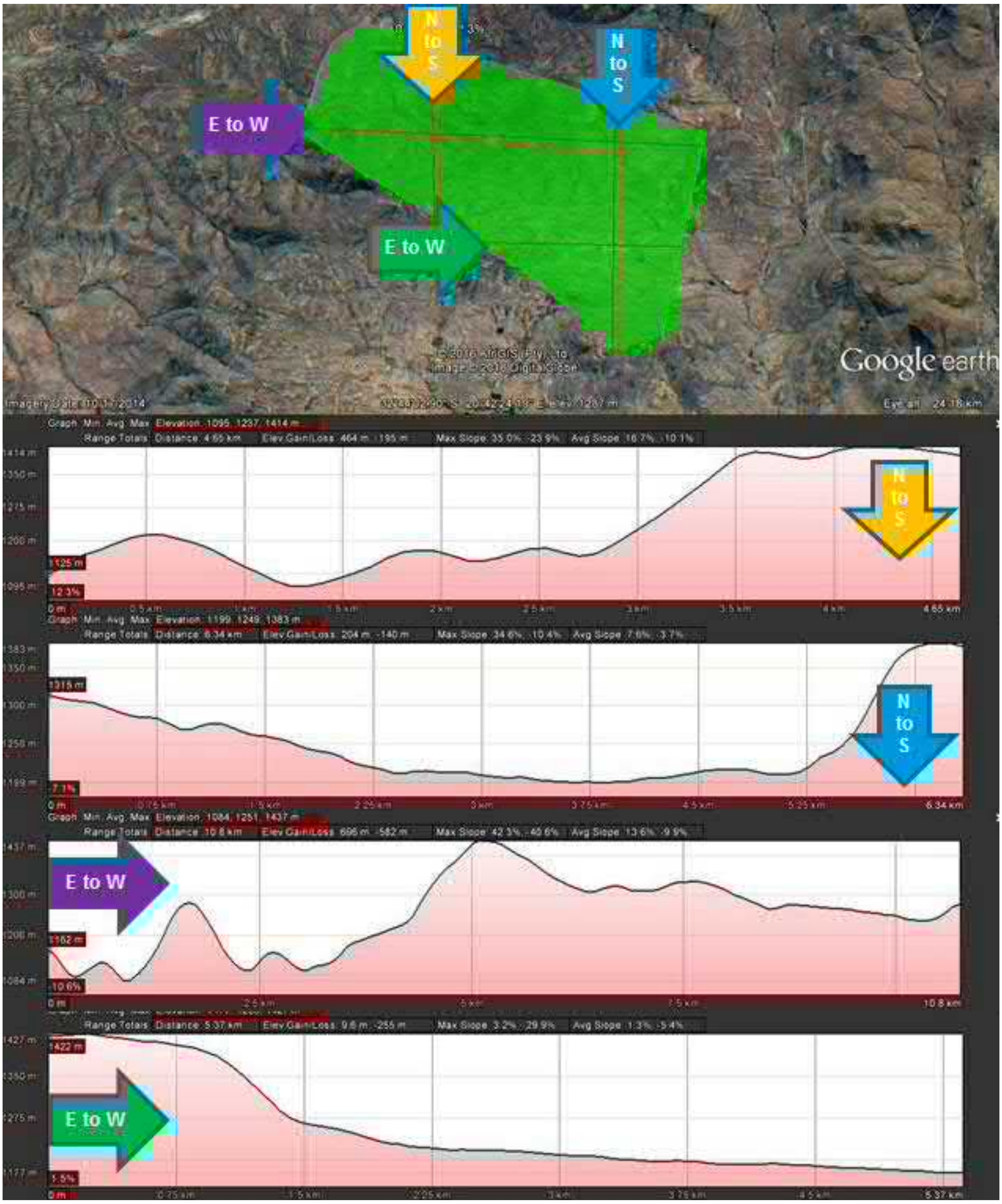

Figure 8-2: Elevation Profile for Maralla West WEF

8.2 GEOLOGY

The Maralla West site is nested in the Roggeveld Mountains range, in the Larger Cape Fold belt system. Maralla West is located on the Beaufort Series which forms part of the Karoo system (**Figure 8-3**). The rock type for the series comprises of shale, mudstone, sandstone and limestone (Schifano et al., 1970). Upon the site visit, shale and mudstone were the dominant rock type for the area. It should be noted that no dolomite deposits occur in the region.

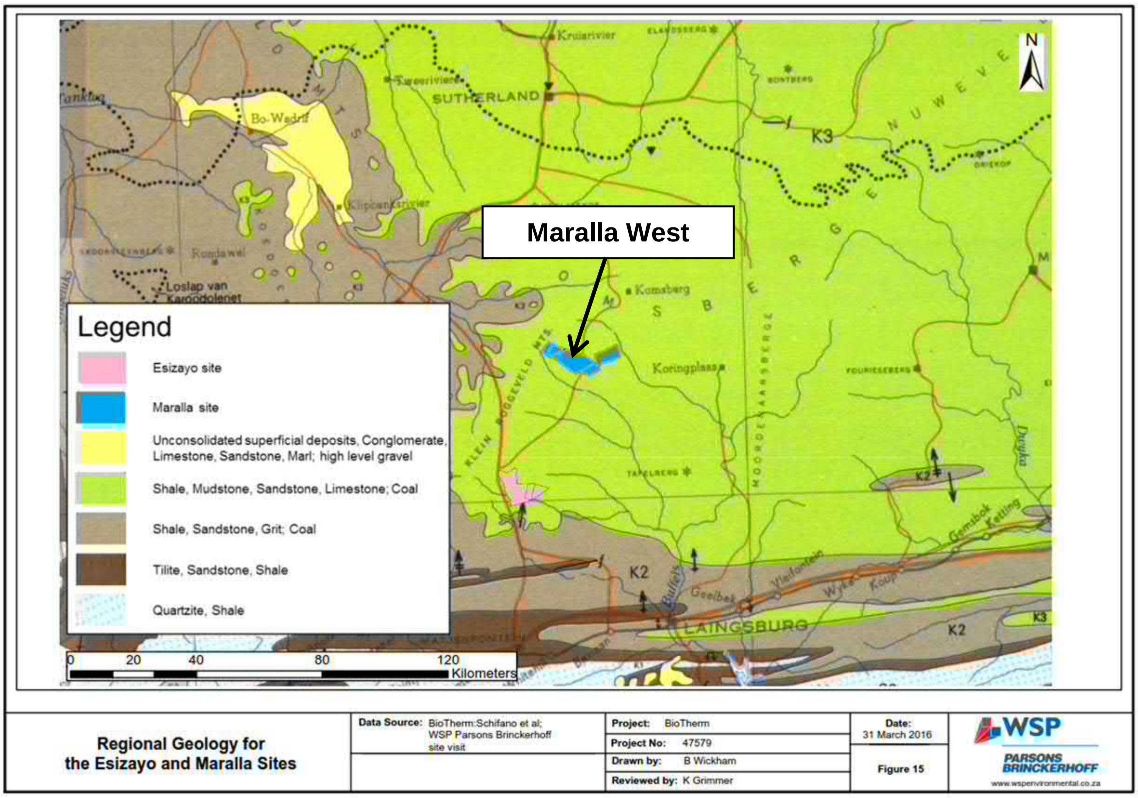

Figure 8-3: Regional Geology for the Maralla West Site

8.3 CLIMATE

The climate of the region is arid to semi-arid. Rainfall is low and occurs throughout the year but predominantly in the winter months between March and August. Mean annual precipitation is approximately 290mm, ranging from 180 – 410mm rainfall per year. **Figure 8-4** shows the Average Annual Rainfall for Laingsburg.

Laingsburg experiences dry hot summers with warmest month of the year being February of 23.4°C. The lowest average temperatures in the year occur in July, when it averages at approximately 9.3°C. **Figure 8-5** shows the mean annual temperature for Laingsburg.

Laingsburg experiences steady strong winds between December to April however the winds calm between the months of June and October. **Figure 8-6** shows the number of days within one month the wind can be expected to reach certain speeds. **Figure 8-7** represents the wind rose for the Laingsburg area.

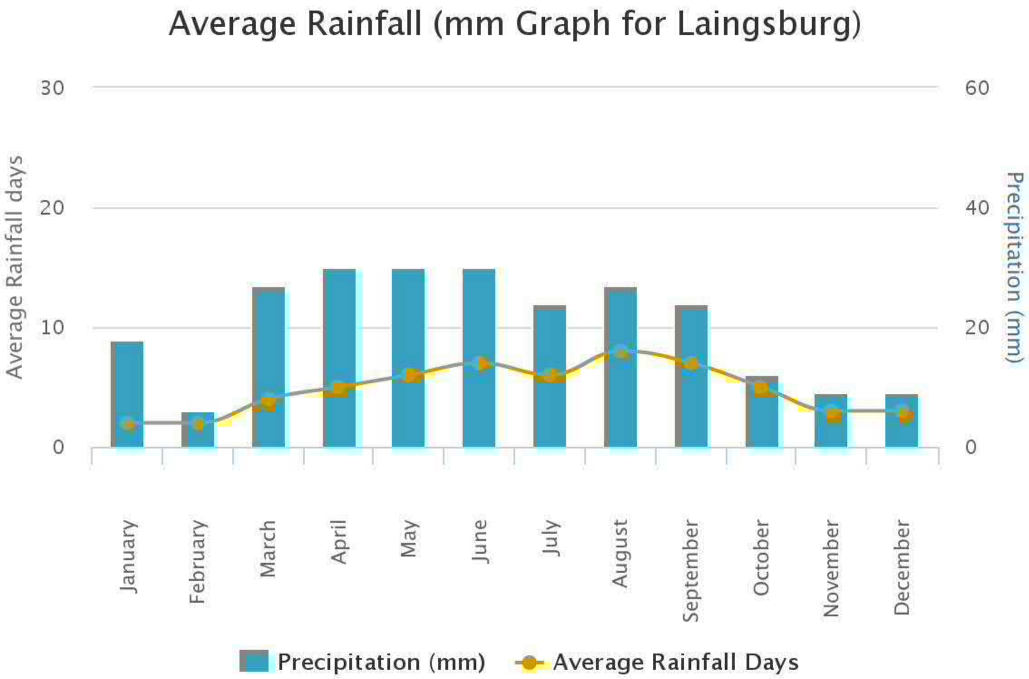

Figure 8-4: Average Annual Rainfall (mm) for Laingsburg

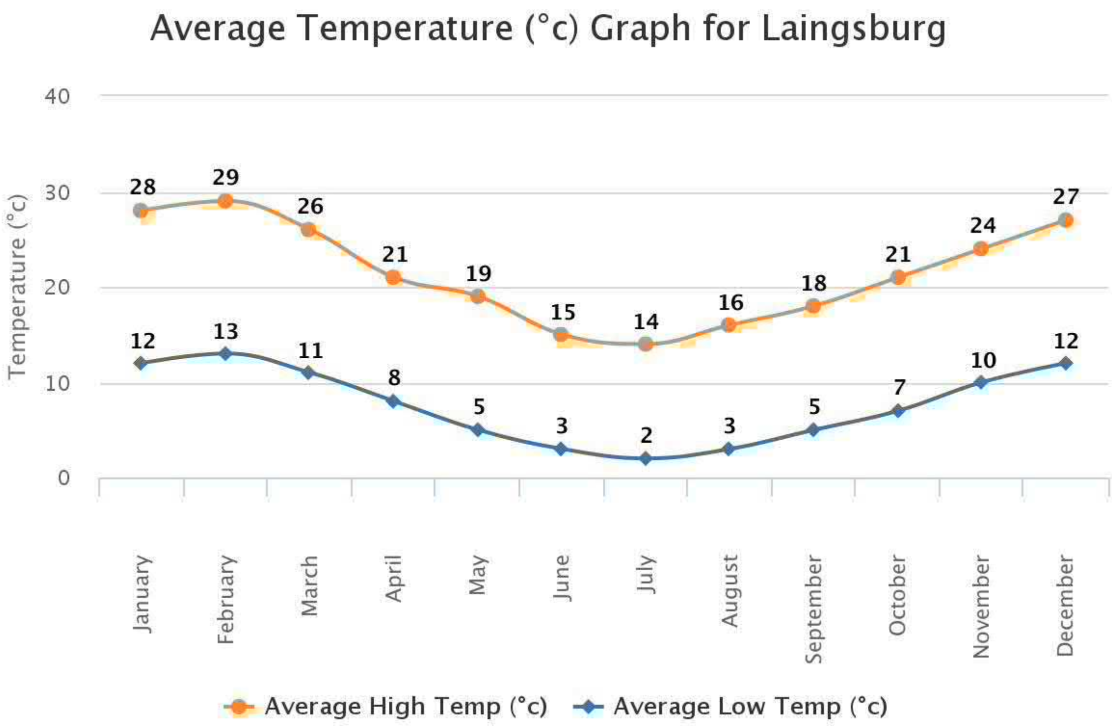

Figure 8-5: Average Annual Temperature (°C) for Laingsburg

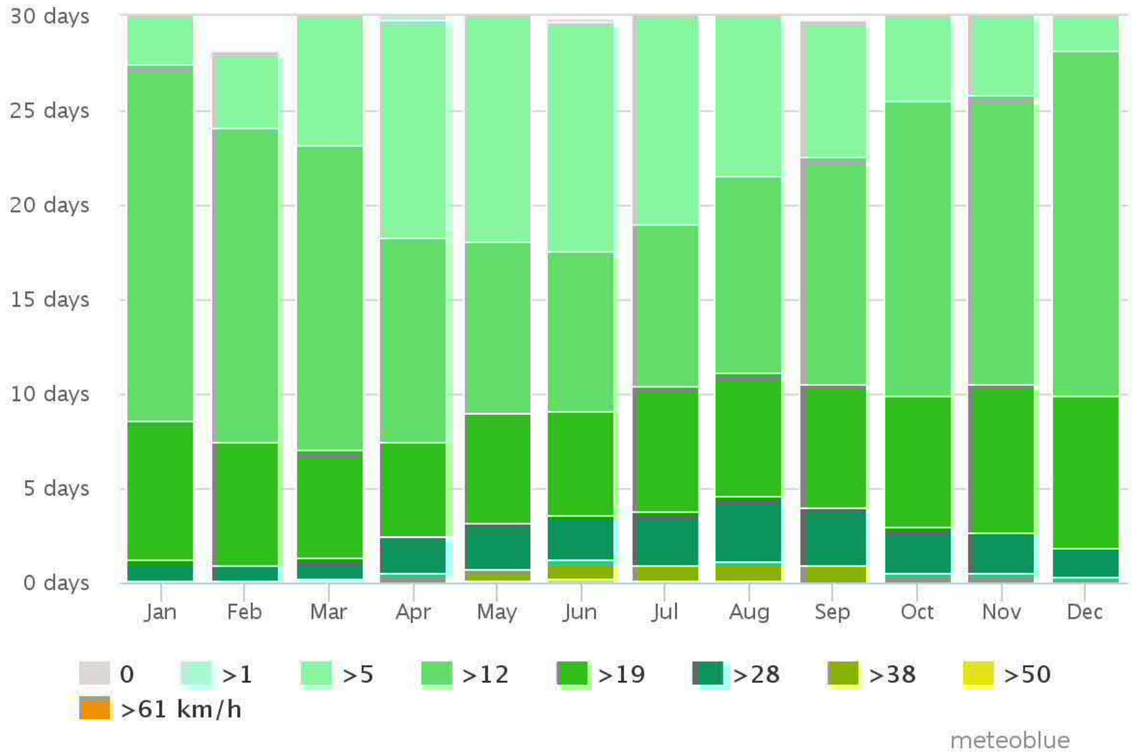

Figure 8-6: Annual Wind Speed (km/h) for Laingsburg

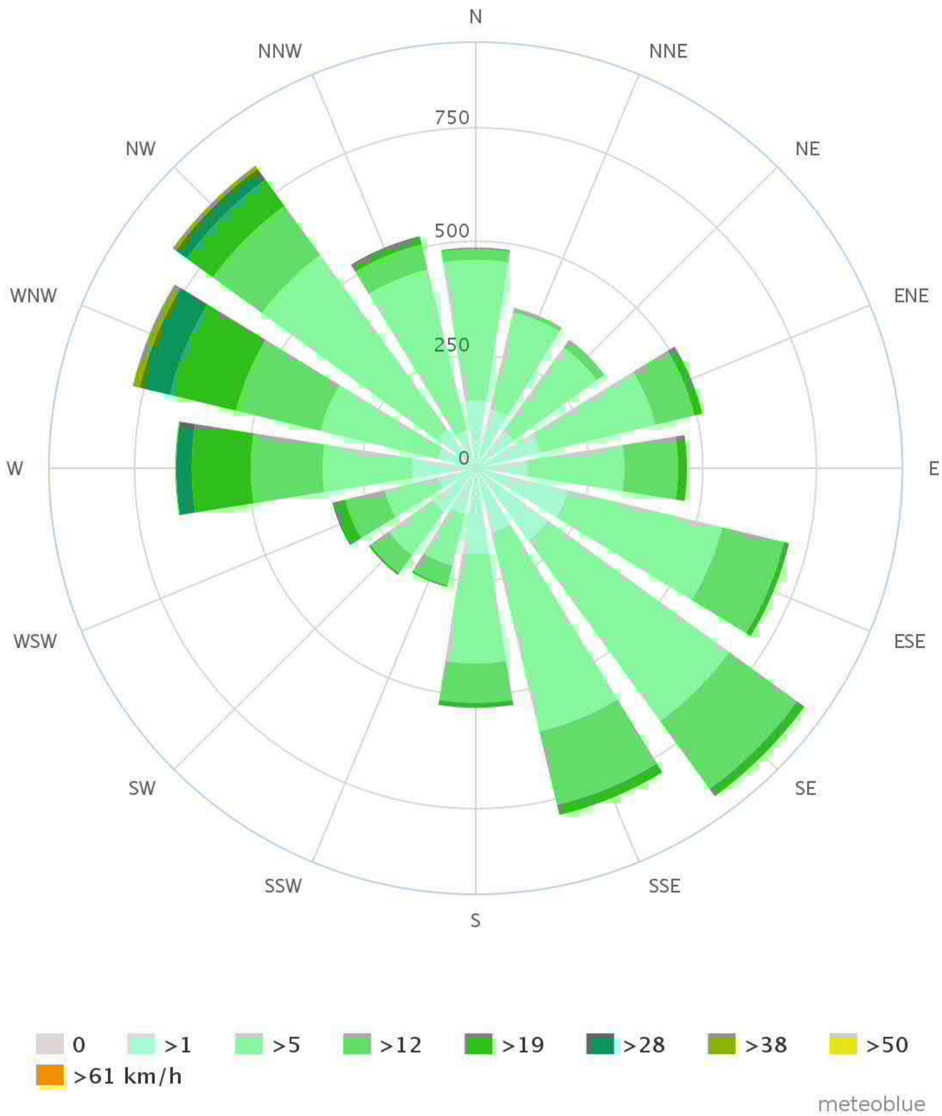

Figure 8-7: Wind Rose for Laingsburg

8.4 SOILS AND LAND CAPABILITY

The Soils and Land Capability Assessment was undertaken by WSP | Parsons Brinckerhoff and is included in **Appendix G**.

SOIL

Based on the land type maps of South Africa (AGIS, 2007) the soils in the area are identified primarily as miscellaneous land classes, rocky areas with miscellaneous soils and Glenrosa and/or Mispha soil forms (other soils may occur). Lime is generally present in the general landscape. Soil land types for Maralla West are shown in **Figure 8-8.**

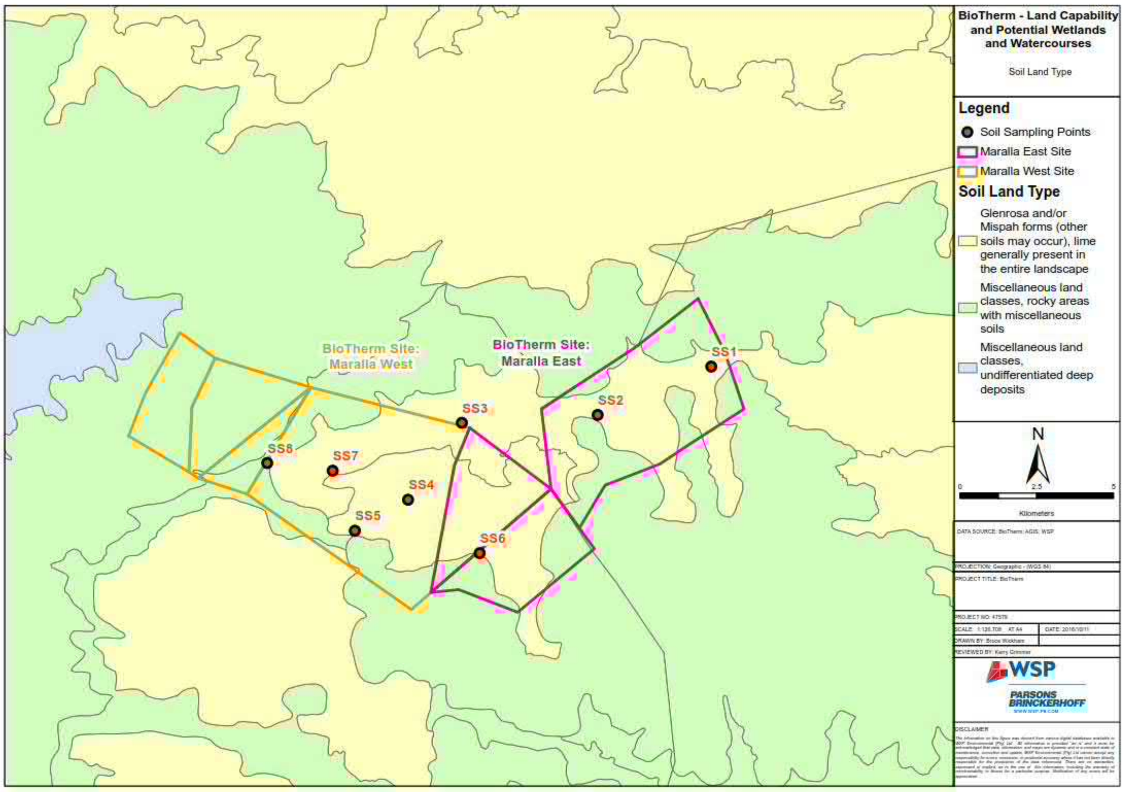

Figure 8-8: Soil Land Types for Maralla West

During the site visit, a total of 8 soil samples were taken at various locations throughout the Maralla West (**Figure 8-9**). At each sampling location the soil profile depth and characteristics were identified and a sample was collected for chemical and physical analyses. The location of the soil samples was determined by the land type maps as well as on-site observation for changes in the topography and land features (i.e. riparian area or wetland) which could induce a change in the soil type. For practical reasons, soil samples that were collected in a similar setting and had the same soil family were mixed to provide representative samples for the area. The representative soil samples were sent to the SGS South Africa (Pty) Ltd laboratory for analysis; characteristics analysed included pH, electrical conductivity, exchangeable sodium and texture were undertaken.

The majority of the soil samples were identified as Mispha soil form. The soil samples collected in a dry river bed were classified as fine-grained alluvial soils, while those from Depressional Pans were identified as Prieska form.

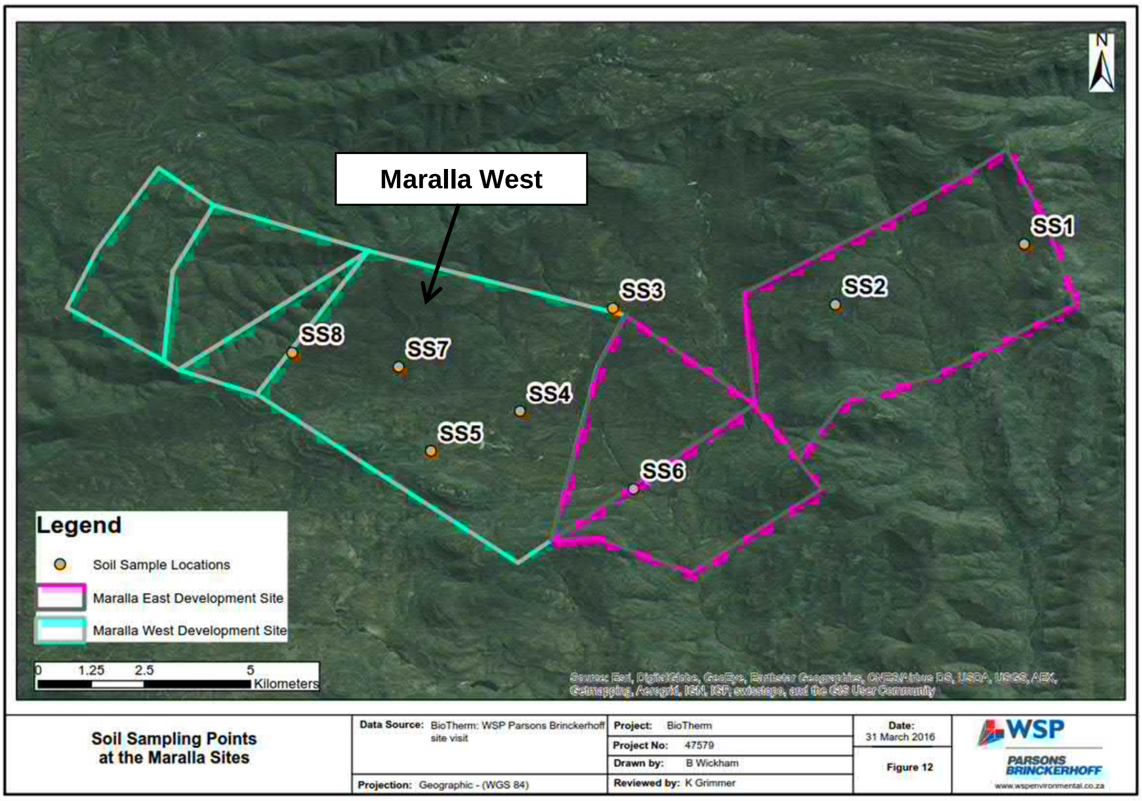

Figure 8-9: Soil Sampling Locations

According to DAFF Agricultural Geo-Referenced Information System (AGIS, 2007), the land capability within the Maralla West Site is mostly non-arable with a low potential for grazing (on the low relief, flatter areas) and Wilderness (on the high relief/steep slopes) (**Figure 8-10**). These two groups correlate to classes VII and VIII from the 8-class land capability system described in Klingebiel and Montgomery (1961), including:

- VII: Severe limitations that make the land unsuited to cultivation and restrict its use largely to grazing, woodland or wildlife. Restrictions are more severe than those for Class VI due to one or more limitations which cannot be corrected, such as very steep slopes, erosion, shallow soil, stones, wet soil, salts or sodicity (amount of sodium held in a soil) and unfavourable climate.
- VIII: Limitation that preclude its use for commercial plant production and restrict its use to recreation, wildlife, water supply, or aesthetic purposes; limitations that cannot be corrected may result from the effects of one or more of erosion or erosion hazard, sever climate, wet soil, stones, low water-holding capacity, salinity or sodicity.

Based on the Land Capability Classification described in the Chamber of Mines Guidelines the land capability within the Maralla West Site is classified as *Class 3: Grazing Land*, for the following reasons:

- While there were a few wetlands identified within the Maralla West Site during the site walkover, collectively these surface features occupy a small portion of the total areas of the site. Thus the site in its entirety is not classified as a wetland as per the land capability classification;
- The soils are predominately shallow (average 0.2m, excluding the fluvial soil profiles). Thus by definition of the Chamber of Mines classification, it is not an arable land;
- The product of the slope (in percent) and erodibility factor (K) in the site is not less than 2 (the lowest value is 30). Thus by definition of the Chamber of Mines Guidelines, it is not arable land;

- While there are a limited minor portions of land that is cultivated, and only a few are irrigated, the collective area of these cultivated areas occupy a small portion of the total areas of the site. Thus the site in its entirety is not arable land; and
- It meets all the requirements for Class 3: Grazing Land

Figure 8-10: Local Land Capability

NATIONAL LAND COVER

The Department of Agriculture, Forestry and Fisheries (DAFF) define the land cover within the Maralla West site, predominantly as Shrubland and Low Fynbos, with minor pockets of Wetlands and Thicket, Bushlands, Bush Clumps, and High Fynbos (DAFF, 2012). The DAFF Land cover is shown in shown in **Figure 8-11**. There are three wetlands marked within the 500 m buffer around the site (**Figure 8-11**). However, upon the site visit, all these marked "wetlands" were actually confirmed to be cultivated areas and small earth-walled farm dams.

Upon the site visit, the majority of the vegetation cover comprised of shrub-like vegetation and Fynbos, with minor areas of cultivated land and wetlands (i.e. "wetland flat" type). The land use throughout the site is dominated by sheep grazing. In addition, antelope were seen grazing on the farm, which may offer potential hunting activities. In general, the land use around the site, comprised of the following surface features:

- Three telecommunication masts installed on hilltops;
- District farm roads;
- Powerlines;
- Earth-wall dams;
- Windmill-driven boreholes; and

→ Reservoirs located on the farm property.

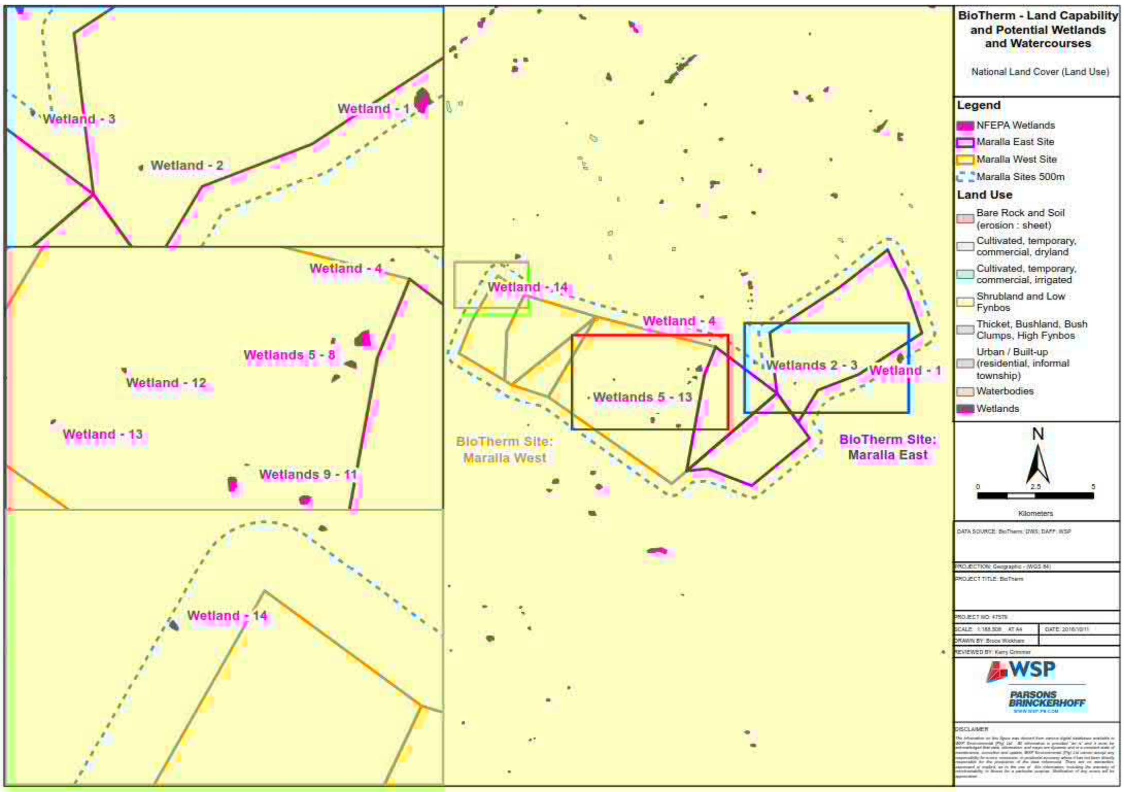

Figure 8-11: National Land Cover for Maralla West Site

NATURE RESERVES AND PROTECTED AREAS

There are no private or government nature protection areas in close proximity to the proposed site. The Komsberg Wilderness Nature Reserve (which is not formally registered) is located near the Komsberg Pass west of the site. **Figure 8-12** and **Table 8-1** outline the private and government nature protection areas located within the region.

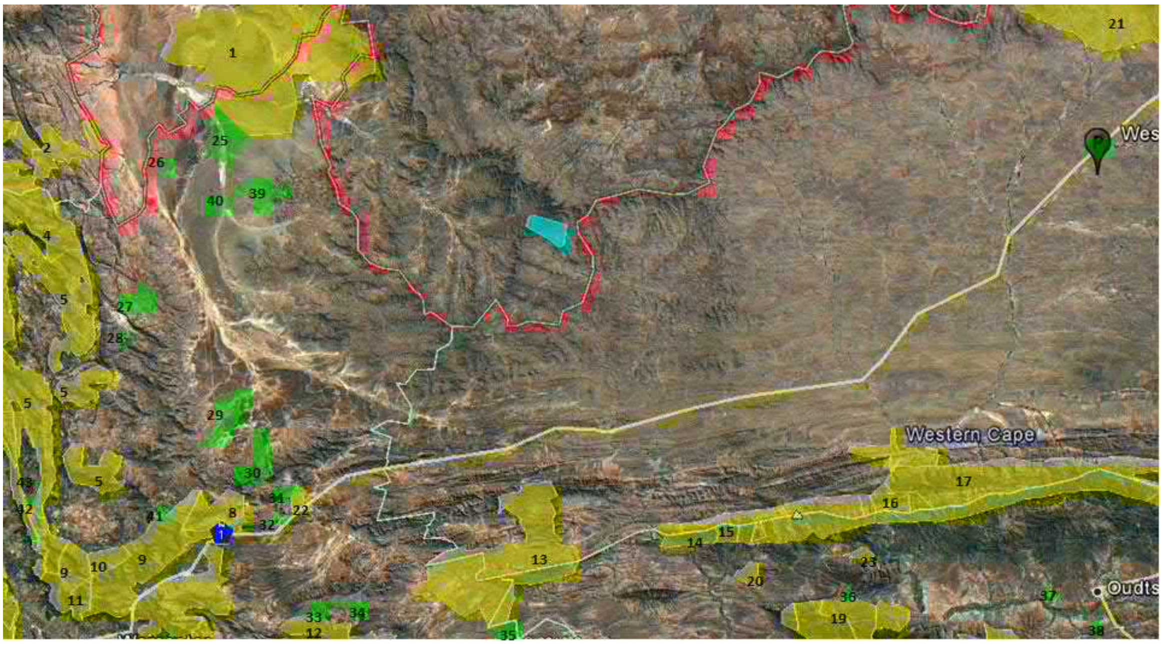

Figure 8-12: Private (Green) and Government (Yellow) Nature Protection Areas in the Region

Table 8-1: Private and Government Nature Protection Areas in the Region

FORMAL (GOVERNMENT) NATURE RESERVES				INFORMAL (PRIVATE) NATURE RESERVES			
1	Tankwa Karoo National Park	13	Anysberg Nature Reserve	24	Uintjieskraal Private Nature Reserve	36	Taayskloof Private Nature Reserve
2	Matjiesrivier Nature Reserve	14	Klein Swartberg Mountain Catchment Area	25	Jakkalsfontein Private Nature Reserve	37	Greylands Private Nature Reserve
3	Cederberg Wilderness Area	15	Towerkop Nature Reserve	26	Basjanskloof Private Nature Reserve	38	Ortmansgat Private Nature Reserve
4	Cederberg Mountain Catchment Area	16	Gamkaskloof (Die Hel) Nature Reserve	27	Groenfontein Private Nature Reserve	39	Zwartbosch Private Nature Reserve
5	Koue Bokkeveld Mountain Catchment Area	17	Groot Swartberg Nature Reserve	28	Klein Cedarberg Private Nature Reserve	40	Groote Kapelsfontein
6	Winterhoek Mountain Catchment Area	18	Groenfontein Nature Reserve (Gamkaberg)	29	Inverdoorn Private Nature Reserve	41	Matroosberg Private Nature Reserve
7	Grootwinterhoek Wilderness Area	19	Rooiberg Mountain Catchment Area	30	Vaalkloof Private Nature Reserve	42	Wakkerstroom Private Nature Reserve
8	Bokkeriviere Nature Reserve	20	Ladismith-Kleinkaroo	31	Kapklip Private Nature Reserve	43	Opdrag Private Nature Reserve

FORMAL (GOVERNMENT) NATURE RESERVES				INFORMAL (PRIVATE) NATURE RESERVES			
9	Matroosberg Mountain Catchment Area	21	Karoo National Park	32	Elim Private Nature Reserve		
10	Ben-Etive Nature Reserve	22	Touw Local Authority Nature Reserve	33	Drie Kuilen Private Nature Reserve		
11	Fonteintjiesberg Nature Reserve	23	Paardenberg Mature Reserve	34	Rooikrans Private Nature Reserve		
12	Langeberg -Wes Mountain Catchment Area			35	Eyerpoort Private Nature Reserve		

LAND USE

The predominant land use in the area is stock farming (predominantly sheep, game or goat farming). Since rainfall is low and water is scarce, crop farming accounts for only a small portion of the land use and is largely confined to the more fertile valleys. Due to the low carrying capacity, farms are large and usually at least about 10km apart.

Current land-use on the Maralla West site includes sheep farming and some production of lucerne and they are all zoned for agriculture.

Most infrastructure present in the greater study area stems from farming activities and the towns of Sutherland and Matjiesfontein. Generally the farming activities in the area have a low impact on the natural visual environment, as farms are large and carrying capacity low. Prominent visual features resulting from farming activities typical of the region include windmills, power lines, sheep kraals and fences and occasional clusters of shade trees. Farm houses and buildings vary but tend to be located in the warmer valleys and are most often surrounded by gardens and sheltering trees.

The towns of Sutherland and Matjiesfontein are both local tourism destinations. Matjiesfontein is a historical town/transportation hub preserved for its Victorian charm and was declared a National Monument in 1975. Sutherland's arid climate and remote location make its' night skies among the world's clearest and darkest and is a destination for star gazing and observation. The telescopes of the Southern African Astronomical Observatory are nearby (~35km from Maralla West), which includes the Southern African Large Telescope (SALT), the largest single optical telescope in the southern hemisphere.

The area falls within the Komsberg REDZ and Central EGI Corridor. These areas are targeted for renewable energy and electricity grid infrastructure development and so this future intended land use will alter the visual landscape. Although construction has not yet commenced, three wind energy farms, in close proximity to the proposed site, have been approved and are due to be constructed. These will cumulatively alter the visual landscape and character of the area.

8.5 NATURAL VEGETATION AND ANIMAL LIFE

The Biodiversity Assessment was undertaken by Simon Todd Consulting and is included in **Appendix L**.

BROAD-SCALE VEGETATION PATTERNS

According to the national vegetation map, two vegetation types occur within the study area (**Figure 8-13**). The majority of the site falls within the Central Mountain Shale Renosterveld vegetation type, followed with a much smaller extent of Tanqua Escarpment Shrubland in the far west.

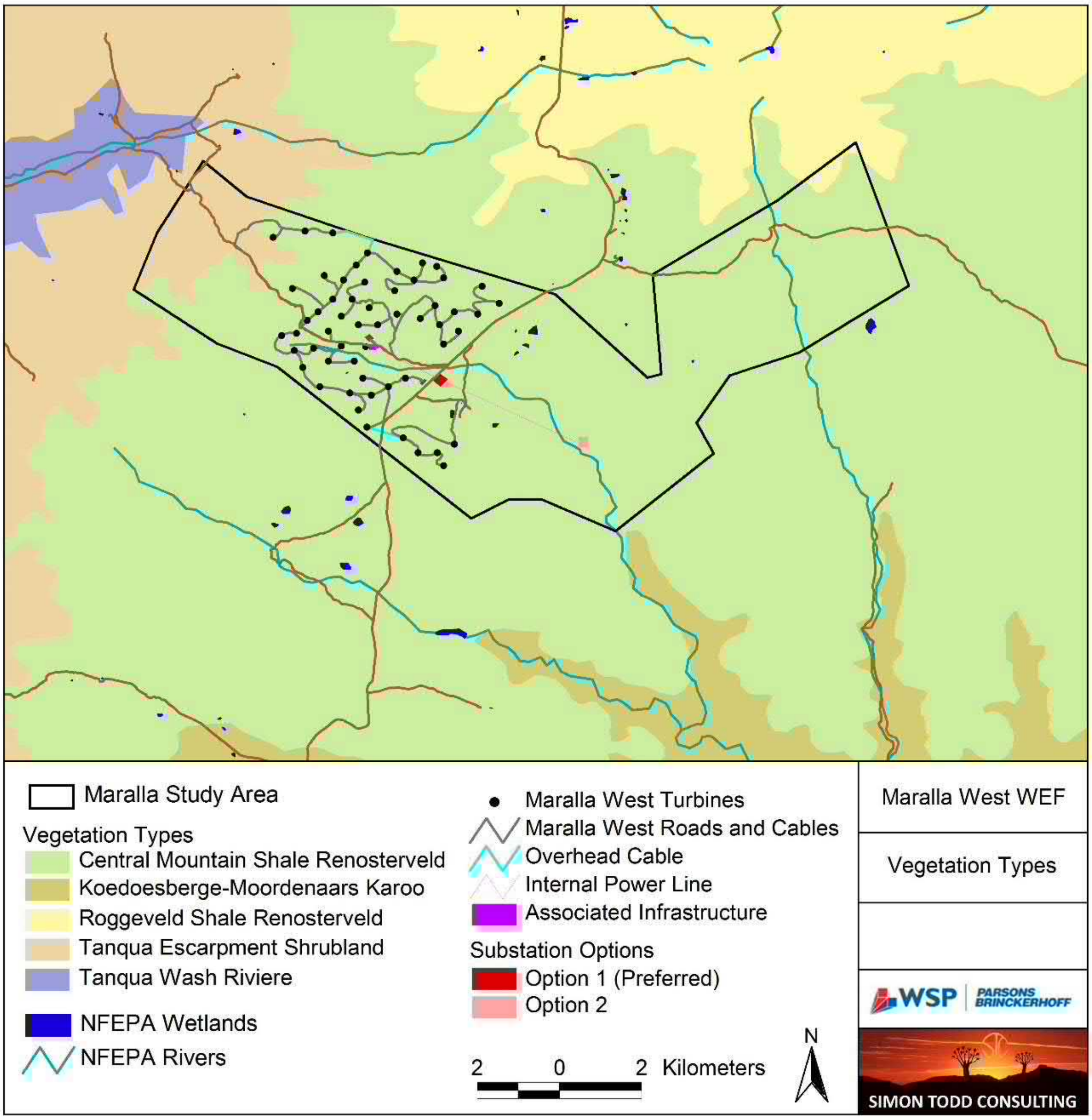

Figure 8-13: Broad-scale overview of the vegetation in and around the proposed site

According to Mucina & Rutherford (2006) Central Mountain Shale Renosterveld occurs in the Western and Northern Cape on the southern and southeastern slopes of the Klein Roggeveldberge and Komsberg below the Komsberg section of the Great Escarpment as well as farther east below Besemgoedberg and Suurkop and in the west in the Karookop area. It is associated with clayey soils overlying Adelaide Subgroup mudstones and subordinate sandstones with land types mostly Ib and Fc. Although this vegetation type is classified as Least Threatened, it has a very limited extent of 1236km^2 and is not formally conserved anywhere. Levels of transformation are however low and it is considered to be 99% intact. Although no endemic species are known to occur within this vegetation type, little is known about this Renosterveld type and it has been poorly sampled.

The Komsberg area is a recognized centre of plant diversity and endemism and the majority of this diversity is associated with the high elevation areas of Central Mountain Shale Renosterveld and Roggeveld Shale Renosterveld (Clark *et al.* 2011).

Tanqua Escarpment Shrubland occurs as a narrow belt on northwest-facing slopes of the Klein-Roggeveldberge and on southwest-facing and west-facing slopes of the Roggeveld Escarpment at altitudes of 620-100m (Mucina & Rutherford 2006). This vegetation type usually occupies steep flanks below an escarpment overlooking a basin, supporting succulent shrubland of medium height with *Tylecodon* (botterboom) and *Euphorbia tanica* (melkboom) (Mucina & Rutherford 2006). This vegetation type is classified as Least Threatened, and only a very small portion is formally conserved in the Tankwa Karoo National Park. Levels of transformation are however low but it is part of the Hantam-Roggeveld Centre of Endemism and is one of the least studied vegetation types of the country (Mucina & Rutherford 2006).

LISTED AND PROTECTED SPECIES

According to the SANBI SIBIS database, 514 indigenous species have been recorded from the four quarter degree squares around the site (**Table 8-2**). This includes 22 species of moderate to high conservation concern. Species that can be confirmed present include *Boophone disticha* (Declining), *Brunsvigia josephinae* (VU), *Eriocephalus grandiflorus* (Rare), *Adromischus phillipsiae* (Rare), *Drimia altissima* (Declining). *Cliffortia arborea* (VU) is present in the area along the base of cliffs along the escarpment, but was not observed within the site itself and if present it is not likely that it would be affected by the development as it usually occurs on very steep terrain. In general, the abundance of listed species within the study area is concentrated within certain habitats such as the drainage lines or high-lying ridges, while the lower plains of the site have a lower abundance of such species.

Table 8-2: Numbers of the species within the different conservation status categories as indicated below, data derived from the SANBI SIBIS database

STATUS/ IUCN RED LIST CATEGORY	NO. SPECIES
Critically Endangered (CR)	0
Endangered (EN)	1
Vulnerable (VU)	5
Near Threatened (NT)	3
Rare	12
Declining	1
Data Deficient - Insufficient Information (DDD)	2
Data Deficient - Taxonomically Problematic (DDT)	5
Least Concern	485
Total	**514**

CRITICAL BIODIVERSITY AREAS AND BROAD-SCALE PROCESSES

Although the east of the broader Maralla site lies within the Western Cape, the Maralla West development area is restricted to the Northern Cape and falls within the Namakwa District Biodiversity Sector Plan (Desmet & Marsh 2008). This biodiversity assessment identifies Critical Biodiversity Areas (CBAs) which represent biodiversity priority areas which should be maintained in a natural to near natural state. The CBA maps indicate the most efficient selection and classification of land portions requiring safeguarding in order to meet national biodiversity objectives. The CBA map for the general area surrounding the site is depicted below in **Figure 8-14**.

Within the Maralla West study area, there are several small scattered CBAs associated with steep south-facing slopes. These are considered important for biodiversity especially in face of climate change as these are the coolest slopes which represent refuge areas where many species can persist under a drying or warming climate. Many of these areas have generally been mapped as high sensitivity in this study as well and while there are some turbines in the CBAs, this would not compromise the overall ecological functioning of the area as these areas have been identified as CBAs for broad-scale ecological purposes and not due to a known presence of important biodiversity features within these areas. The small footprint of the turbines would not significantly impact the potential functioning of these areas as refuge areas for flora.

In addition, the majority of the Maralla West development area lies within a NPAES Focus Area. This area was identified as a priority area as part of the Western Karoo Focus Area on the grounds that apart from being an extensive tract of unfragmented natural vegetation, it is also an area of high climate and landscape variation which is likely to be resilient to climate change. Such areas are likely to be more climatically stable over time, providing refugia where plants and animals can persist, as described above for the south-facing CBAs. While development of an area as a wind farm may have a significant impact on the perceived value of the area for conservation, the actual impact on biodiversity may be low and in many cases this impact is likely to be significantly less than the prevailing land use, which can have significant deleterious effects. As such, the impact of the development on the NPAES is one largely of perception related to our vision of what should constitute a conservation area, rather than a consideration of the actual minimal loss in long-term biodiversity value associated with development of wind energy which occupies than 0.5% of the surface area of the Komsberg region. In other words, it is unreasonable to consider wind farm development incompatible with biodiversity maintenance when many of our national parks contain tar roads, rest camps, power lines and other infrastructure of similar extent and nature to wind farms.

The NPAES is currently being revised to align with provincial priorities, which have unfortunately not been finalized as yet. Consequently, it is difficult to evaluate the true potential impact of the development on future protected area expansion as on the one hand the current NPAES is outdated and is being replaced and on the other hand, the development which would also only happen in the future is one of a large number of wind energy developments in the area that may or may not be built under the REIPPP. However, as indicated above, there is little to suggest that wind energy development on extensive sites cannot happen in a biodiversity compatible manner and as such, these areas should not be excluded as possibilities for future conservation expansion.

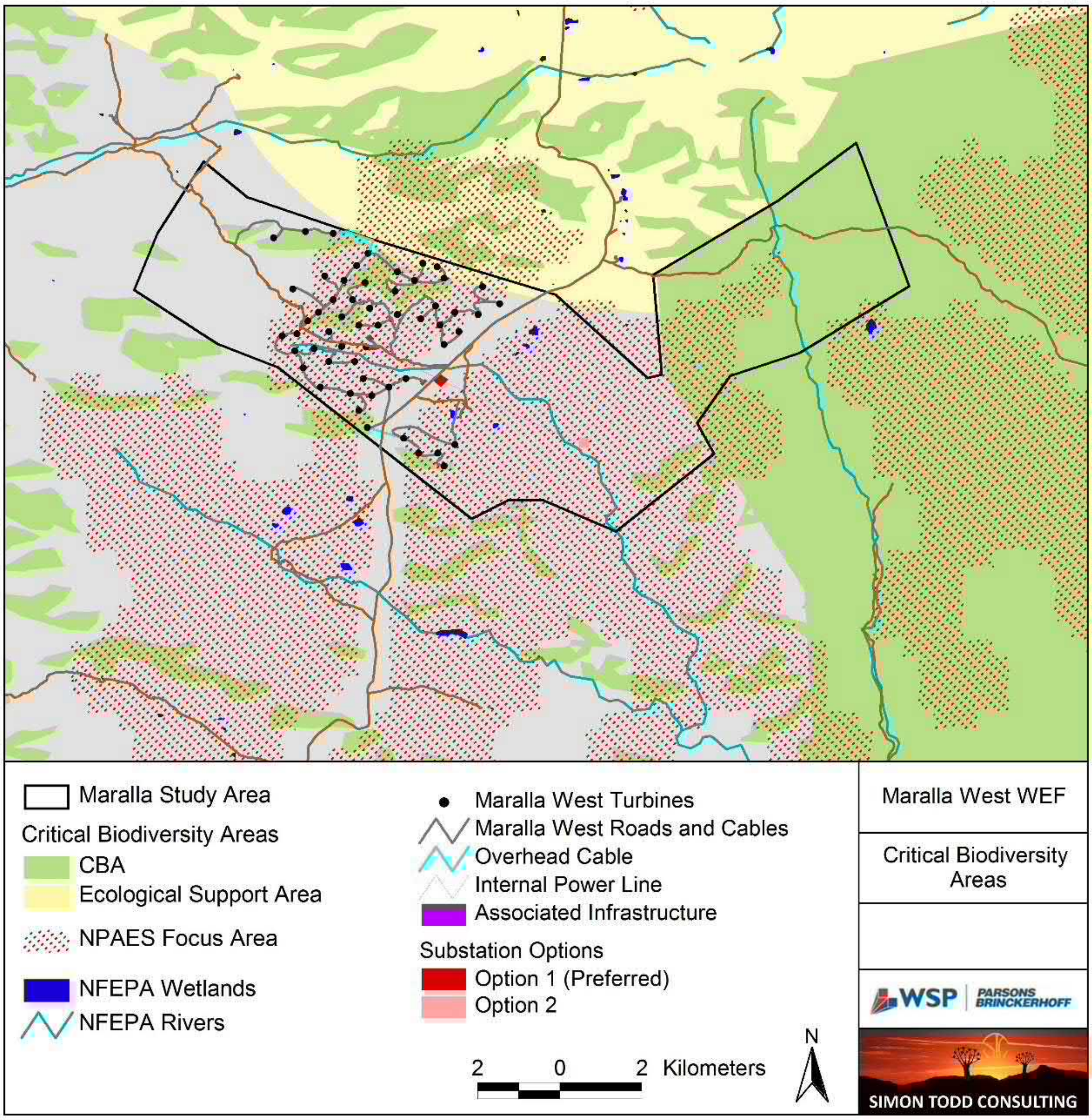

Figure 8-14: Critical Biodiversity Areas map of the area around the Proposed Site

FAUNAL COMMUNITIES

MAMMALS

At least 50 mammal species potentially occur at the site. Due to the diversity of habitats available, which includes rocky uplands, densely vegetated kloofs and riparian areas, as well as open plains and low shrublands, the majority of species with a distribution that includes the site are likely to be present in at least part of the broader site.

Although large antelope such as eland, would once have occurred in the area, these are confined to game farms and conservation areas today. However smaller antelope are abundant in the area and regularly seen at the site. Both Duiker and Steenbok are common, adaptable species that are able to tolerate moderate to high levels of human activity and are not likely to be highly sensitive to the disturbance associated with the development as they will quickly become habituated to the turbines. Grey Rhebok *Pelea capreolus* are common at the site and tend to move from the lowlands to the uplands on a season basis. This species is however relatively tolerant of human disturbance if it is not persecuted and will likely not suffer a large extent of habitat loss as a result of the development. Klipspringer *Oreotragus oreotragus* are present along the higher-lying ridges and are somewhat more specialized in their habitat requirements, being associated with steep slopes, cliffs and rocky outcrops and of the antelope present may be most vulnerable to impact from the development due to greater overlap between their habitat and the distribution of the wind turbines along the larger ridges and escarpments that are home to this species. In the short-term it would be affected by construction-related noise and disturbance, while in the longer-term it may avoid the proximity of the turbines which would decrease the available habitat. The alien fallow deer is also common in the area, but is not of concern, given its' status.

Despite trapping and hunting by the local landowners, medium sized carnivores such as jackal and caracal remain relatively common in the area, as are baboons and even an occasional Leopard may move through the area. The ridges, hills and uplands of the site, with rocky outcrops, rocky bluffs and cliffs provide suitable habitat for species which require or prefer rock cover such as Cape Rock Elephant Shrew, *Elephantulus edwardii*, Hewitt's Red Rock Hare *Pronolagus saundersiae*, Namaqua Rock Mouse *Micaelamys namaquensis* and Rock Hyrax, *Procavia capensis*. Although of limited extent, there are also deeper soils along the larger drainage lines such as Komsberg River and its' tributaries which support a higher vegetation density and support species associated such as Brants's Whistling Rat *Parotomys brantsii*, the Bush Vlei Rat *Otomys unisulcatus*, Hairy-footed Gerbil *Gerbillurus paeba* and Common Duiker *Sylvicapra grimmia*.

The Riverine Rabbit *Bunolagus monticularis* which is listed as Critically Endangered and is regarded as one of the most threatened mammals in South Africa is known to occur within the broad area. Populations of this species occur between Sutherland and Fraserburg to the northeast as well as in the Tanqua Karoo to the west. The drainage systems within the site do not contain wide flood plains or alluvial terraces which are the known favoured habitat of the Riverine Rabbit. As a result, it is unlikely that this species occurs at the site and an impact on this species is therefore not considered likely.

The major impact of the development on mammals is likely to occur during the construction phase when a lot of noise and disturbance would be generated. In the longer term, the noise generated by the turbines would have a potential impact on species which avoid human disturbance or those species use sound to find their prey or avoid their predators.

REPTILES

There is a wide range of habitats for reptiles present at the site, including rocky uplands and cliffs, open flat and lowlands and riparian areas. As a result the site is likely to have a rich reptile fauna which is potentially composed of 7 tortoise species, 16 snakes, 15 lizards and skinks, two chameleons and 11 geckos. The only currently listed species which may occur at the site is the Karoo Padloper *Homopus boulengeri* which is listed as Near Threatened.

Species observed in the immediate area or on-site include Karoo Girdled Lizard *Cordylus polyzonus*, Southern Rock Agama *Agama atra*, Cape Skink *Mabuya capensis* and Cape Cobra *Naja nivea*, Marsh Terrapin *Pelomedusa subrufa*, Puff Adder *Bitis arietans*. Tortoises are abundant in the area and consist mostly of Angulate Tortoises, *Chersina angulata* with occasional observations of Karoo Tent Tortoises, *Psammobates tentorius tentorius* as well. Tortoises may be negatively impacted by the development as they are vulnerable to collisions with motor vehicles and predation by avian predators while traversing open areas. Attractive species such as tent tortoises are also vulnerable to collection for use as pets or trade, and the increased accessibility resulting from the new roads that will be constructed as part of the development would raise the risk for these species.

In general, the major impact associated with the development would be habitat loss and fragmentation for reptiles, with the potential for increased levels of predation being a secondary impact which may occur as a result of vegetation clearing for roads and turbine pads.

AMPHIBIANS

Amphibian diversity at the site is low, with only 9 species recorded from the broader area. The Roggeveld and other drainage lines and their vicinity are the most important areas for frogs at the site. Some of the larger drainage systems contain rocky, sheltered pools that contain water on a near-perennial basis and some species which depend on permanent water are present. No species of conservation concern are known from the area and all the species which may be present are quite widespread species of low conservation concern.

The Karoo Dainty Frog, *Cacosternum karooicum* is listed as Data Deficient reflecting the little-known distribution and ecology of this species. To date, the Karoo Dainty Frog has been recorded from a few scattered locations across the Karoo in the Western and Northern Cape, but it is likely that it occurs more widely across the karoo in general. The site also falls within the distribution of two other regional endemic species, the Cape Sand Frog, *Tomopterna delalandii* and the Raucous Toad, *Amietophrynus rangeri*. The Cape Sand Frog occurs in lowlands and valleys in fynbos and Succulent Karoo throughout most of the Western Cape and into Namaqualand. The Raucous Toad is more widely distributed and occurs throughout much of South Africa inland and along the east coast into Gauteng and Mpumalanga. There do not therefore appear to be any range-restricted species which occur at the site which would be vulnerable to population-level impacts.

As the drainage lines and lowlands would not be targeted for development, direct impacts on amphibians at the site are likely to be fairly low. Amphibians are however highly sensitive to pollutants and the large amount of construction machinery and materials present at the site during the construction phase would pose a risk to amphibians should any spills occur.

8.6 AVIFAUNA

The Avifauna Assessment was undertaken by Chris van Rooyen Consulting and is included in **Appendix M**. This assessment includes a 12-month monitoring study which commenced in October 2015 and was completed in November 2016 in accordance with the Best Practice Guidelines for Avian Monitoring and Impact Mitigation at Proposed Wind Energy Development Sites in Southern Africa developed by the Endangered Wildlife Trust and Birdlife South Africa

The study area straddles the slopes of the Klein Roggeveld Mountains below the escarpment, and is bisected by numerous ephemeral rivers, the largest being the Komsberg River and the Venter's River. The habitat in the study area is extremely rugged, consisting of rolling hills with boulder-strewn slopes and exposed ridge lines. The two highest points in the study area is Graskop (1430m a.s.l) and Perdekop (1478m a.s.l.). The study area contains a number of man-made dams used for the irrigation of a few crops (mostly pastures), which is grown as supplementary fodder for small stock farming. Sheep farming is the main economic activity. Maralla West is traversed by the Laingsburg / Roggeveld 1 66kV distribution power line, and Eskom's Droërivier-Muldersvlei and Bachus-Droërivier 400kV transmission lines pass about 10km to the south of the study area.

The habitat in the study area from an avian perspective is relatively uniform, dominated by open, rocky, undulating or montane renosterbos, with steep, rocky slopes, ridges and low cliffs, denser, woody vegetation along the bigger drainage lines (and stands of alien trees), and both natural and artificial wetlands - river courses, vleis and dams. The larger artificial impoundments in the area probably support good numbers of waterbirds in wet years, and the Eskom power pylons are used as roosting, hunting and/or nesting habitat by certain species (e.g. raptors and corvids).

The site is not located within 50 km of any of the currently registered national Important Bird Areas (Marnewick et al. 2015). **Figure 8-15** shows the Maralla West site relative to the surrounding Important Bird Areas (IBAs).

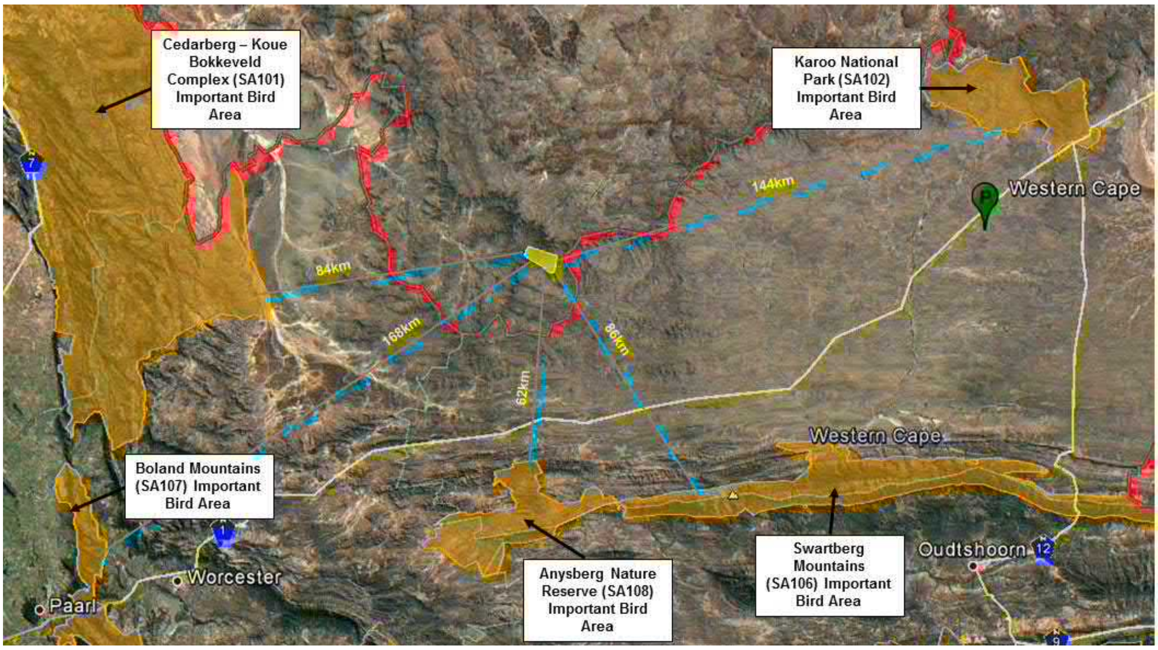

Figure 8-15: The location of the Maralla East WEF relative to the surrounding Important Bird Areas

In order to get an accurate assessment of the abundance and variety of avifauna in the study area, a pre-construction monitoring programme was instituted which ran over four seasons. Data was collected through drive and walk transect counts, incidental sightings, the recording of flight behaviour from vantage points, inspection of potential focal points and nest searches.

A total of 163 species could potentially occur in the study area. Of these, 19 are classified as priority species. **Table 8-3** below lists the priority species that could potentially occur in the study area, as well as the potential impact on the species in the study area. **Table 8-4** lists all priority species which were recorded during the course of the pre-construction monitoring in the study area, and the manner in which they were recorded

Table 8-3: Priority Species that could potentially occur at the Maralla West Site (LC = Least concern, NT = Near threatened, VU = Vulnerable, EN = Endangered)

Species	Taxonomic Name	Priority Species	Global Status Red Data	Regional Status Red Data	Endemic Status SA	Endemic Status Region	SABAP2 Reporting Rate % (9 pentad)	SABAP2 Reporting Rate % (3220DA)	Recorded during pre-construction monitoring	Collisions with associated powerline	Collisions with turbines	Displacement through disturbance	Displacement through habitat transformation
Bustard, Ludwig's	*Neotis ludwigii*	X	EN	EN		Near Endemic	5.71	✓ 10.42	X	X		X	
Buzzard, Jackal	*Buteo rufofucus*	X			Near Endemic	Endemic	42.86	✓ 22.22	X		X		
Buzzard, Steppe	*Buteo vulpinus*	X					7.14	✓ 17.65	X		X		
Eagle, Booted	*Aquila pennatus*	X					4.29	✓ 10.71	X		X		
Eagle, Martial	*Polemaetus bellicosus*	X	VU	EN			14.29	✓ 10.42	X		X		
Eagle, Verreaux's	*Aquila verreauxii*	X	LC	VU			11.43	✓ 16.67	X		X		
Eagle-Owl, Spotted	*Buba africanus*	X					7.14	✓ 5.88			X		
Falcon, Lanner	*Falco biarmicus*	X	LC	VU			0	0	X		X		
Flamingo, Greater	*Phoenicoptrus ruber*	x	LC	NT			0	✓ 18.18	X	X	X		
Francolin, Grey-winged	*Scleroptila*	X			Endemic (SA, Lesotho, Swaziland)	Endemic	31.43	✓ 8.33	X			X	X
Goshawk, Southern Pale Chanting	*Melierax canorus*	X				Near endemic	28.57	✓ 30.00	X		X		

Species	Taxonomic Name	Priority Species	Global Status Red Data	Regional Status Red Data	Endemic Status SA	Endemic Status Region	SABAP2 Reporting Rate % (9 Pentad)	SABAP2 Reporting Rate % (3220DA)	Recorded during pre-construction monitoring	Collisions with associated powerline	Collisions with turbines	Displacement through disturbance	Displacement through habitat Transformation
Harrier, Black	*Circus maurus*	X	VU	EN	Near endemic	Endemic	1.43	✓ 12.00	X		X		
Kestrel, Lesser	*Falco naumanni*	X					1.43	× 0.00			X		
Kite, Black-Shouldered	*Elanus caeruleus*	X					1.43	✓ 29.41			X		
Korhaan, Karoo	*Eupodotis vigorsii*	X	LC	NT		Endemic	17.14	✓ 15.00	X	X		X	X
Korhaan, Southern Black	*Afrotis afra*	X	VU	VU	Endemic	Endemic	18.57	✓ 16.00		X	X	X	X
Snake-Eagle, Black-chested	*Circaetus pectoralis*	X					1.43	✓ 16.67	X		X		
Sparrowhawk, Rufous-chested	*Accipiter rufiventris*	X					1.43	× 0.00	X		X		
Stork, Black	*Ciconia nigra*	X	LC	VU			0	✓ 5.88	X		X		
Harrier-hawk, African	*Polyboroides typus*	X	LC				0	0	X		X		
African Fish Eagle	*Haliaeetus vocifer*	X	LC				0	0	X		X		
Sclater's Lark	*Spizocorys sclateri*	X	NT	NT	Endemic	Endemic	0	0			X		

Table 8-4: Priority Species Recorded during the Pre-Construction Monitoring in the Study Area

PRIORITY SPECIES	SCIENTIFIC NAME	TURBINE	CONTROL	VP	CONTROL VP	INCIDENTAL	FOCAL POINT
African Fish Eagle	*Haliaeetus vocifer*			X			
Harrier-hawk, African	*Polyboroides typus*	X					
Harrier, Black	*Circus maurus*	X		X		X	
Snake-Eagle, Black-chested	*Circaetus pectoralis*		X		X	X	
Eagle, Booted	*Aquila pennatus*			X			
Flamingo, Greater	*Phoenicoptrus ruber*		X	X			
Francolin, Grey-winged	*Scleroptila*	X	X			X	
Buzzard, Jackal	*Buteo rufofucus*	X	X	X	X	X	
Falcon, Lanner	*Falco biarmicus*		X				
Kestrel, Lesser	*Falco naumanni*			X			
Bustard, Ludwig's	*Neotis ludwigii*			X			
Eagle, Martial	*Polemaetus bellicosus*		X	X		X	
Sparrowhawk, Rufous-chested	*Accipiter rufiventris*	X					
Sclater's Lark	*Spizocorys sclateri*		X				
Korhaan, Southern Black	*Afrotis afra*	X		X		X	
Goshawk, Southern Pale Chanting	*Melierax canorus*	X	X	X		X	
Eagle-Owl, Spotted	*Buba africanus*					X	
Buzzard, Steppe	*Buteo vulpinus*	X		X		X	
Eagle, Verreaux's	*Aquila verreauxii*	X	X	X	X	X	
19	**Total:**	**9**	**9**	**12**	**3**	**10**	**0**

Figure 8-16 shows the spatial distribution of transect recorded priority species in the study area.

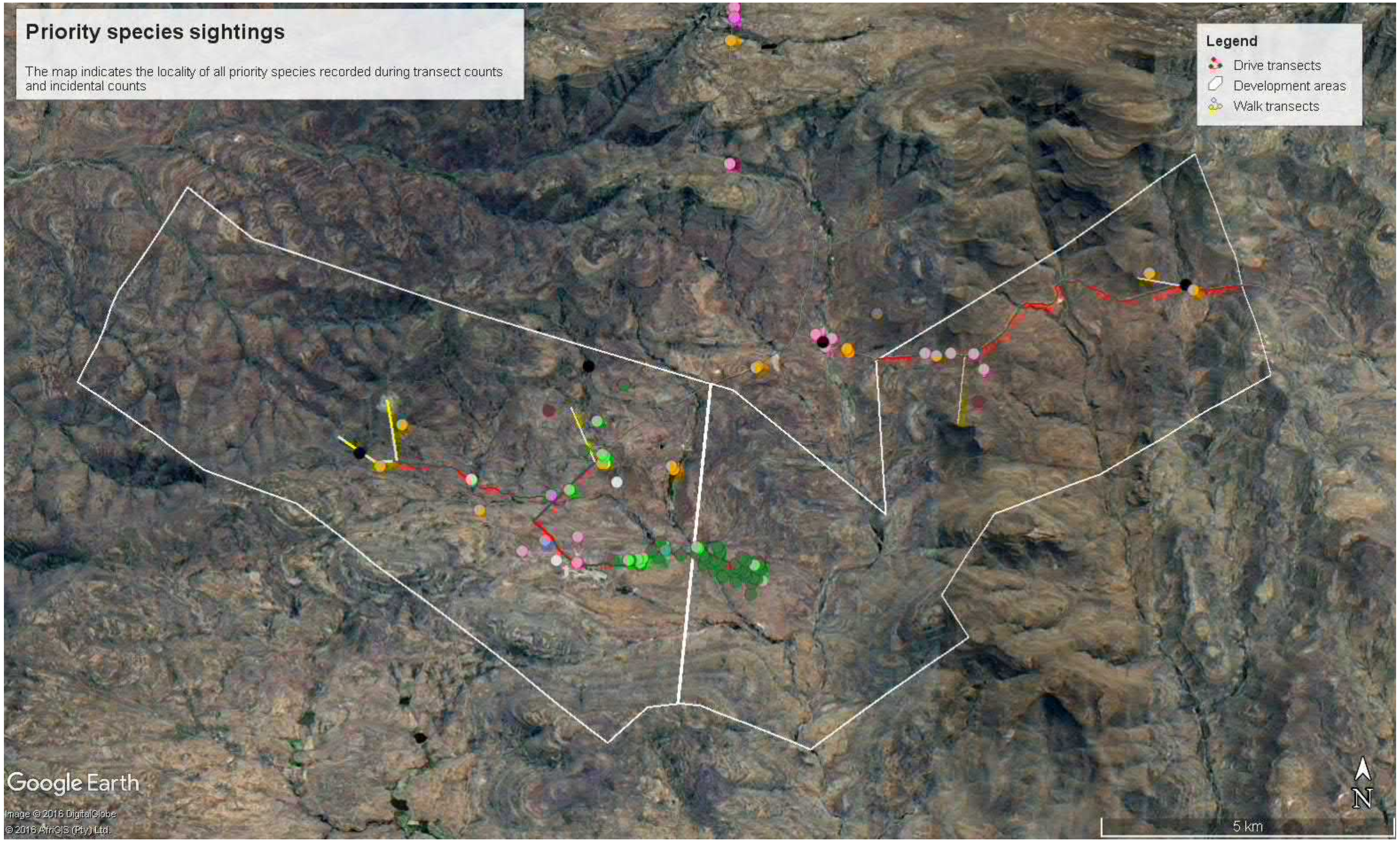

Figure 8-16: The spatial distribution of transect recorded individuals of priority species at the study area

A total of 288 hours of vantage point watches were completed at six vantage points at the study area in order to record flight patterns of priority species. In the four sampling periods, priority species were recorded flying for a total of 10 hours, 44 minutes and 50 seconds. A total of 584 individual flights were recorded. Of these, 210 (36%) flights were at high altitude (>220m), 281 (48%) were at medium altitude (i.e. between 30m and 220m) and 93 (16%) were at low altitude (<30m).

The passage rate for priority species recorded at the development area (all flight heights) was 0.86 birds/hour. **Figure 8-17** illustrates the duration of flights for each species, at each height class

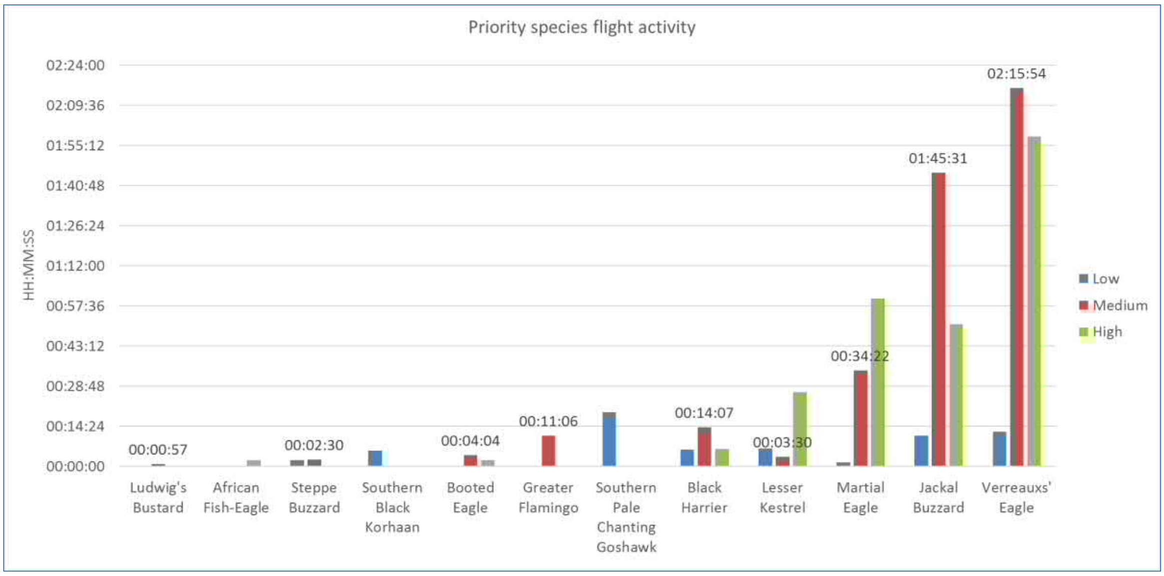

Figure 8-17: Flight times and heights recorded for priority species at the development area

A site-specific collisions risk rating for each priority species recorded during VP watches was calculated to give an indication of the likelihood of an individual of the specific species to collide with the turbines at these sites. This was calculated taking into account the following factors:

- The duration of rotor height flights;
- The susceptibility to collisions, based on morphology (size) and behaviour (soaring, predatory, ranging behaviour, flocking behaviour, night flying, aerial display and habitat preference) using the ratings for priority species in the Avian Wind Farm Sensitivity Map of South Africa (Retief et al. 2012); and
- The planned number of turbines

This was done in order to gain some understanding of which species are likely to be most at risk of collision at these specific sites. The results are displayed in **Figure 8-18**.

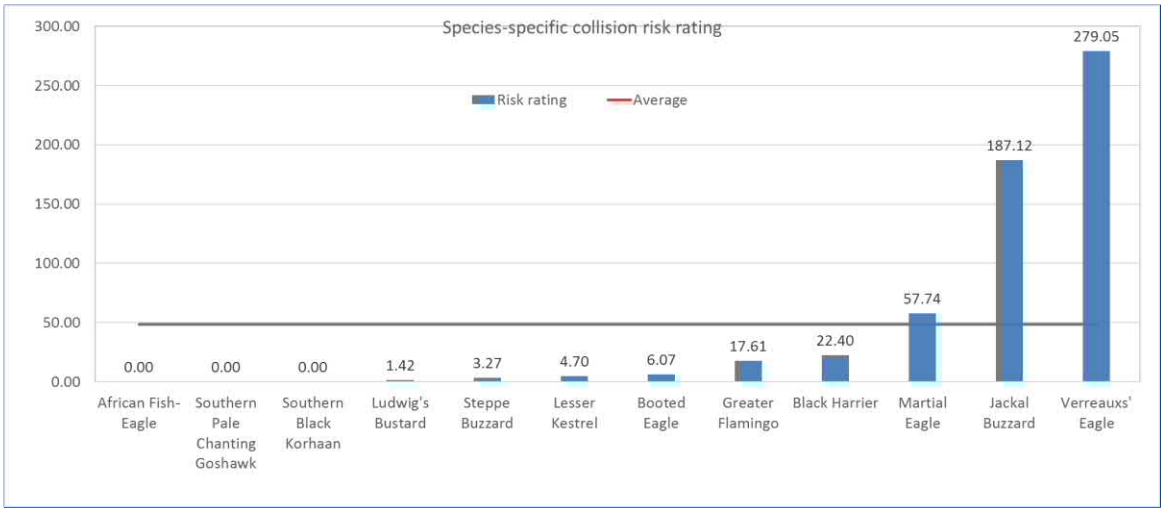

Figure 8-18: Site specific collision risk rating for priority species at the study area

The spatial distribution of the flight activity of the four priority species with the highest risk ratings is presented in **Figure 8-19** to **Figure 8-22**.

Figure 8-19: Distribution of flight activity of Verreaux's Eagle

Figure 8-20: Distribution of flight activity of Martial Eagle

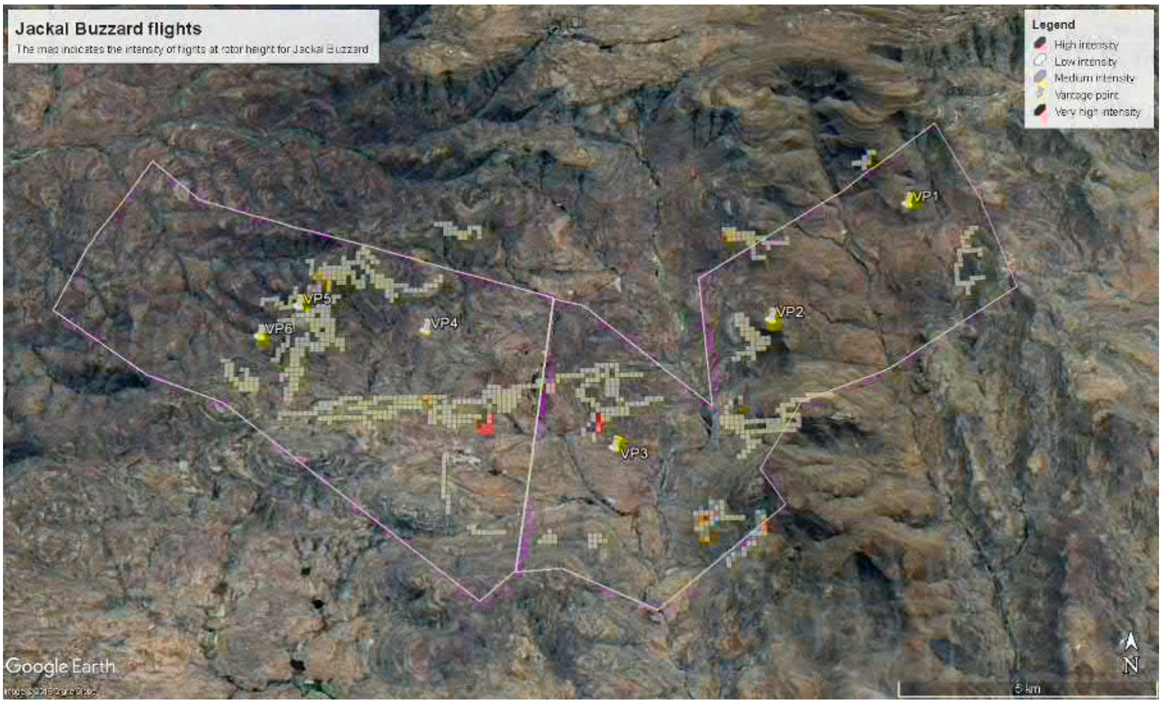

Figure 8-21: Distribution of flight activity of Jackal Buzzard flights

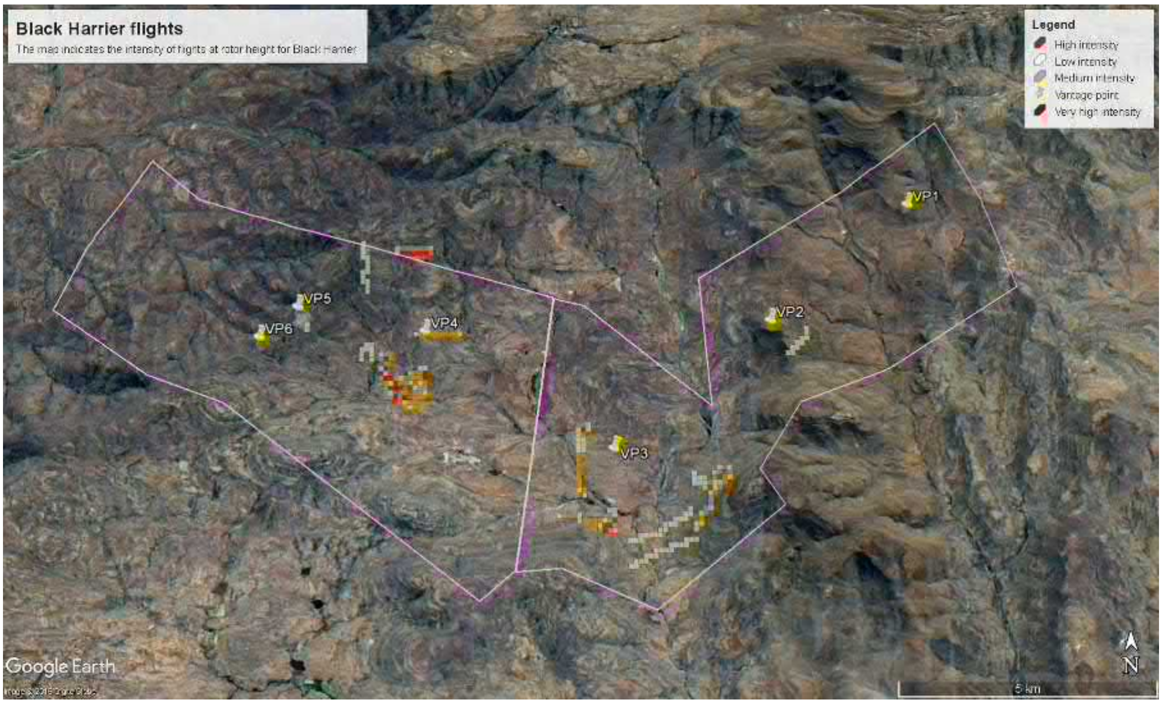

Figure 8-22: Distribution of flight activity of Black Harrier flights

A total of 10 potential focal points of bird activity were identified and inspected during each of the four surveys at the two Maralla development areas, i.e. five sites with potential habitat for cliff-nesting raptors and five dams:

- FPM 1: Steep valley with rocky ridges
- FPM 2: West-facing cliffs
- FPM 3: East-facing slope with ridge
- FPM 4: Deep valley with ridges
- FPM 5: Deep valley with west-facing ridge
- FPM 6: Dam
- FPM 7: Dam
- FPM 8: Dam
- FPM 9: Dam
- FPM 10: Dam

Dedicated searches were also conducted to investigate potential nesting and roosting sites in trees and powerlines in the study area and beyond. In addition, a total of 7 areas were identified immediately adjacent to the development areas consisting of cliffs and ridges along the escarpment which were meticulously searched by an observer with binoculars and a scope for nests. Nest searches were conducted in 2016 in January, April, June and November/December.

The seven potential cliff nesting areas comprise the following:

- FP 1: Deep north-south kloof with cliffs on both sides
- FP 2: Deep north-south kloof with cliffs on both sides

- FP 3: South-facing cliffs
- FP 4: Deep north-south kloof
- FP 5: South-facing cliffs
- FP 6: South-facing cliffs
- FP 7: South facing cliffs

Five dams at the control site were also identified as focal points and counts of waterbirds were conducted during each survey iteration.

Figure 8-23 indicates the position of the focal points. **Figure 8-24** indicates the locality of all nests and roosts recorded and/or confirmed during the pre-construction monitoring.

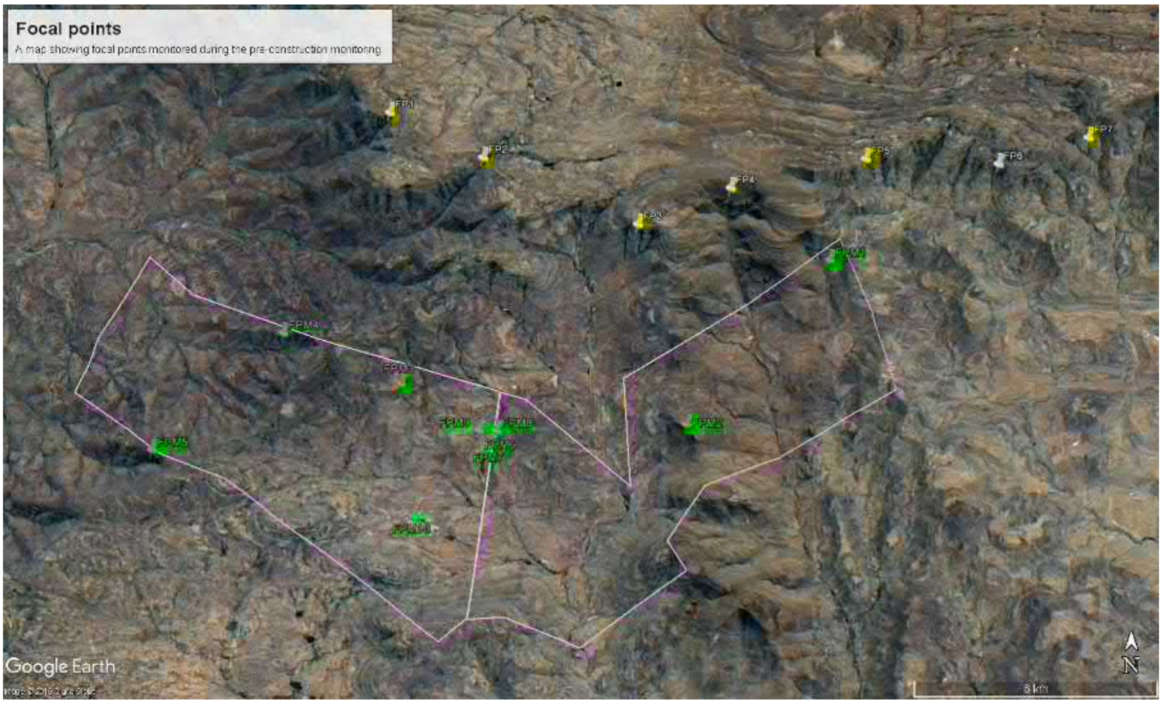

Figure 8-23: The location of focal points monitored during the pre-construction monitoring

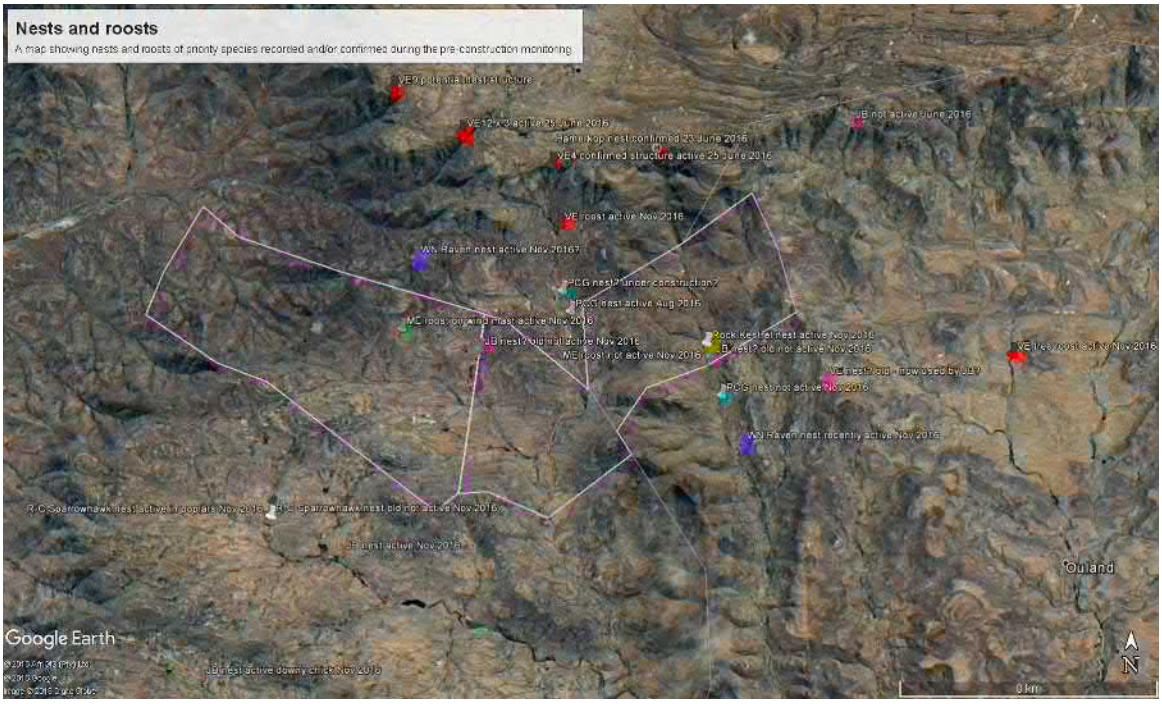

Figure 8-24: The location of roots and nests recorded and/or confirmed during the pre-construction monitoring

8.7 BATS

The Bat Assessment was undertaken by Animalia and is included in **Appendix N**.

"Probability of Occurrence" is assigned based on consideration of the presence of roosting sites and foraging habitats on the site, compared to literature described preferences. The probability of occurrence is indicative of the likelihood of encountering the bat species on site. **Table 8-5** lists the species that may be roosting or foraging on the study area, the possible site specific roosts, and their probability of occurrence based on literature (*Monadjem et al*. 2010).

The column of "Likely risk of impact" describes the likelihood of risk of fatality from direct collision or barotrauma with wind turbine blades for each bat species. The risk was assigned by Sowler and Stoffberg (2014) based on species distributions, altitudes at which they fly and distances they traverse; and assumes a 100% probability of occurrence.

There are several bat species in the vicinity of the site that occur commonly in the area. These species are of importance based on their likelihood of being impacted by the proposed WEF, due to high abundances and certain behavioural traits. The most relevant species include:

- *Tadarida aegyptiaca*, the Egyptian Free-tailed Bat, is a Least Concern species as it has a wide distribution and high abundance throughout South Africa, and is part of the Free-tailed bat family (*Molossidae*). It occurs from the Western Cape of South Africa, north through to Namibia and southern Angola; and through Zimbabwe to central and northern Mozambique (Monadjem et al. 2010). This species is protected by national legislation in South Africa (ACR 2010).
- *Neoromicia capensis* is commonly called the Cape serotine and has a conservation status of Least Concern as it is found in high numbers and is widespread over much of Sub-Saharan Africa.
- *Miniopterus natalensis*, also commonly referred to as the Natal long-fingered bat, occurs widely across the country but mostly within the southern and eastern regions and is listed as Near

Threatened (Monadjem et al., 2010). This bat is a cave-dependent species and identification of suitable roosting sites may be more important in determining its presence in an area than the presence of surrounding vegetation.

Table 8-5: Species that may be roosting or foraging on Maralla West

SPECIES	COMMON NAME	PROBABILITY OF OCCURRENCE	CONSERVATION STATUS	POSSIBLE ROOSTING HABITAT ON SITE	POSSIBLE ROOSTING HABITAT UTILIZED ON SITE	LIKELIHOOD OF RISK OF FATALITY
Tadarida aegyptiaca	Egyptian free-tailed bat	Confirmed	Least Concern	Caves, rock crevices, under exfoliating rocks, in hollow trees, and behind the bark of dead trees	Open-air forager	High
Sauromys petrophilus	Robert's flat-headed bat	90-100	Least Concern	Narrow cracks and slabs of exfoliating rock. Rocky habitat in dry woodland, mountain fynbos or arid scrub.	Open-air forager	High
Miniopterus natalensis	Natal long-fingered bat	Confirmed	Near Threatened	Cave and hollow dependent, but forage abroad. Also, take refuge in culverts and vertical hollows, holes.	Clutter-edge forager	Medium - High
Eptesicus hottentotus	Long-tailed serotine	Confirmed	Least Concern	Roosts in rock crevices	Clutter-edge forager	Medium - High
Neoromicia capensis	Cape serotine	Confirmed	Least Concern	Roosts under the bark of trees and under roofs of houses.	Clutter-edge forager	Medium - High

Four bat species were detected by the passive monitoring systems, namely, *Eptesicus hottentotus, Miniopterus natalensis, Neoromicia capensis,* and *Tadarida aegyptiaca*. *Tadarida aegyptiaca* and *Neoromicia capensis* are the most abundant bat species recorded by all systems. Common and abundant species, such as *Neoromicia capensis* and *Tadarida aegyptiaca*, are of a larger value to the local ecosystems as they provide a greater contribution to most ecological services than the rarer species due to their higher numbers. *Miniopterus natalensis* is the only migratory species detected on site. It was detected by all the monitoring systems, except for Short Mast 3. The relative abundance of this species, as detected by the monitoring systems, was over the months of April – July 2016, with it being highest in June 2016 (Short Mast 2) (**Figure 8-25** to **Figure 8-27**).

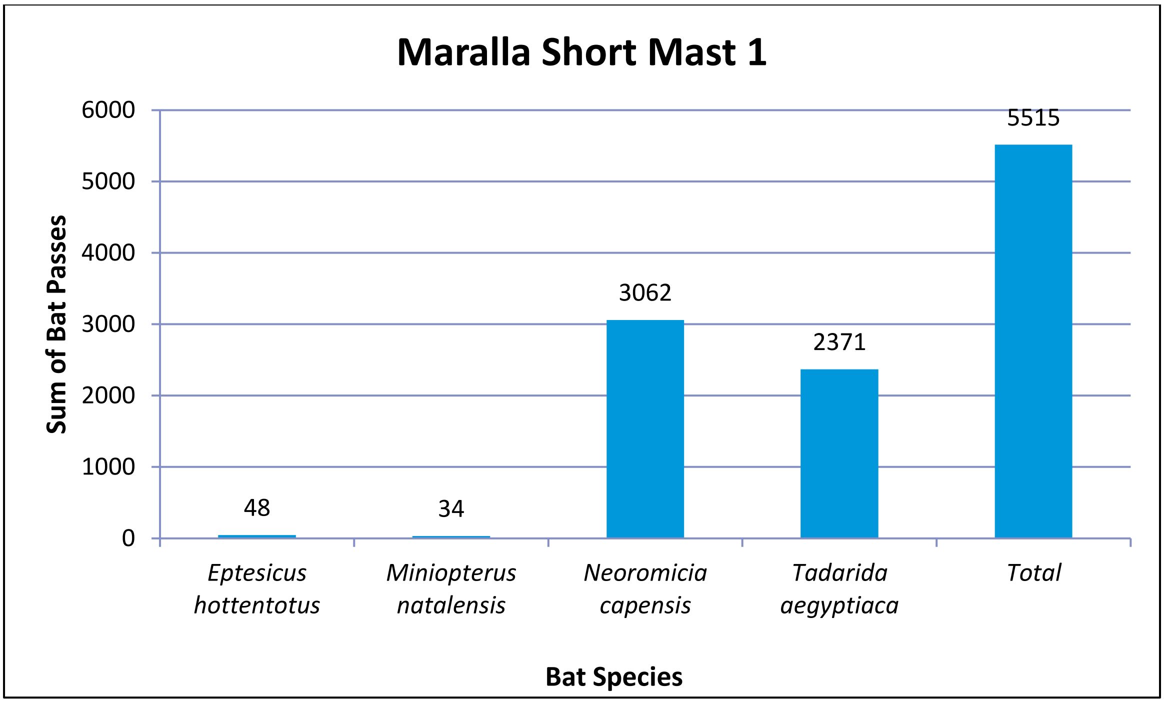

Figure 8-25: Sum of bat passes per species detected by the Maralla Short Mast 1 monitoring system

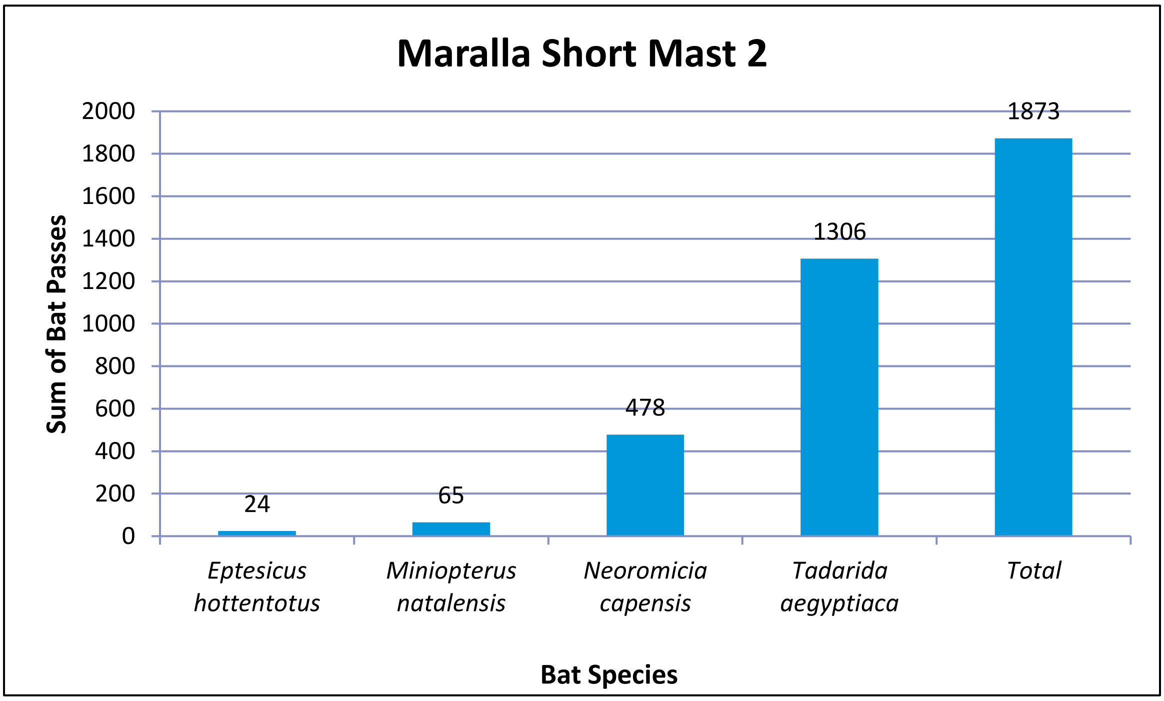

Figure 8-26: Sum of bat passes per species detected by the Maralla Short Mast 2 monitoring system

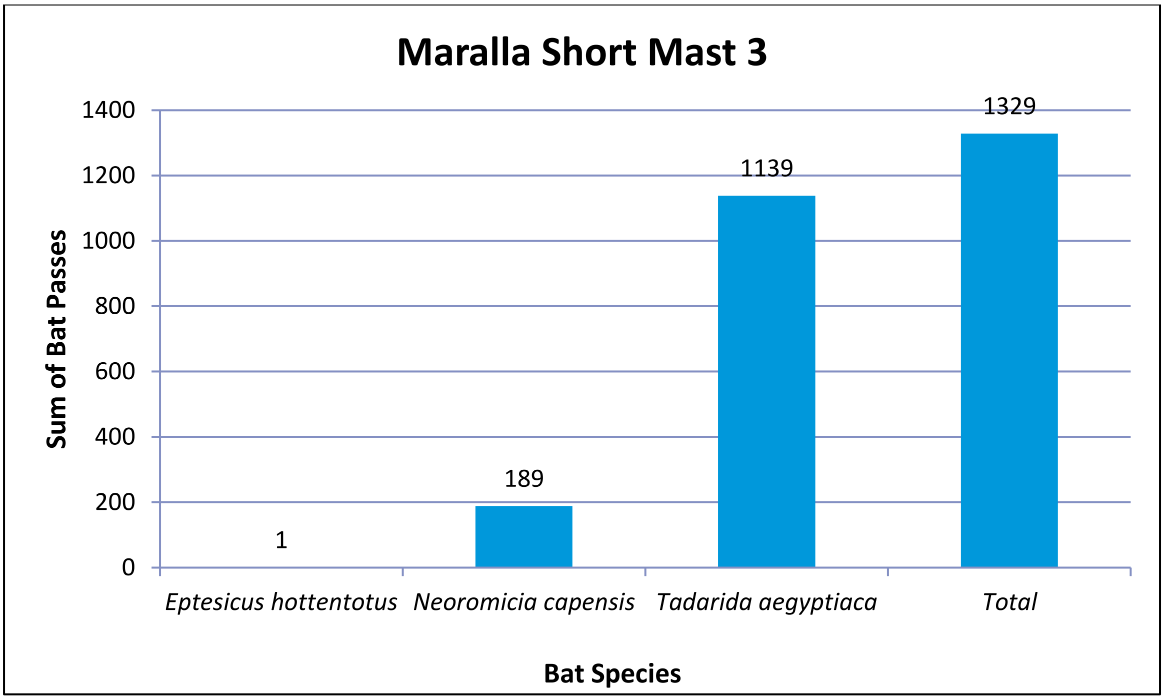

Figure 8-27: Sum of bat passes per species detected by the Maralla Short Mast 3 monitoring system

8.8 SURFACE WATER

The Surface Water Assessment was undertaken by WSP | Parsons Brinckerhoff and is included in **Appendix Q.**

The Water Resources 2012 (WR2012) Study (WRC/DWA, 2012) was used to obtain hydrological data for the area. This study modelled South Africa (including Lesotho and Swaziland) on a quaternary basis. The proposed Maralla West Site falls within the Breede-Gouritz Water Management Area 6 (WMA 6). The Maralla West Site is located within the quaternary catchments J11A and E23A. **Table 8-6** shows the hydrological characteristics of the applicable quaternary catchments.

There are numerous dry natural channels which drain the sites of water from a westerly to easterly direction. The water courses are generally ephemeral in nature which seldom shows evidence of surface water runoff due to the arid conditions of the area. The main water course viz. Kamberg River (quaternaries J11A and E23A) drains the catchment of the Maralla West site.

Table 8-6: Hydrological characteristics of the quaternary catchments (Source: WR2012, WRC/DWS, 2012)

QUATERNARY	MAP (MM/A)	MAE (MM/A)	MAR (MILLION M3/A)
J11A	295	1965	5.86
E23A	254	1895	3.25

Upon the site visit, there were several watercourses/drainage channels present within the Maralla West Site, the main river being the Kamberg which runs through the site (**Figure 8-28**). However, a few of the watercourses that were visited within the site were dry and only the Kamberg River exhibited small pools of water at intermittent section along the watercourse. Given the arid climatic condition of the region, majority of the watercourses are ephemeral and are likely to only convey water during infrequent high rainfall events.

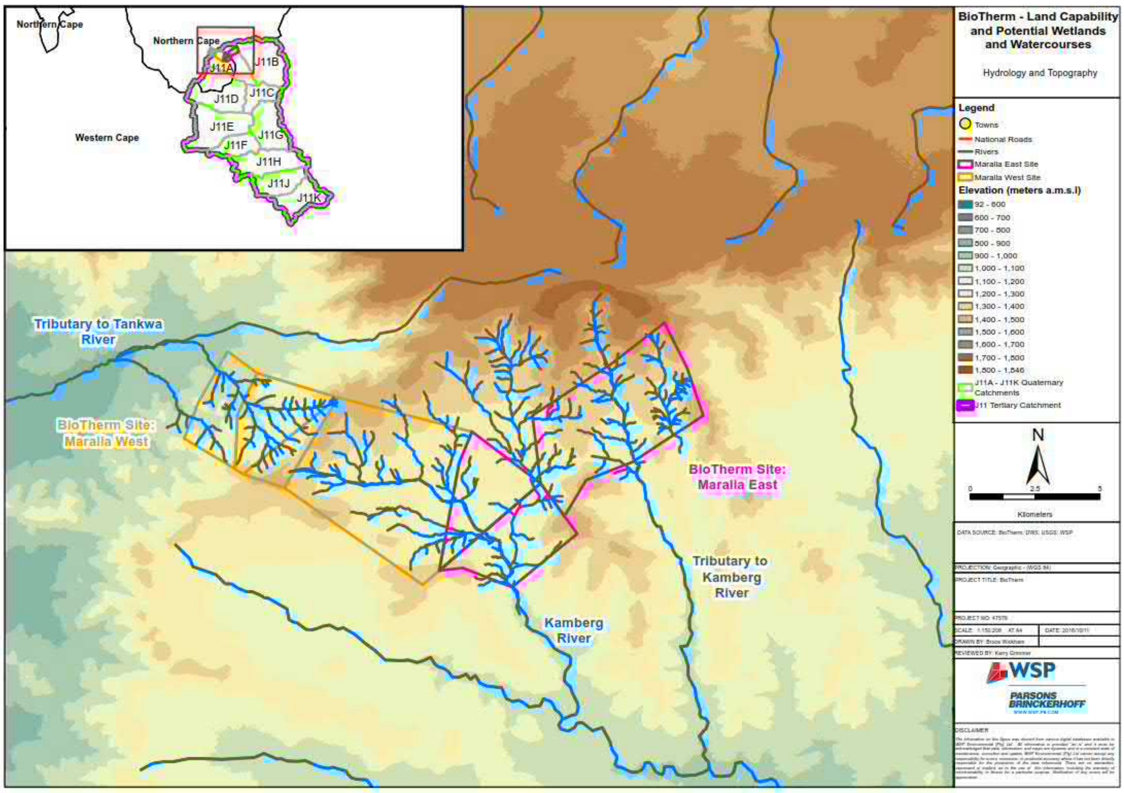

Figure 8-28: Local Hydrology and Topography

WETLANDS

A total of two Depressional Pan type wetlands were identified and delineated at the Maralla West (**Figure 8-29**). The characteristics of the wetlands include:

- Circular/oval shape of bare earth exhibiting shrink-swell cracks, typical of clayey soils, and surface fluvial flow features indicative of overland sheet flow towards the centre of the pans after high rainfall events;
- A very hard clayey layer at 0.2 – 0.3 m, which is typical of Hardpan diagnostic soil horizon;
- The soil from the centre of the Depressional Pan wetland exhibited a relatively high clay percentage (20%), which decreased further away from the centre (6%); and
- A well-defined ring of shrub-like vegetation around the edge of the wetland, which is indicative of the Central Mountain Shale Renosterveld natural vegetation.

The location of the two Depressional Pan in relation to the proposed infrastructure of the Maralla West wind facility is indicted in **Figure 8-29. Figure 8-29** illustrates that the majority of the wind turbines, roads and cables fall within 500m of a watercourse and Depressional pans, yet none of infrastructure sits within 32m radius from pan.

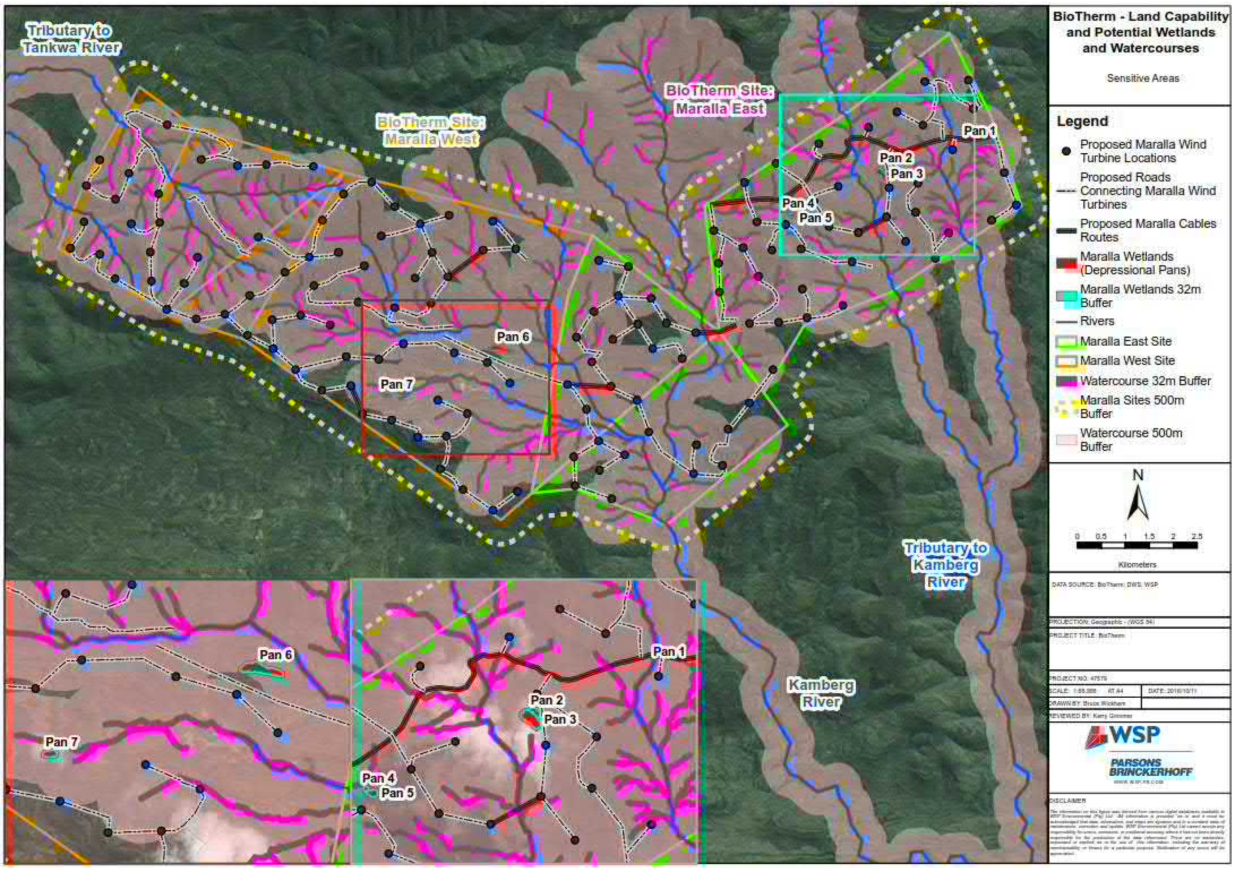

Figure 8-29: Confirmed Wetlands on Maralla West WEF

8.9 HERITAGE

The Heritage Assessment was undertaken by ACO Associates and is included in **Appendix R**.

ARCHAEOLOGICAL BACKGROUND

There is at least two concentrations of archaeological (with later, superimposed historical) sites on Maralla West, one along a stream ("River Settlement"), and the second along the public gravel road which bisects Drie Roode Heuvels (Die Kom) named "Road Settlement":

- River Settlement - There are several well-defined LSA sites with relatively abundant artefactual material (including Khoekhoen pottery) associated with water sources such as small streams and spring. These "pastoralist" sites are found on sandy river banks, often in proximity to later colonial sites. There are numerous stone kraals and abandoned stockpost dwellings in the same area;
- Road Settlement - There are remains of a large, late 19th century settlement, on Drie Roode Heuvels, on both sides of the public gravel road. It comprises a series of kraal complexes to the west of the road, as well as a threshing floor (trapvloer) and a wide distribution of 19thcentury ceramics and glass. This site has been bisected by the gravel road, as the graveyard, containing at least 12-15 Christian style graves, is located to the east of the road. There is also extensive stone walling, on both sides of the road.

There are no significant archaeological resources on the high lying ridges which will accommodate the wind turbines.

HISTORICAL BACKGROUND

The Roggeveld and Sutherland area were settled from as early as 1750 (Schoeman 1986; Penn 2005). The early farmers found the escarpment, which enjoys the highest rainfall, particularly suitable for small stock farming during the summer months but they moved down into the valleys and plains of the Karoo to escape the extreme winters. Drought, poor grazing and attacks by the San caused many farms to be abandoned. Per Penn (2005), in the 18th century there were numerous independent Khoekhoen kraals located amongst the Trekboer farms in the Roggeveld. While the violent conflict between the various groups has been well documented, very little is known of the peaceful interaction and assimilation which took place over the last 200 years.

The Built Environment of the area is characterised by farmhouses (some containing an inner core dating to the 19th century), barns, stone kraals, shepherds stockposts, etc. The generic house comprised a "small oblong low hut" built of slabs of leiklip piled on top of each other, un-plastered, with a reed roof. However, very few of these structures have been preserved. A fine example, although much altered, of a 19th century vernacular farmhouse can be found on Wolven Hoek (Maralla West WEF). Some of the stone structures described above under pre-colonial settlements, may in fact represent colonial-era stockposts. They are generally identified by associated historic ceramics and glass. These colonial settlements are invariably found in river valleys, close to a permanent source of water.

HISTORY OF THE FARMS

- **Drie Roode Heuwels 180:** An earlier circular loan farm granted to SJ Botma (who also owned Schalkwykskraal) in 1838. It then passed into the hands of a Maritz, Moller and de Vos. It was subdivided in the 1930's. The historic farmhouse of Die Kom (Plate 2) has been renovated by the new owners;
- **Annex Drie Roode Heuwels 181:** Granted to Abraham le Roux (who also owned Schalkwykskraal, Wolvenhoek and Schietfontein) in 1893. This portion of land was originally part of Wolvenhoek and subsequently incorporated into Drie Roode Heuwels;
- **Wolvenhoek 182:** Surveyed in 1893 and originally granted to Abraham le Roux. Thereafter the property was owned by a number of different families including Theron, Brink and van Wyk. It was subdivided in 1939. There is a late 19th century vernacular cottage on the property, right next to the access road (Plate 3). The house has been partially renovated, with a bathroom added to the back. It retains, however, many of its original features;

CEMETERIES AND GRAVES/CAIRNS

Farm cemeteries and graves have been recorded in the Maralla West WEF study areas. The cemeteries are generally closely associated with farm settlements such as at Die Kom (Drie Roode Heuvels). In some cases, the cemetery is situated in proximity to a ruined settlement and is no longer easily identified, as is the case on Drie Roode Heuvels, where the current gravel road to the escarpment bisects and old settlement and graveyard.

There are also several isolated graves in the veld, many of them covered with flat slabs and without headstones. These are very difficult to identify and the list provided in Tables 2 may not be comprehensive.

LANDSCAPE AND SCENIC ROUTES

Hart (2016) describes the Cultural Landscape of the region thus: "The ridge tops where the proposed activities will take are windswept and bleak; some areas are completely devoid of farm tracks making access to the higher mountain areas a tortuous task. The sense of isolation, nature and desertification do impart a certain beauty and distinct sense of place. Overall a Grade IIIB is recommended (medium local significance), however there are enclaves of high aesthetic value and views from the higher ridges are spectacular and worthy of Grade IIIA".

According to Winter & Oberholzer (2013), the R354 between Matjiesfontein and Sutherland, which crosses the Klein Roggeveld Mountains, is an area of high scenic and rural value. It is an important tourism route to the Sutherland Observatory and is considered of Route III significance.

Webley & Halkett (2016) have given this landscape a preliminary field grading of IIIB to IIIA as the study area is remarkably intact and deeply layered.

8.10 PALAEONTOLOGY

The Palaeontological Assessment was undertaken by Natura Viva and is included in **Appendix S**.

The geology of the Maralla West WEF study area is outlined on the 1: 250 000 geology sheet 3220 Sutherland (Council for Geoscience, Pretoria; Theron 1983, Cole & Vorster 1999). The area lies on the gently-folded northern margin of the Permo-Triassic Cape Fold Belt (CFB) and is dominated by bedrocks of the Karoo Supergroup within the Main Karoo Basin (Johnson et al. 2006). Gentle folding along west-east trending fold axes of Lower Beaufort Group bedrocks is apparent within the study area. In general bedding dips are not high, however (5-15 degrees on geological map), and levels of tectonic deformation are usually low, with little cleavage development. Dykes and sills associated with the Karoo Dolerite Suite of Early Jurassic age are not mapped within the study area, but are represented elsewhere within the Klein-Roggeveld region. Only one mappable sedimentary bedrock unit or formation is represented within the study area, namely:

- → Fluvial and lacustrine mudrocks and sandstones of the Abrahamskraal Formation (Lower Beaufort Group / Adelaide Subgroup) of Middle Permian age. These beds crop out over the entire study area, including beneath almost all proposed wind turbine positions.

Levels of bedrock exposure in the Klein-Roggeveldberge region are generally very low due to the pervasive mantle of Late Caenozoic superficial deposits such as alluvium, colluvium (scree, hillwash), surface gravels, pedocretes (e.g. calcrete) and soils, as well as karroid bossiveld vegetation. Most of these deposits are of Quaternary to Holocene age. They have not been separately mapped at 1: 250 000 scale within the Maralla West WEF project area.

FOSSILS IN THE LOWER PART OF THE ABRAHAMSKRAAL FORMATION

A chronological series of mappable fossil biozones or assemblage zones (AZ), defined mainly on their characteristic tetrapod faunas, has been established for the Main Karoo Basin of South Africa (Rubidge 1995, 2005, Van der Walt et al. 2010, Smith et al. 2012). Maps showing the distribution of the Beaufort Group assemblage zones within the Main Karoo Basin have been provided by Keyser and Smith (1977-1978) and Rubidge (1995, 2005). A recently updated version is now available (Nicolas 2007, Van der Walt et al. 2010).

The earliest terrestrial vertebrate faunas of the Main Karoo Basin, recorded from the lowermost part of the Abrahamskraal Formation are assigned to the Eodicynodon Assemblage Zone of c. 268-265 million years ago (Rubidge 1995, Smith et al. 2012). The Combrinkskraal Member sensu lato (including the Combrinkskraal and Grootfontein Members of Day & Rubidge 2014) is assigned to the Eodicynodon AZ (ibid, Jinnah & Rubidge 2007). Only a few fossil tetrapod (i.e. four-limbed vertebrate) remains have been discovered from the lowermost Abrahamskraal Formation beds along the southern and south-western margins of the Great Karoo. They are dominated by small dicynodont therapsids (mammal-like reptiles) as well as extremely rare, large-bodied dinocephalians (**Figure 8-30**). Sparse, disarticulated skeletal remains and sizeable burrows of small-bodied tetrapods – probably the dicynodont Eodicynodon itself - have recently been recorded from lower Abrahamskraal Formation beds in the Klein-Roggeveld region (Almond 2016c). Other interesting fossils from the lowermost Abrahamskraal Formation include well-preserved, reedy swamp plants (horsetail ferns) and possible lungfish burrows (cf Almond 2010a, Hasiotis et al. 1993, Odendaal & Loock 2015).

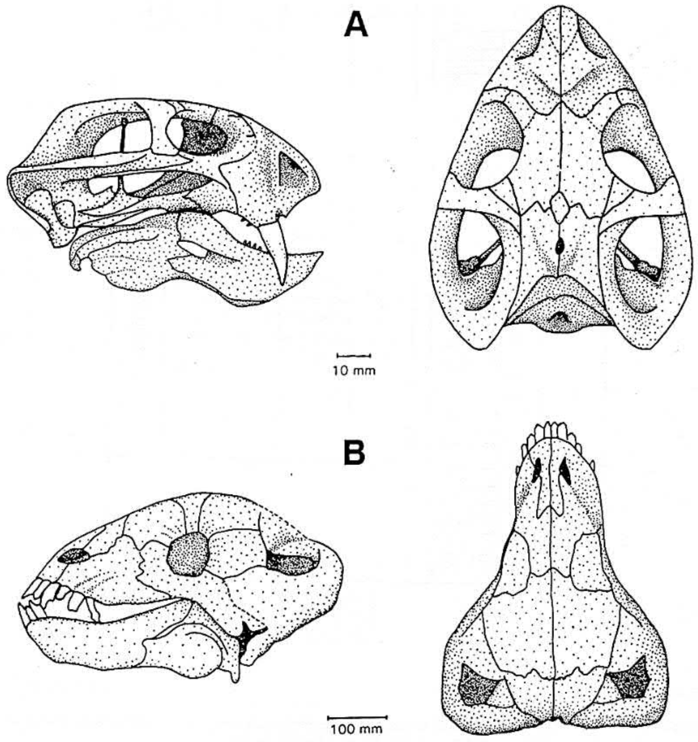

Figure 8-30: Skulls of two key fossil therapsids from the Middle Permian Eodicynodon Assemblage Zone: A – the small dicynodont Eodicynodon; B – the rhino-sized dinocephalian Tapinocaninus (From Rubidge 1995)

Rare to moderately abundant fossil vertebrates from the upper portion of the Leeuvlei Member and the overlying Koornplaats Member of the Abrahamskraal Formation are assigned to the Middle Permian Tapinocephalus Assemblage Zone. The main categories of fossils recorded within the Tapinocephalus fossil biozone (Keyser & Smith 1977-78, Anderson & Anderson 1985, Smith & Keyser 1995a, MacRae 1999, Rubidge 2005, Nicolas 2007, Almond 2010a, Smith et al. 2012, Day 2013a, Day 2013b, Day et al. 2015b) (**Figure 8-31**) include:

- Isolated petrified bones as well as rare articulated skeletons of tetrapods (i.e. air-breathing terrestrial vertebrates) such as true reptiles (notably large herbivorous pareiasaurs like Bradysaurus, small insectivorous millerettids), rare pelycosaurs, and diverse therapsids or “mammal-like reptiles” (e.g. numerous genera of large-bodied dinocephalians, herbivorous dicynodonts, flesh-eating biarmosuchians, gorgonopsians and therocephalians);
- Aquatic vertebrates such as large temnospondyl amphibians (Rhinesuchus, usually disarticulated), and palaeoniscoid bony fish (Atherstonia, Namaichthys, often represented by scattered scales rather than intact fish);
- Freshwater bivalves (Palaeomutela);
- Trace fossils such as worm, arthropod and tetrapod burrows and trackways, coprolites (fossil droppings) and plant root casts;
- Vascular plant remains (usually sparse and fragmentary), including leaves, twigs, roots and petrified woods (“Dadoxylon”) of the Glossopteris Flora, especially glossopterid trees and arthrophytes (horsetail ferns).

In general, tetrapod fossil assemblages in the Tapinocephalus Assemblage Zone are dominated by a wide range of dinocephalian genera and small therocephalians plus pareiasaurs while relatively few dicynodonts can be expected (Day & Rubidge 2010, Jirah & Rubidge 2010 and refs. therein).

Vertebrate fossils in this zone are generally much rarer than seen in younger assemblage zones of the Lower Beaufort Group (Loock et al. 1994).

Fossils in the Tapinocephalus Assemblage Zone occur in association with both mudrocks and sandstones, most notably in thin intraformational conglomerates (beenbreksie) at the base of channel sandstones (Rossouw & De Villiers 1952, Turner 1981, Smith & Keyser 1995a). Tetrapod bones actually occur in a wide range of taphonomic settings in the Tapinocephalus Assemblage Zone (Almond 2010a).

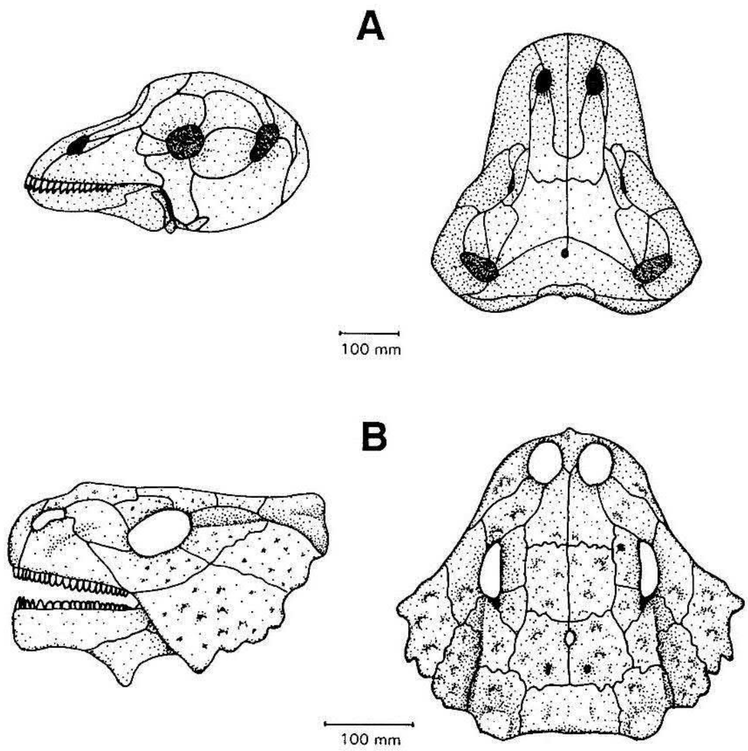

Figure 8-31: Skulls of two key large-bodied tetrapods of the Tapinocephalus Assemblage Zone: A – the dinocephalian therapsid Tapinocephalus; B – the pareiasaur Bradysaurus (From Smith & Keyser 1995b).

No tetrapod skeletal fossils or traces (e.g. burrows, trackways) were recorded from the Abrahamskraal Formation in the Maralla West WEF study area during the recent field study. This was despite a careful search of several good exposures showing well-developed palaeosols as well as of the infrequent calcrete-dominated breccio-conglomerates that elsewhere in the Karoo may contain reworked disarticulated bones and teeth (See Appendix for locality details). The scarcity of vertebrate fossil remains would support the contention that beds from the fossil-poor lowermost part of the Abrahamskraal Formation are represented here.

Invertebrate trace fossils recorded from the Maralla West WEF study area include several occurrences of small (c. 8 mm wide) meniscate back-filled burrows assigned to the ichnogenus Scoyenia and characteristic of damp substrates, such as the sandy margins of ponds and rivers. A more unusual, broader cylindrical burrow with a segmented (back-filled) internal structure and possible short side branches was also recorded on Wolwenhoek 182.

Mudrock and sandstone bedding planes with dense assemblages of narrow, vertical, subcylindrical structures are commonly seen in the Abrahamskral Formation They are interpreted as the sand-infilled moulds of reedy plants - probably sphenophyte ferns (horsetails) - that colonised extensive swampy settings along river banks and floodplain lakes. Finely-ridged, segmented stem compressions and moulds of sphenophyte stems occur abundantly in some mudrock horizons. No petrified wood occurrences were noted in the study area.

FOSSILS IN THE LATE CAENOZOIC SUPERFICIAL SEDIMENTS

The wide spectrum of Late Caenozoic superficial sediments overlying the Palaeozoic and Mesozoic bedrocks in the study area are generally fossil-poor. Important occurrences of bones, teeth and horn cores may occasionally be found in better-consolidated Quaternary alluvial deposits, while finer-grained sediments and calcretes may contain fossilised burrows (e.g. termitaria), freshwater molluscs and plant root casts (e.g. Skead 1980, Klein 1984, Bousman et al. 1988, Brink & Rossouw 2000, Churchill et al. 2000, Cole et al. 2004, Rossouw 2006). Surface gravels on the footslopes of the Klein-Roggeveld escarpment to the southwest of the present study area as well as in nearby valleys contain locally common blocks of silicified wood that have probably been reworked from petrified logs within the Waterford Formation outcrop area (Almond 2016b, 2016c). No reworked blocks of petrified wood or other fossils were recorded from the superficial sediments in the Maralla West WEF study area, however.

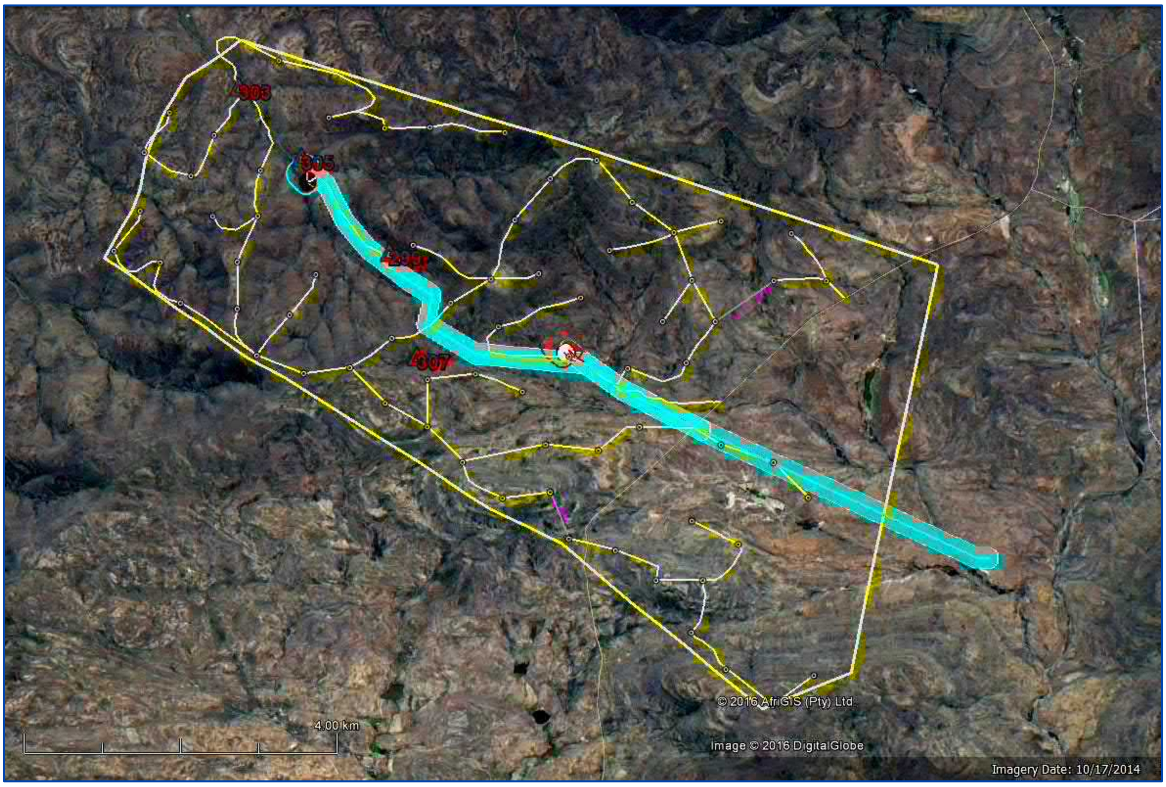

Figure 8-32: Distribution of recorded fossil sites within the Maralla West WEF project area

8.11 VISUAL

The Visual Assessment was undertaken by Belinda Gebhardt and is included in **Appendix T**.

VISUAL CHARACTER

Landscape character is the description of the pattern of the landscape, resulting from particular combinations of natural (physical and biological) and cultural (land use) factors. It focuses on the inherent nature of the land. The basis for the visual character of the area is therefore provided by the underlying geology and climate.

The climate of the region is arid to semi-arid with very low rainfall. This together with the geology, of the area, has resulted in rugged landforms with low growing, karoo shrub extending over an expansive, undulating landscape. The uninhabited nature of the wide open spaces gives a feeling of remoteness and isolation (**Figure 8-33**).

The mountainous areas to the north provide topographic interest. The rugged skyline ridges against the high clear skies serve as backdrops to the undulating plains. The colours of the land are soft greys, browns and muted greens which contrast with the high blue skies. Occasional clusters or shelterbelts of trees, the only taller vegetation in the region, are visually conspicuous features in the landscape and are often situated close to the homesteads which are nestled in the valleys.

The current land-use in the area does not significantly alter the natural visual character. The study area is remote and sparsely populated. The patterns created by the winding powerlines, fences and roads, with few dwellings or other man-made structures add to the sense of wilderness and isolation.

Figure 8-33: Visual Character: remote, arid and undulating

SENSE OF PLACE

An area will have a stronger sense of place if it can easily be identified, that is to say if it is unique and distinct from other places. Lynch defines 'sense of place' as "*the extent to which a person can recognise or recall a place as being distinct from other places – as having a vivid or unique, or at least a particular, character of its own*" (Lynch, 1992:131).

The greater area, known as the Moordenaars Karoo, has a strong sense of place defined by its dry, undulating landscape and feeling of remote stillness and isolation. The mountains to the north and west define the greater area but the sites themselves are not easily recognisable from the surrounding landscape.

VISUAL QUALITY

Aesthetic value is an emotional response derived from our experience and perceptions. As such, it is subjective and difficult to quantify in absolute terms. Studies in perceptual psychology have shown that humans prefer landscapes with higher complexity (Crawford, 1994). Landscape quality can be said to increase when:

- Natural landscape increases and man-made landscape decreases;
- Well-preserved, compatible man-made structures are present;
- Diverse or vivid patterns of grasslands and trees occur;

- Water forms are present;
- Topographic ruggedness and relative relief increases; and
- Where land use compatibility increases (Crawford, 1994, Arriaza, 2004).

Greater aesthetic value is also attached to places where:

- Rare, distinguished or uncommon features are present;
- The landscape/townscape evokes particularly strong responses in community members or visitors;
- The landscape/townscape has existing, long-standing meaning or significance to a particular group; and
- Landmark quality features are present. (Ramsay, 1993).

Visual quality therefore is an estimation of the composition of landscape and man-made elements and their resulting visual or scenic excellence.

The undulating, arid plains of the Moordenaars Karoo with the backdrop of the rugged rocky mountains of the Great Escarpment contrast dramatically with the strikingly clear skies and create a landscape which is appealing in its expanse and remote nature. While not symbolic, the vastness of this remote landscape is evocative. Generally, the majority of inhabitants can be said to have a strong connection with, and affinity for, the land and the large, undisturbed open spaces that are characteristic of the landscape.

The Great Escarpment, here represented by the Klein Roggeveld and Komsberg Mountains, has high visual value, due to the scenic physical forms, un-spoilt and remote nature of the area and excellent views.

The visual features which create the landscape pattern are therefore considered to currently have a high visual quality due to:

- the compatibility of the land-use;
- the general absence of intrusive, man-made features;
- The rugged nature of the topography; and
- the evocative visual character of the undulating, arid plains.

Some areas close to the sites have been vertically compromised, due the extensive power lines on high towers which zigzag through the landscape. When the area is developed as a REDZ the concentration of turbines will alter the visual character, compromising the rural character and providing a cleaner, more futuristic or modern character.

8.12 TRAFFIC

The Transport Impact Assessment was undertaken by WSP | Parsons Brinckerhoff and is included within **Appendix O**.

The site is located east of Provincial route, road R354 (TR02001). The road links National Road N1 to the south at Matjiesfontein; with Sutherland to the north. An unsurfaced local road traverses the site, and connects to the R354 to the south-west in the Western Cape, and to the north-west in the Northern Cape.

The R354 is a single carriageway 2-way surfaced road (1 lane per direction), with no surfaced shoulders. It is regarded as in “Fair” and “Good” condition on the section located in the Western

Cape, as per the Provincial Government of the Western Cape (PGWC) Department of Transport's 2015 Surfaced Road Condition Assessment.

Traffic surveys were sourced from the Western Cape Government Road Network Information System (RNIS), (https://rnis.pgwc.gov.za/rnis/rnis_web_reports).

Counts undertaken during April 2015 confirm very low traffic volumes on the R354, these were escalated to the current year and total 145 AADT (Annual Average Daily Traffic). The counts were undertaken on the section between the DR2243 Aprilkraal intersection and the Northern Cape border.

8.13 NOISE

The Acoustic Assessment was undertaken by WSP | Parsons Brinckerhoff and is included within **Appendix N**.

The existing noise climate in the area surrounding the proposed wind energy project is typically rural with limited anthropogenic influences. Current sources of noise include livestock, birds, insects and motor vehicles travelling along nearby roads. Three farmhouse receptor locations were identified in and around the Maralla West project (**Figure 8-34**).

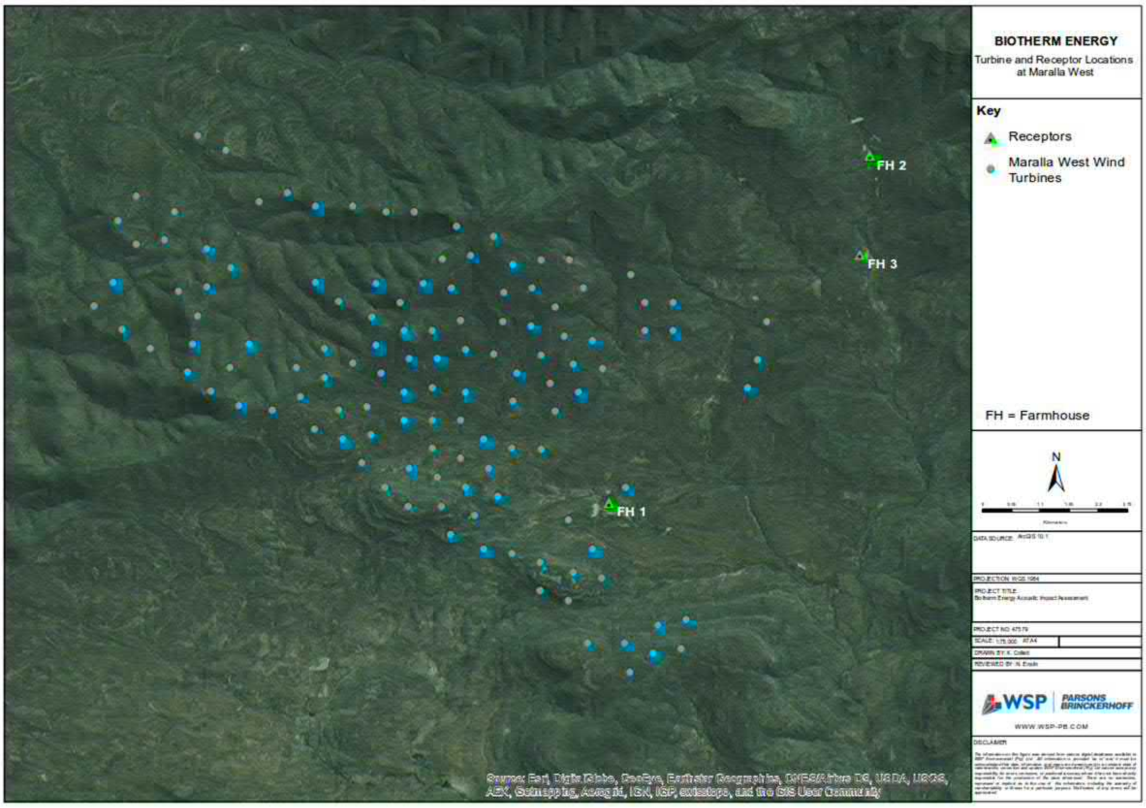

Figure 8-34: Farmhouse Receptors around Maralla West

Ambient sound level monitoring was conducted at three receptor locations surrounding the proposed site during April 2016. Results from this monitoring are presented in **Table 8-7**, **Figure 8-35** and **Figure 8-36**. Average day-time (L_{Aeq}) sound levels are fairly similar to the SANS day-time rural rating level (45 dB(A)), with current ambient sound levels at two of the three receptors slightly above this guideline. At night, noise levels drop considerably, with current ambient sound levels at Farmhouse 2 and 3 well below the rural guideline level (35 dB(A)). At Farmhouse 1, activities at the farmhouse as well as noise from nearby livestock, contributed to the slightly elevated ambient levels recorded.

It must be noted that as a result of safety constraints at night due to the remoteness of the Maralla West site, sound level monitoring could not be undertaken during the night-time timeframe (22:00 – 06:00) as prescribed in SANS 10103 at all receptor locations. As such, in order to present a worst-case assessment, the lowest L_{Aeq} value (25.6 dB(A)) for night time was applied as the current baseline level to all receptor locations when assessing changes in noise as a result of the Maralla West wind energy facility.

Owing to the remoteness of the site, with limited impact from external sources, the day-time monitored levels are considered an accurate representation of ambient conditions. Similar noise levels were recorded during the three day-time periods at Farmhouse 1 and Farmhouse 3. Slight variations in the day-time monitored noise levels at Farmhouse 2 can be attributed to cars operating at the receptor during different times of the day.

Table 8-7: Sound level monitoring results at the three farmhouse receptor locations surrounding the Maralla West site

Farmhouse 1			
Date	**Time**	**L_{Aeq}**	**L_{A90}**
14 April 2016	08:09	44.3	34.5
13 April 2016	11:32	44.3	32.5
13 April 2016	17:28	42.6	37.5
Day-time Average		43.8	34.8
13 April 2016	22:09	42.0	21.0
Farmhouse 2			
Date	**Time**	**L_{Aeq}**	**L_{A90}**
14 April 2016	05:53	38.8	23.5
13 April 2016	12:50	50.7	35.0
13 April 2016	15:05	47.6	29.5
Day-time Average		47.8	29.3
13 April 2016	19:48	30.0	19.5
Farmhouse 3			
Date	**Time**	**L_{Aeq}**	**L_{A90}**
14 April 2016	06:58	40.0	20.0
13 April 2016	14:00	49.4	33.0
13 April 2016	16:10	47.0	31.5
Day-time Average		46.9	28.2
13 April 2016	20:53	25.6	18.5

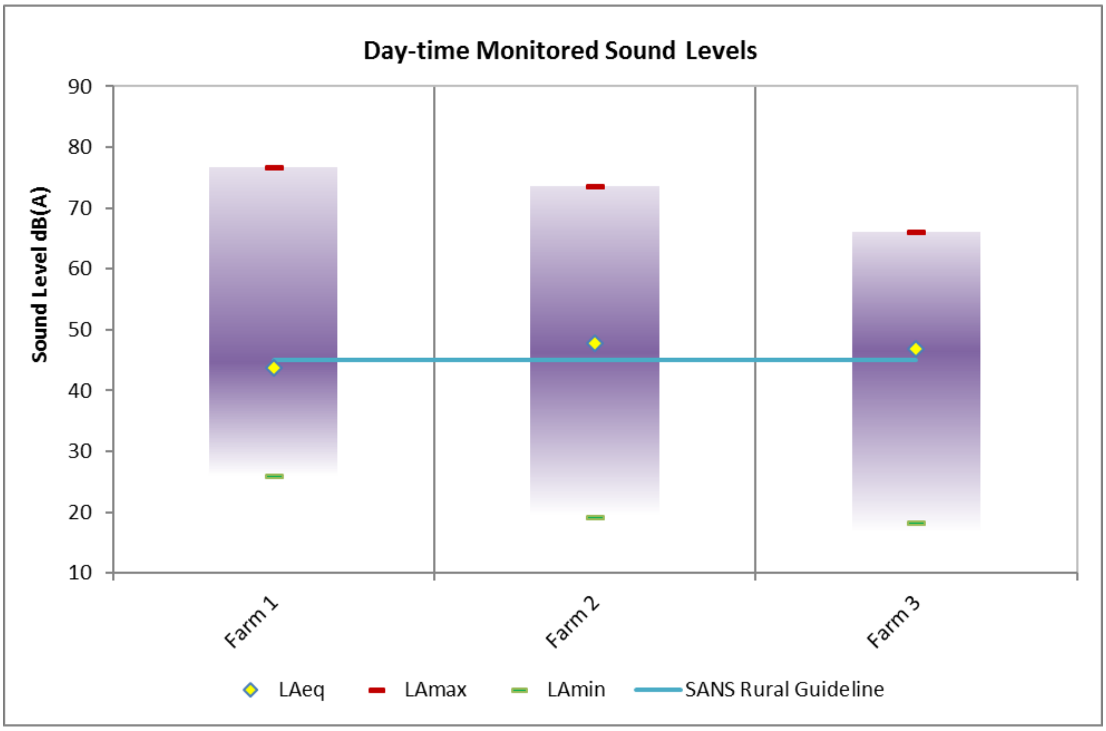

Figure 8-35: Day-time average sound levels in the vicinity of the Maralla West site. Note, L_{Aeq} is assessed against the SANS guideline.

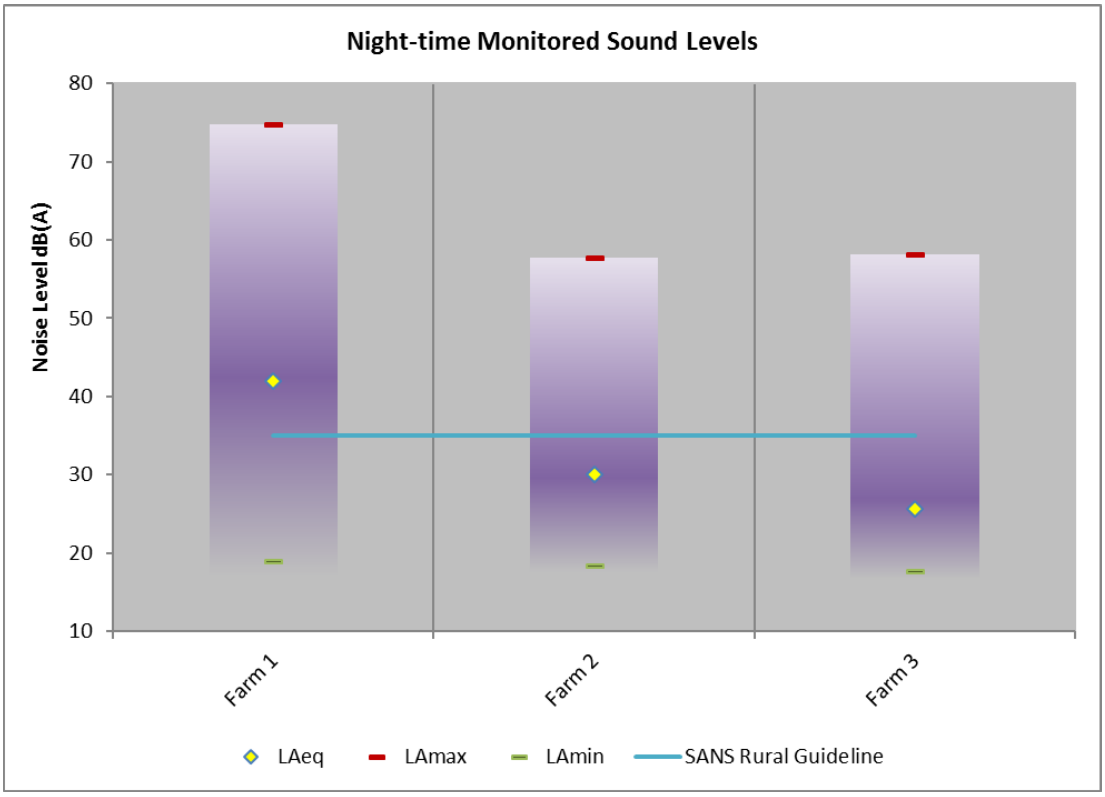

Figure 8-36: Night-time average sound levels in the vicinity of the Maralla West site. Note, L_{Aeq} is assessed against the SANS guideline

8.14 SOCIAL ENVIRONMENT

The social specialist study was undertaken by WSP | Parsons Brinckerhoff and is included in **Appendix V**.

SOCIO-ECONOMIC CONTEXT

NORTHERN CAPE PROVINCE

The proposed Maralla West Wind Facility site is located within the Northern Cape Province (**Figure 8-39**). The Northern Cape is the largest province within South Africa, 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 one person per square kilometre) (Statistics South Africa, 2016). The population comprises predominantly Black African (50%) and Coloured (40%) population groups (**Figure 8-37**). The two main first languages spoken within the province are Afrikaans (53%) and Setswana (33%) (**Figure 8-37**).

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.

Geographically 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.

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 8-38** 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).

Extensive sheep, goat, and cattle rearing are prominent in the province due to the sparse, arid climate. Farmers in the province contribute to 6.1% to South African agriculture and 6.6% of the province's economy (Statistics South Africa, 2012). Mining (including diamonds, iron, titanium, zinc, lead, and copper) is one of the main economic sectors, generating nearly 7% of South Africa's total mining value and contributes 23.4% to the provinces total economy.

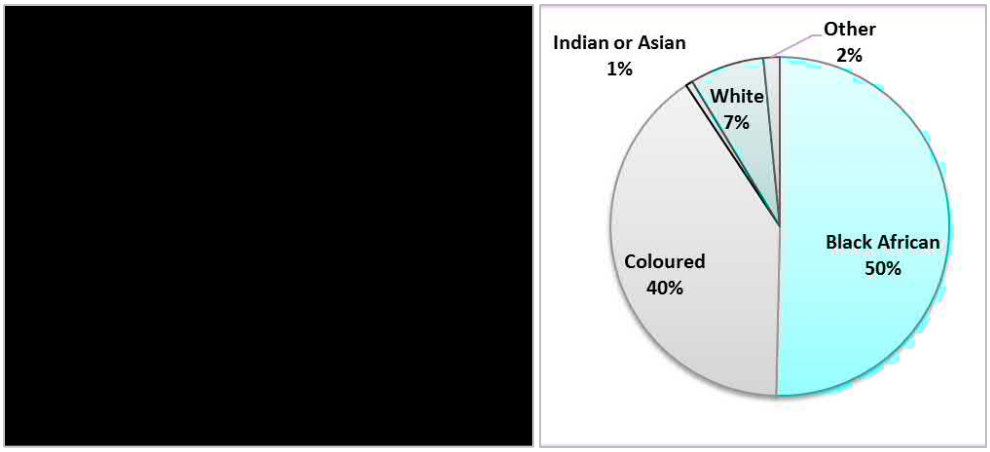

Figure 8-37: Population groups and languages spoken – Northern Cape (Statistics South Africa (2012))

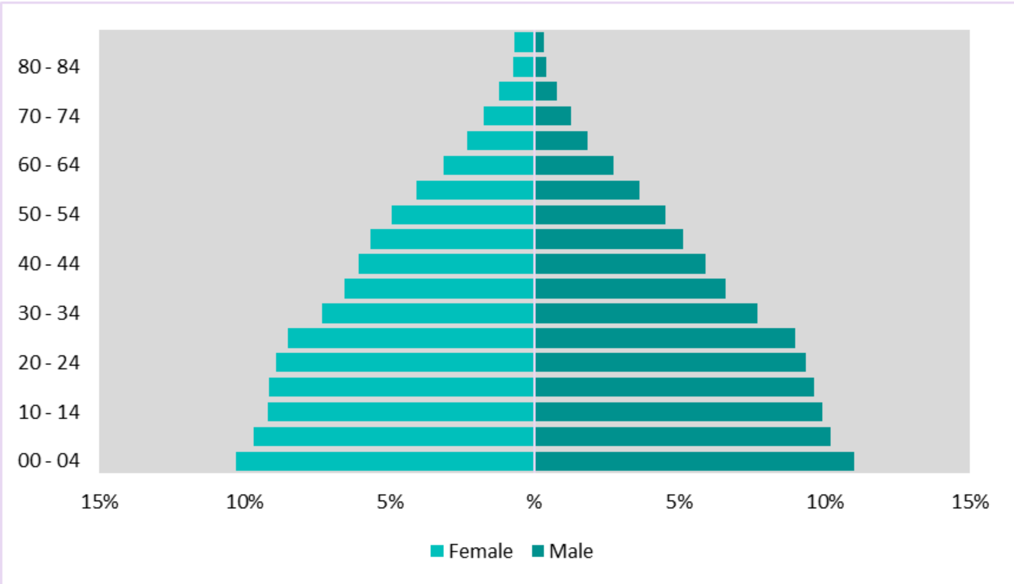

Figure 8-38: Population pyramid – Northern Cape (*Statistics South Africa (2012)*)

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

Figure 8-39: The regional location of the Maralla West site

CENTRAL KAROO DISTRICT MUNICIPALITY

Central Karoo District Municipality is one of five districts situated in the Western Cape Province and covers a total area of 38 854 km^2 (Central Karoo District Municipality, 2012). The Central Karoo is the largest district in the Western Cape, is predominantly arid and rural in nature, and covers a large, sparsely populated area. The majority (83%) of the population is concentrated in urban areas of the municipality (Statistics South Africa, 2012). The main language spoken within the district municipality is Afrikaans, and of the total population of approximately 71 000, 76% are Coloured.

The unemployment rate is high at 30.8% compared to the provincial (22.2%) and national (26.6%) levels (Central Karoo District Municipality, 2012 and Statistics South Africa, 2012). With a moderate to high dependency ratio of 58%, the high unemployment is a significant issue for the local population. This is further hampered by a relatively high percentage of the pollution over 20 not having any schooling (10% compared to the national 8%) and 39% with a matric (compared to 41% nationally).

The key economic sectors within the district are agriculture; community, social and personal services, and wholesale and retail trade (Central Karoo District Municipality, 2012). The arid climate, water scarcity, limited connectivity, and low to moderate infrastructure within the district municipality are economic development constraints for this area.

LOCAL CONTEXT

The local context refers to the area surrounding the study area contextualised within local municipality. The proposed Maralla West Wind Facility site is located within the Karoo Hoogland Local Municipality, which forms part of the Namaqua District Municipality, in the southernmost area of the Northern Cape. The three main towns in Karoo Hoogland Local Municipality are Williston, Fraserburg and Sutherland (Karoo Hoogland Local Municipality, 2015).

The human settlement within the Karoo Hoogland Local Municipality is concentrated within urban areas, with farming communities and settlements dispersed across the municipality. The population is 12 588, with a population density of 0.4 persons per square kilometre (Statistics South Africa, 2012). The groups representing the highest percentages of the municipality's population are Coloured (79%), followed by White (15%) and Black African (6%) (Statistics South Africa, 2012). The most-spoken first language is Afrikaans (90%), with 1% of the population speaking English and isiXhosa.

The population of the Karoo Hoogland Local Municipality is relatively stable; however, a notable gap occurs between the ages of 15 – 39 (**Figure 8-40**). This may be indicative of on out-migration of youth in search of education and employment. The dependency ratio is 61%, which is 1.6 dependants for every working age person.

The service levels within the local municipality are moderate with 73.4% of the households having access to electricity for lighting, 58.5% for cooking and 46.4% for heating. This is due to majority (73.3%) of the population residing in urban areas. Sixty-two percent of the municipality's water service is provided by the municipality and other water services, while 33.8% is sourced from boreholes. Refuse removal services level are moderate, as 62.7% of households have their refuse removed by the local authority. Sanitation levels are low with only 39.4% having flush toilets connected to a sewer system. A lack of infrastructure has been identified by the Karoo Hoogland IDP as one of the key a priority development needs (Karoo Hoogland Local Municipality, 2015).

The education levels within the local municipality are low compared to the national average, as indicated in **Figure 8-41**. Areas with low levels of education and skills generally present a lower level of economic employment than populations with higher education levels, as indirect opportunities through entrepreneurship are also lost. There are therefore likely to be low numbers of skilled individuals available for employment within the Karoo Hoogland Local Municipality.

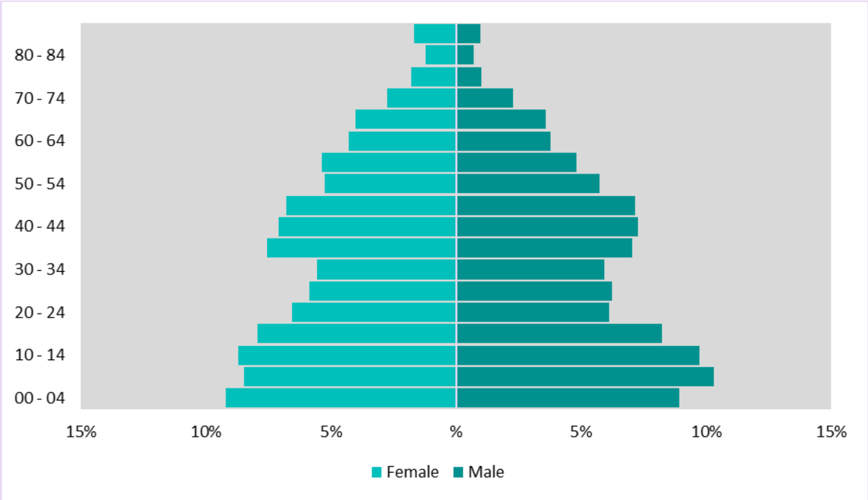

Figure 8-40: Population pyramid – Karoo Hoogland Local Municipality (Statistics South Africa (2012))

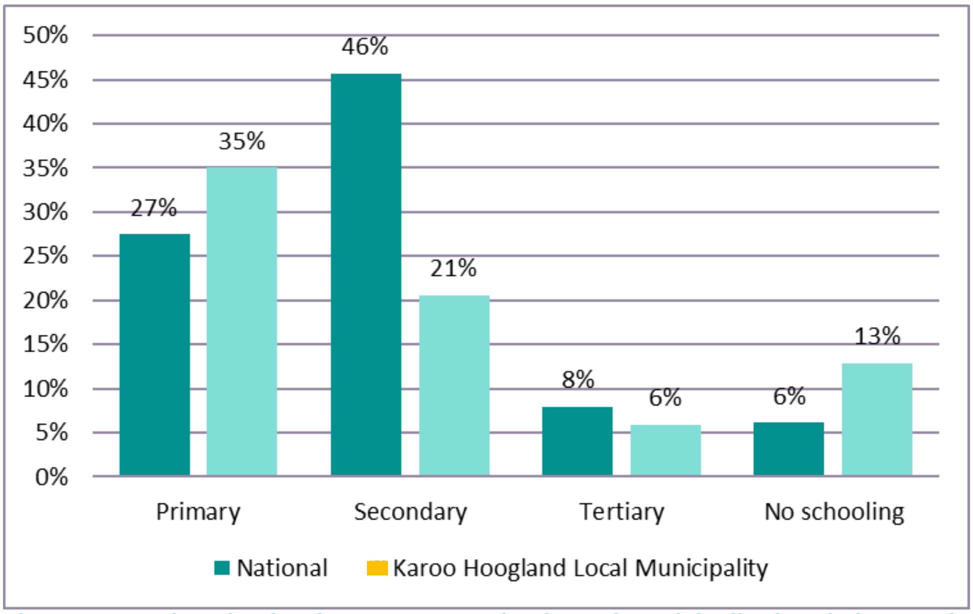

Figure 8-41: Education levels – Karoo Hoogland Local Municipality (*Statistics South Africa (2012)*)

The income levels of the municipality's population are low with 42.5% earning less than R1600 per month. The unemployment levels are 23.1% higher than national levels, with 33.2% of the potential labour force being unemployed in comparison to the national unemployment levels of 26.7% (as of the first quarter 2016) (Statistics South Africa, 2012 and 2016, Karoo Hoogland IDP, 2015). According to the Karoo Hoogland IDP (2015), more than half (55%) of the population within the municipality is classified as semi-skilled of unskilled

The Karoo Hoogland Local Municipality is characterised by an arid and mountainous environment. The low potential grazing, non-arable land is suited for sheep and game farming, and consequently agriculture and tourism are the main local economic contributors (Karoo Hoogland Local Municipality, 2010).

LOCAL ECONOMIC ACTIVITIES

The Karoo Hoogland Local Municipality has very limited arable land and poor soil conditions, which makes it ideally suited for grazing (Karoo Hoogland Local Municipality, 2010). Sheep farming is therefore the key agricultural and economic driver. Other agricultural activities include ostrich rearing, and limited, intensive crop farming.

Tourism plays a secondary, but important, role within the Karoo Hoogland local economy. Sutherland is home to the SALT (14 km from Sutherland), which provides a technology tourism opportunity. In addition, agri-tourism and eco-tourism (including an extinct volcano) attract visitors nationally and internationally.

Development in the area appears to be centred on renewable energy generation and associated infrastructure. There are several proposed and existing renewable energy developments situated within a 50 km radius of the proposed Maralla West project site

LOCAL COMMUNITIES

The proposed Maralla West project site lies 33 km south of the town of Sutherland, within an area used predominantly for extensive sheep grazing. There is a number of farming related activities within the proposed Maralla West site and within the surrounding areas, with Sutherland being the closest town to the proposed site. A description of these communities is provided in **Table 8-8** and illustrated in **Figure 8-42**.

Table 8-8: Description of local settlements and towns – Maralla West site

RELEVANCE TO THE SITE	SETTLEMENT NAME	DISTANCE AND DIRECTION FROM SITE	DESCRIPTION
Within site boundary	Aurora Farm	1 600 m from eastern border	Comprised of several buildings, and planted pastures. This settlement is currently occupied (son of the landowner), but is not within proximity to any of the proposed structures on site.
Adjacent to site boundary	Welgemoed	1.8 km north east	Both farming settlement includes of several buildings and planted pastures.
	Komsberg	1.9 km east	
Within 10 km of site boundary	Surrounding farm settlements	2.9 km northeast 3.7 km southeast 3.9 km southeast 4.7 km south	There are several small settlements along the Komsberg and MeintjiesPlaas River and tributaries surrounding the proposed site. These are predominantly sheep farms, with planted pastures or lucerne.
Closest towns	Sutherland	32 km north	Sutherland is historically an agricultural service centre, catering for the surrounding farming community. The town has includes tourism activities and is a key technology centre in South Africa, with the South African Astronomical Observatory and the (SALT). The town has a population estimated at 2 836 people and approx. 718 households.

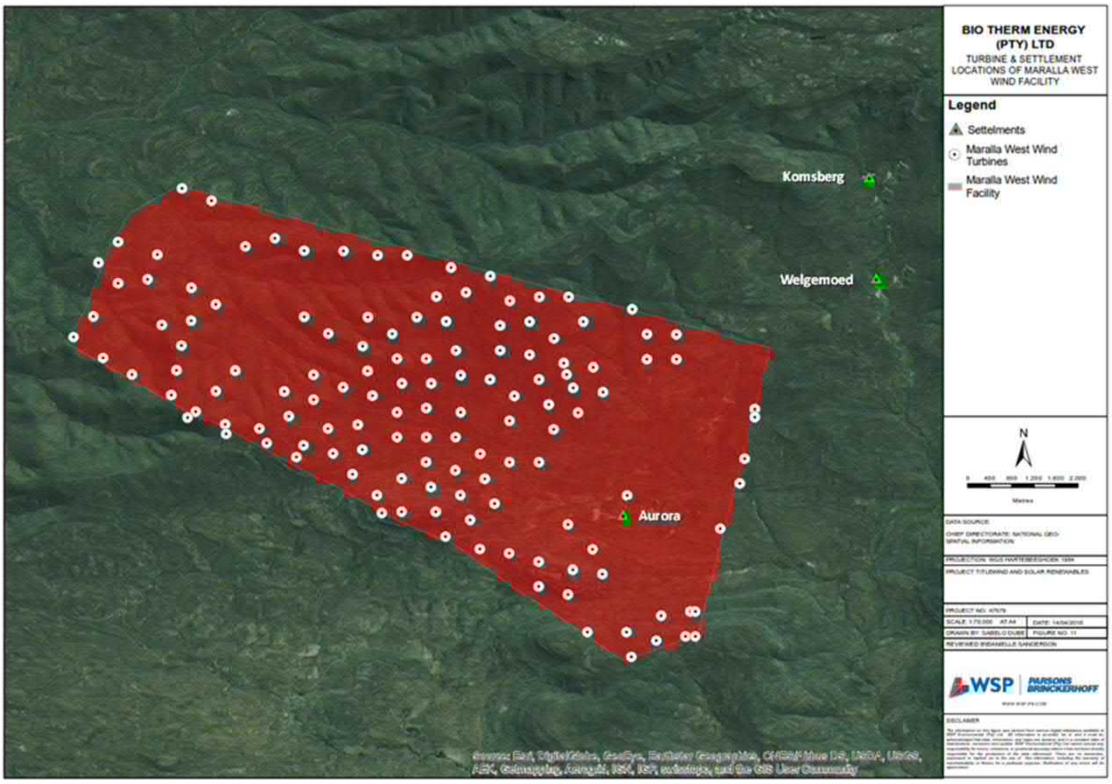

Figure 8-42: Location of Settlements at the Maralla West Site

9 IMPACT ASSESSMENT

9.1 PHASE OF DEVELOPMENT

Potential impacts have been identified and preliminarily assessed according to the phases of the project's development. For the purpose of this project, these phases have been generically defined below.

- Construction Phase:

  The construction phase includes the preparatory works/activities typically associated with the creation of surface infrastructure, access and electrical power. The activities most relevant to this phase include:

  - Topsoil stripping;
  - Cut and fill activities associated with site preparation (if required); and
  - Construction of the surface infrastructure including turbine foundations, turbines, invertors, site substation and internal powerlines.

- Operational Phase:

  The operational phase includes the daily activities associated with the wind energy facility.

- De-commissioning:

  The decommissioning phase includes the activities associated with the removal/dismantling of machinery/equipment/infrastructure no longer necessary to the operation.

9.2 ACTIVITIES MATRIX

The impacts below have been assessed according to environmental categories. **Table 9-1** provides an indication of how these environments are linked to the various NEMA listed activities outlined in **Chapter 3**.

Table 9-1: Activities Matrix (C- Construction, O- Operation, D- Decommissioning)

Activity Description	Topography	Geology	Climate	Soil and Land Capacity	Natural Vegetation	Avifauna	Surface Water	Ground Water	Heritage	Palaeontological	Visual	Traffic	Social
GNR 983- Listing Notice 1													
(11)- The development of facilities or infrastructure for the transmission and distribution of electricity- (i) Outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.	O	C D	-	C D	C D	C O D	-	-	C D	C D	O	C	C O D
(12)- The development of- (xii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.	C D	C D	-	C O D	C D	C O D	C O D	C D	C D	C D	C O D	-	C D
(19)- The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from- (i) a watercourse.	C D	C D	-	C O D	C D	C O D	C O D	C D	C D	C D	C O D	-	C D
(24)- The development of- (ii) A road with a reserve wider than 13,5 meters, or where no reserve exists where the road is no wider than 8 meters.	C D	C D	-	C D	C D	C O D	C D	-	C D	C D	C O D	C O D	C O D
(28)- Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 01 April 1998 and where such development: (ii) Will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.	C D	C D	-	C O D	C O D	C O D	C D	C D	C D	C D	C O D	C D	C O D
(30)- Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).	C D	-	-	C D	C D	C D	-	-	C D	C D	-	-	-

Activity Description	Topography	Geology	Climate	Soil and Land Capacity	Natural Vegetation	Avifauna	Surface Water	Ground Water	Heritage	Palaeontological	Visual	Traffic	Social
(56)- The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre- (i) Where the existing reserve is wider than 13,5 meters; or (ii) Where no reserve exists, where the existing road is wider than 8 metres.	C D	C D	-	C D	C D	C O D	C D	-	C D	C D	C O D	C O D	C O D
GNR 984- Listing Notice 2													
(1)- The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs within an urban area.	C D	C D	-	C O D	C O D	C O D	C D	C D	C D	C D	C O D	C D	C O D
(15)- The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	-	-	-	C	C	C	C	C	C	C	C	-	-
GNR 985- Listing Notice 3													
(4)- The development of a road wider than 4 metres with a reserve less than 13,5 metres. In The Northern Cape - (bb) National Protected Area Expansion Strategy Focus Areas (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans	C D	C D	-	C D	C D	C O D	C D	-	C D	C D	C O D	C O D	C O D
(10)- The development of facilities or infrastructure for the storage or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic meters In the Northern Cape – (ii) Outside urban areas- (bb) National Protected Area Expansion Strategy Focus Areas	C D	-	-	C D	C D	C D	C D	C D	C D	C D	C D	C D	C D

Activity Description	Topography	Geology	Climate	Soil and Land Capacity	Natural Vegetation	Avifauna	Surface Water	Ground Water	Heritage	Palaeontological	Visual	Traffic	Social
(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans													
(12)- The clearance of an area of 300 square meters or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan In the Northern Cape - (i) Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified a critically endangered in the National Spatial Biodiversity Assessment 2004; (ii) Within critical biodiversity areas identified in bioregional plans	-	-	-	C	C	C	C	C	C	C	C	-	-
(14) The development of – (xii) infrastructure or structures with a physical footprint of 10 square meters or more- In the Northern Cape (bb) National Protected Area Expansion Strategy Focus Areas (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	C D	C D	-	C O D	C D	C D	C D	C D	C D	C D	C O D	C D	C D
(18) The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. (a) In the Northern Cape – (ii) Outside urban areas- (bb) National Protected Area Expansion Strategy Focus Areas (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans	C D	C D	-	C D	C D	C O D	C D	-	C D	C D	C O D	C O D	C O D
(23) The expansion of: (iii) bridges where the bridge is expanded by 10 square metres or more in size (a) In the Northern Cape – (ii) Outside urban areas- (bb) National Protected Area Expansion Strategy Focus Areas	C D	C D	-	C O D	C D	C D	C D	C D	C D	C D	C O D	C D	C D

ACTIVITY DESCRIPTION	TOPOGRAPHY	GEOLOGY	CLIMATE	SOIL AND LAND CAPACITY	NATURAL VEGETATION	AVIFAUNA	SURFACE WATER	GROUND WATER	HERITAGE	PALAEONTOLOGICAL	VISUAL	TRAFFIC	SOCIAL
(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans													

9.3 SOILS AND LAND CAPABILITY

FINDINGS AND IMPACT DESCRIPTION

CONSTRUCTION PHASE

The anticipated impacts for the Maralla West site during the construction phase include:

- Loss of grazing land currently utilised for grazing mostly sheep farming, cattle farming and indigenous antelope.
- Increased potential of soil erosion due to vegetation clearance, soil disturbance and a high traffic movement on site.
- Potential land contamination from hazardous substances. This includes spillage of concrete onto soil surface, as well as oils, fuel, grease (from construction vehicles) and sewage from temporary on-site ablution facilities.

There are no fatal flaws identified for the construction phase associated with the proposed Maralla West project. The loss of grazing land is a negative impact and was assigned a low environmental significance rating score, after mitigation measures. This impact is unavoidable given the fact that during the construction phase the project will physically occupy portions of the land located within the project footprint. The low rating is under the assumption that farming practices may continue in and around the turbines during the operational phase. Potential impacts of soil erosion and spillage of hazardous substances were both classified with a low environmental significance, before and after mitigation measures, due to the lower probability of significant erosion or spills occurring.

The other identified impacts (i.e. soil erosion and spillage of hazardous substances) were classified as negative impacts, but had a low environmental significance rating before and after mitigation measures..

OPERATIONAL PHASE

The anticipated impacts for the Maralla West site during the operational phase include:

- Permanent loss of portions of grazing land currently utilised for mostly sheep farming, cattle farming and indigenous antelope.
- Increased potential of soil erosion due to vegetation clearance, and more run-off from harden surfaces (i.e. roads).
- Potential land contamination from hazardous substances. This includes spillage of oils, fuel, grease (from site operational and maintenance vehicles) and permanent onsite sewage systems.

Similar to the construction phase, there were no fatal flaws identified during this phase of the project. The loss of grazing land was assigned a medium environmental significance rating, however this negative impact is unavoidable given the fact that the powerline and substation infrastructure will permanently occupy a portion of the land within the proposed project footprint. With mitigation measures in place, this impact was brought down to a low environmental significance. The low rating is under the assumption that farming practices may continue in and around the turbines during the operational phase.

The other negative impacts of potential soil erosion and spillage of hazardous substances were assigned a low environmental significance before and after mitigation measures, due to the majority of the risk/impact being isolated to the construction phase (therefore short term) and the lower probability of significant erosion or spills occurring.

DE-COMMISSIONING PHASE

The anticipated impacts for the Maralla West site during the de-commissioning phase include:

- Increased potential of soil erosion due to removal of wind turbine infrastructure, soil disturbance and a high traffic movement on site.
- Potential land contamination from hazardous substances. This includes spillage of oils, fuel, grease (from construction vehicles) and sewage from on-site systems.

The decommissioning phase exhibited the lowest environmental significance rating scores for the associated impacts of the proposed Maralla West project. There were no fatal flaws identified during this phase of the project. The potential for soil erosion and spillage of hazardous substances were classified as a low environmental significance rating before and after mitigation measures.

IMPACT ASSESSMENT

The impact assessment for the above mentioned impacts is included in **Table 9-2**.

Table 9-2: Assessment of Soil and Land Capability Impacts for the Maralla West WEF

REF.		EXTENT (E)	DURATION (D)	MAGNITUDE (M)	PROBABILITY (P)	SIGNIFICANCE (S=(E+D+M)*P)		STATUS (+ve or -ve)
Construction Phase								
SLC1	**Impact**	Loss of land (including wetlands) previously used for sheep and antelope grazing will be occupied by the wind facility and associated infrastructure.						
	Without Mitigation	2	2	6	5	**50**	**Medium**	-
	degree to which impact can be reversed:	Low						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	1	2	4	4	**28**	**Low**	-ve
SLC2	**Impact**	Construction activities will entail vegetation clearance, soil disturbance and high traffic movement on site, resulting in a higher potential for soil erosion						
	Without Mitigation	2	2	4	3	**24**	**Low**	-
	degree to which impact can be reversed:	High						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	1	2	2	2	**10**	**Low**	-ve
SLC3	**Impact**	Potential spillage of hazardous substances such as oils, fuel, grease from construction vehicles, and sewage from on-site sanitation systems.						
	Without Mitigation	2	2	2	2	**12**	**Low**	-

	degree to which impact can be reversed:	High						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	1	2	0	1	**3**	**Low**	-ve
Operational Phase								
SLC4	**Impact**	Loss of land (including wetlands) previously used for sheep and antelope grazing will be occupied by the wind facility and associated infrastructure.						
	Without Mitigation	2	4	6	5	**60**	**Medium**	-ve
	degree to which impact can be reversed:	Low						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	1	4	2	4	**28**	**Low**	-ve
SLC5	**Impact**	Vegetation clearance for wind turbines and roads, soil disturbance and stockpiles, and increased traffic movement on site, resulting in a higher potential for soil erosion						
	Without Mitigation	2	4	4	3	**30**	**Low**	-ve
	degree to which impact can be reversed:	High						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	1	4	2	2	**14**	**Low**	-ve
SLC6	**Impact**	Potential land contamination from hazardous substances. This includes spillage of oils, fuel, grease (from site operational and maintenance vehicles) and permanent onsite sewage systems Potential spillage of hazardous substances such as oils, fuel, grease from maintenance vehicles, and sewage from on-site sanitation systems.						
	Without Mitigation	2	4	2	2	**16**	**Low**	-ve
	degree to which impact can be reversed:	High						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	1	4	2	1	**7**	**Low**	-ve
Decommissioning Phase								
SLC7	**Impact**	Increased potential of soil erosion due to removal of wind infrastructure (i.e. turbines), soil disturbance and a high traffic movement on site.						
	Without Mitigation	2	2	4	3	**24**	**Low**	-ve

	degree to which impact can be reversed:	High						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	1	2	2	2	**10**	**Low**	-ve
SLC8	**Impact**	Potential spillage of hazardous substances such as oils, fuel, grease from maintenance vehicles, and sewage from on-site sanitation systems.						
	Without Mitigation	2	2	2	2	**12**	**Low**	-ve
	degree to which impact can be reversed:	High						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	1	2	0	1	**3**	**Low**	-ve
No Go Alternative								
	Impact	No impacts are associated with the No-Go alternative as the status quo will remain.						

MITIGATION MEASURES

The following mitigation and management measures have been recommended:

- Loss of land previously used for sheep, cattle and antelope grazing will be occupied by the powerline and substation infrastructure.
  - Areas of construction should be (where practical) limited to the extent of the project footprint, and activities outside of the site should be kept to a minimum.
- Increased potential for soil erosion (especially wind driven) due to vegetation clearance, soil disturbance and high traffic movement on site.
  - Areas of construction should be (where practical) limited to the extent of the project footprint, and activities outside of the site should be kept to a minimum. Traffic of construction vehicles should be kept to a minimum to reduce soil compaction, and limited to existing or proposed roadways where practical. Soils excavated during construction of the facility should be appropriately stored in stockpiles which are protected from erosion (wind and water) (i.e. through use of vegetation cover in the case of long-term stockpiles- this should form part of the rehabilitation process after the construction phase). Wind erosion is dominant for the region. Water erosion action is considered limited, however backfilling with soil and use of gabions or Reno Mattresses should be used where evidence of erosion is present.
- Potential spillage of hazardous substances such as oils, fuel, grease from construction and operational vehicles, and sewage from on-site sanitation systems.
  - The proper handling and storage of hazardous materials, the use of hardstanding in storage areas of hazardous substances and where spillages are possible. The use of bunding around storage of hazardous materials and proper upkeep of machinery and vehicles. A complete spill kit must be onsite at all times.

9.4 NATURAL VEGETATION AND ANIMAL LIFE

FINDINGS AND IMPACT DESCRIPTION

CONSTRUCTION PHASE

The anticipated biodiversity impacts for the Maralla West site during the construction phase include:

IMPACTS ON VEGETATION AND PROTECTED PLANT SPECIES

Impacts on vegetation and protected plant species will occur due to vegetation clearing and disturbance associated with roads, turbines etc. Although some mitigation is possible especially with regards to avoidance of sensitive features, the development cannot avoid vegetation clearing within the footprint of infrastructure, with the result that this impact will remain **Medium** after mitigation

FAUNAL IMPACTS DUE TO CONSTRUCTION ACTIVITIES

Disturbance, transformation and loss of habitat during construction of the wind energy facility will have a negative effect on resident fauna, with many species moving away from the area and some individuals of smaller species not able to move away likely to be killed by construction activity. Although noise and disturbance cannot be avoided during construction, this will be transient, and disturbance levels during operation will be lower.

INCREASED SOIL EROSION RISK DURING CONSTRUCTION

During and immediately after construction, the disturbed areas within the site will be highly vulnerable to erosion. It is a common misconception that erosion in semi-arid environments is a low risk factor, however, this is false as these areas are often exposed to high intensity rainfall events and the vegetation cover is low, leaving the soils exposed and vulnerable to erosion. Erosion results in soil loss and a decline in biodiversity and productive potential from the affected areas and may also result in the siltation and degradation of aquatic systems which receive the eroded soils. With the implementation of erosion control and avoidance measures, this impact can however be effectively reduced to a **Low** level.

OPERATIONAL PHASE

The anticipated biodiversity impacts for the Maralla West site during the operational phase include:

FAUNAL IMPACTS DUE TO OPERATIONAL ACTIVITIES OF THE WIND FARM SUCH AS NOISE, AND HUMAN PRESENCE DURING MAINTENANCE ACTIVITIES

Although disturbance during the operational phase will be significantly lower than during the construction phase, it is also higher than the background pre-development levels of noise and this will impact some species, especially those that use sound to find their prey or avoid their predators. This includes species such as Bat-eared Fox, gerbils and golden moles and potentially other species such as owls and frogs. Although the severity of this impact is moderate, it cannot be well mitigated as the primary source of noise in the area would be from the turbines themselves. It is difficult to quantify the extent of this impact, but it is likely to extend 500m or more from turbines depending on wind conditions. The overall significance of this impact is likely to be **Medium**.

EROSION

Areas disturbed during construction will remain vulnerable to disturbance for some time into the operational phase and will require regular maintenance to ensure that erosion is minimised. With mitigation, this impact can however be reduced to a **Low** level.

ALIEN PLANT INVASION

Disturbed areas are vulnerable to alien plant invasion and it is likely that road verges, crane pads and other cleared or disturbed areas will be foci for alien plant invasion. Uncontrolled invasion can result in invasion into the intact rangeland and where woody species are involved, this can result in loss of biodiversity and a decline in ecosystem services. With regular clearing and management, this impact can be reduced to a **Low significance** level

DE-COMMISSIONING PHASE

The anticipated biodiversity impacts for the Maralla West site during the de-commissioning phase include:

FAUNAL IMPACTS DUE TO DECOMMISSIONING OF THE WIND FARM SUCH AS NOISE, AND OPERATION OF HEAVY MACHINERY ON-SITE

Decommissioning will require the use of heavy machinery on-site and will generate a lot of noise and disturbance which would have a negative impact on fauna. This impact would however be relatively short-lived and would ultimately result in the removal of the development and rehabilitation of the site and as such the ultimate impact of decommissioning on fauna would be **Low** after mitigation.

EROSION

Decommissioning will result in a lot of disturbance which will leave the site vulnerable to erosion. As a result the site should be monitored for erosion problems for at least 2 years after decommissioning. With mitigation, this impact can be reduced to a **Low** significance.

ALIEN PLANT INVASION.

Decommissioning will leave the site vulnerable to alien plant invasion and alien plants should be monitored and managed for at least two years following decommissioning or until an adequate cover of perennial plants has been established in disturbed areas. With mitigation, this impact can be reduced to a **Low** significance.

IMPACT ASSESSMENT

The impact assessment for the above mentioned impacts is included in **Table 9-2**.

Table 9-3: Assessment of Biodiversity Impacts for the Maralla West WEF

REF.		EXTENT (E)	DURATION (D)	MAGNITUDE (M)	PROBABILITY (P)	SIGNIFICANCE (S=(E+D+M)*P)		STATUS (+ve or -ve)
Construction Phase								
BIO1	**Impact**	Impacts on vegetation and protected plant species						
	Without Mitigation	2	2	8	5	**60**	**Medium**	-
	degree to which impact can be reversed:	Medium						
	degree of impact on irreplaceable resources:	Medium						
	With Mitigation	1	2	8	5	**55**	**Medium**	-ve

BIO2	**Impact**	Faunal impacts due to construction activities						
	Without Mitigation	2	2	8	5	**60**	**Medium**	-
	degree to which impact can be reversed:	Medium						
	degree of impact on irreplaceable resources:	Medium						
	With Mitigation	1	2	8	5	**55**	**Medium**	-ve
BIO3	**Impact**	Increased Soil Erosion risk during construction						
	Without Mitigation	2	2	6	5	**50**	**Medium**	-ve
	degree to which impact can be reversed:	High						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	1	2	6	3	**27**	**Low**	-ve
Operational Phase								
BIO4	**Impact**	Faunal impacts due to operational activities of the wind farm such as noise, and human presence during maintenance activities						
	Without Mitigation	2	4	6	5	**60**	**Medium**	-ve
	degree to which impact can be reversed:	Medium						
	degree of impact on irreplaceable resources:	Medium						
	With Mitigation	1	4	6	5	**55**	**Medium**	-ve
BIO5	**Impact**	Erosion						
	Without Mitigation	2	4	6	5	**60**	**Medium**	-ve
	degree to which impact can be reversed:	High						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	1	4	4	3	**27**	**Low**	-ve
BIO6	**Impact**	Alien plant invasion						
	Without Mitigation	2	4	4	3	**30**	**Low**	-ve
	degree to which impact can be reversed:	High						

	degree of impact on irreplaceable resources:	Low						
	With Mitigation	1	4	4	3	**27**	**Low**	-ve
Decommissioning Phase								
BIO7	**Impact**	Faunal impacts due to decommissioning of the wind farm such as noise, and operation of heavy machinery on-site						
	Without Mitigation	2	4	6	5	**60**	**Medium**	-ve
	degree to which impact can be reversed:	High						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	1	4	4	3	**27**	**Low**	-ve
BIO8	**Impact**	Erosion						
	Without Mitigation	2	2	6	5	**50**	**Medium**	-ve
	degree to which impact can be reversed:	High						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	1	2	4	3	**21**	**Low**	-ve
BIO9	**Impact**	Alien plant invasion						
	Without Mitigation	2	2	6	5	**50**	**Medium**	-ve
	degree to which impact can be reversed:	High						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	1	2	4	3	**21**	**Low**	-ve
No Go Alternative								
	Impact	No impacts are associated with the No-Go alternative as the status quo will remain.						

MITIGATION MEASURES

The following mitigation and management measures have been recommended:

→ Construction Phase:

- Impacts on vegetation and protected plant species:

  - Placement of turbines within the High and Very High Sensitivity areas should be avoided;
  - Preconstruction walk-though of the approved development footprint to ensure that sensitive habitats and species are be avoided where possible;
  - Ensure that lay-down and other temporary infrastructure is within low sensitivity areas, preferably previously transformed areas if possible;
  - Minimise the development footprint as far as possible and rehabilitate disturbed areas that are no longer required by the operational phase of the development;
  - A large proportion of the impact of the development stems from the access roads and the number of roads should be reduced to the minimum possible and routes should also be adjusted to avoid areas of high sensitivity as far as possible, as informed by a preconstruction walk-though survey;
  - Preconstruction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness as to no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimizing wildlife interactions, remaining within demarcated construction areas etc; and
  - Demarcate all areas to be cleared with construction tape or similar material. However caution should be exercised to avoid using material that might entangle fauna.
- Faunal impacts due to construction activities:
  - Preconstruction walk-through of the facility to identify areas of faunal sensitivity;
  - During construction any fauna directly threatened by the construction activities should be removed to a safe location by the ECO or other suitably qualified person;
  - The illegal collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the construction site;
  - No fires should be allowed within the site as there is a risk of runaway veld fires;
  - No fuelwood collection should be allowed on-site;
  - No dogs or cats should be allowed on site apart from that of the landowners;
  - If any parts of site such as construction camps must be lit at night, this should be done with low-UV type lights (such as most LEDs), which do not attract insects and which should be directed downwards;
  - All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill;
  - No unauthorized persons should be allowed onto the site and site access should be strictly controlled and vehicles which need to roam around the site should be accompanied by the ECO or security personnel;
  - All construction vehicles should adhere to a low speed limit (40km/h for cars and 30km/h for trucks) to avoid collisions with susceptible species such as snakes and tortoises and rabbits or hares. Speed limits should apply within the facility as well as on the public gravel access roads to the site; and
  - All personnel should undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and owls which are often persecuted out of superstition.
- Increased Soil Erosion risk during construction:
  - Runoff management and erosion control should be integrated into the project design;
  - Development on steep slopes should be avoided as much as possible and specific additional mitigation may be required where this cannot be avoided;

- Dust suppression and erosion management should be an integrated component of the construction approach;
- Disturbance near to drainage lines should be avoided and sensitive drainage areas near to the construction activities should demarcated as no-go areas;
- Regular monitoring for erosion problems along the access roads and other cleared areas;
- Erosion problems should be rectified on a regular basis;
- Sediment traps may be necessary to prevent erosion and soil movement if there are topsoil or other waste heaps present during the wet season; and
- A low cover of vegetation should be left wherever possible within the construction footprint to bind the soil, prevent erosion and promote post-disturbance recovery of an indigenous ground cover.

→ Operational Phase:

- Faunal impacts due to operational activities of the wind farm such as noise, and human presence during maintenance activities:
  - Management of the site should take place within the context of an Open Space Management Plan;
  - No unauthorized persons should be allowed onto the site;
  - Any potentially dangerous fauna such snakes or fauna threatened by the maintenance and operational activities should be removed to a safe location;
  - The illegal collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden by anyone expect landowners with the appropriate permits where required;
  - If the site must be lit at night for security purposes, this should be done with downward-directed low-UV type lights (such as most LEDs), which do not attract insects;
  - All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill;
  - All vehicles accessing the site should adhere to a low speed limit (40km/h max) to avoid collisions with susceptible species such as snakes and tortoises; and
  - If parts of the facility are to be fenced, then no electrified strands should be placed within 30cm of the ground as some species such as tortoises are susceptible to electrocution from electric fences as they do not move away when electrocuted but rather adopt defensive behaviour and are killed by repeated shocks. Alternatively, the electrified strands should be placed on the inside of the fence and not the out.
- Erosion:
  - Erosion management at the site should take place according to the Erosion and Rehabilitation Plan;
  - All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk;
  - Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance;
  - All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques; and

- All cleared areas should be revegetated with indigenous perennial shrubs and grasses from the local area. These can be cut when dry and placed on the cleared areas if natural recovery is slow.

- Alien plant invasion:
  - Wherever excavation is necessary, topsoil should be set aside and replaced after construction to encourage natural regeneration of the local indigenous species;
  - Due to the disturbance at the site as well as the increased runoff generated by the hard infrastructure, alien plant species are likely to be a long-term problem at the site and a long-term control plan will need to be implemented. Problem woody species such as Prosopis are already present in the area and are likely to increase rapidly if not controlled;
  - Regular monitoring for alien plants within the development footprint as well as adjacent areas which receive runoff from the facility as there are also likely to be prone to invasion problems; and
  - Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible.

→ Decommissioning Phase:

- Faunal impacts due to decommissioning activities of the wind farm such as noise, and human presence during maintenance activities:
  - Any potentially dangerous fauna such snakes or fauna threatened by the decommissioning activities should be removed to a safe location;
  - All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill;
  - All vehicles accessing the site should adhere to a low speed limit (40km/h max) to avoid collisions with susceptible species such as snakes and tortoises; and
  - All above-ground infrastructure should be removed from the site. Below-ground infrastructure such as cabling can be left in place if it does not pose a risk, as removal of such cables may generate additional disturbance and impact.
- Erosion:
  - Any roads that will not be rehabilitated should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk;
  - There should be regular monitoring for erosion for at least 2 years after decommissioning by the applicant to ensure that no erosion problems develop as result of the disturbance, and if they do, to immediately implement erosion control measures;
  - All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques; and
  - All disturbed and cleared areas should be revegetated with indigenous perennial shrubs and grasses from the local area.
- Alien plant invasion:
  - Wherever excavation is necessary for decommissioning, topsoil should be set aside and replaced after construction to encourage natural regeneration of the local indigenous species;
  - Due to the disturbance at the site alien plant species are likely to be a long-term problem at the site following decommissioning and regular control will need to be implemented until a cover of indigenous species has returned;
  - Regular monitoring for alien plants within the disturbed areas for at least two years after decommissioning; and

- Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible

9.5 AVIFAUNA

FINDINGS AND IMPACT DESCRIPTION

The effects of a wind farm on birds are highly variable and depend on a wide range of factors including the specification of the development, the topography of the surrounding land, the habitats affected and the number and species of birds present. With so many variables involved, the impacts of each wind farm must be assessed individually. The principal areas of concern with regard to effects on birds are listed below. Each of these potential effects can interact with each other, either increasing the overall impact on birds or, in some cases, reducing a particular impact (for example where habitat loss or displacement causes a reduction in birds using an area which might then reduce the risk of collision):

- Collision mortality on the wind turbines;
- Displacement due to disturbance during construction and operation of the wind farm;
- Displacement due to habitat change and loss; and
- Collisions with the internal powerline connections.

It is important to note that the assessment is made on the status quo as it is currently in the study area. The possible change in land use in the broader development area is not taken into account because the extent and nature of future developments are unknown at this stage. It is however highly unlikely that the land use will change in the foreseeable future

CONSTRUCTION PHASE

DISPLACEMENT OF PRIORITY SPECIES DUE TO DISTURBANCE

The construction of the wind farm and associated infrastructure, including the on-site powerline and road network, will result in a significant amount of movement and noise, which will lead to temporary displacement of avifauna from the site. It is highly likely that most priority species will vacate the area for the duration of these activities. None of the priority species are likely to be permanently displaced due to disturbance, although displacement in the short term during the construction phase is very likely. The risk of permanent displacement is larger for large species such as Ludwig's Bustard, although displacement of the closely related Denham's Bustard (Neotis denhami) is evidently not happening at existing wind farms in the Eastern Cape (M. Langlands 2016 pers. comm, Rossouw 2016 pers. comm). If the wind farm follows the modern trend of fewer, larger turbines, the risk of displacement is also lower. However, this will only be established through a post-construction monitoring programme.

OPERATIONAL PHASE

PRIORITY SPECIES MORTALITY DUE TO COLLISION WITH THE TURBINES

Priority species that could potentially be vulnerable to wind turbine collisions are listed in **Table 8-3**.

- Priority species that could potentially be vulnerable to wind turbine collisions due to morphological features (high wing loading) are Southern Black Korhaan, Grey-winged Francolin, Greater Flamingo and Ludwig's Bustard. It is noted though that no Ludwig's Bustard mortalities have as yet been reported at wind farms in South Africa, despite initial concerns that the species might be vulnerable in this respect (Ralston, M. in litt. 2016).

- Many of the priority species at the proposed wind farm probably have high resolution vision areas found in the lateral fields of view, rather than frontally, e.g., the bustards, korhaans and passerines. The possible exceptions to this are the raptors which all have wider binocular fields, although as pointed out by Martin (2011, 2012), this does not necessarily result in these species being able to avoid obstacles better. The major concern at the site is collision mortality of raptors, namely Verreaux's Eagle, Martial Eagle, Jackal Buzzard and Black Harrier. All of these have been recorded as collision victims at wind farms in South Africa (Ralston, M. in litt. 2016), despite their wide binocular fields.
- Soaring species are likely to be at greater risk of collision than terrestrial species, especially Verreaux's Eagle, Martial Eagle and Jackal Buzzard, and to a lesser extent Black Harrier, all of which are vulnerable to turbine collisions (Ralston, M. in litt. 2016). However, specific behaviour of some terrestrial species might put them at risk of collision, e.g. display flights of Southern Black Korhaan might place them within the rotor swept zone.
- It is anticipated that the birds at the proposed wind farm will successfully avoid the wind turbines most of the time. However, risky situations may develop with raptors (especially Verreaux's' Eagle, Martial Eagle, Jackal Buzzard and Black Harrier) engaged in hunting which might serve to distract them and place them at risk of collision, or birds engaged in display behaviour, e.g. Southern Black Korhaan (see earlier point). Raptors engaged in territorial defence involving conspecifics, or being mobbed by crows or other raptors are at particular risk as they are distracted during such activities (Simmons 2016). The temporary wind mast at the site is currently acting as a roost for a pair of Martial Eagles. Both birds have been observed roosting on the booms supporting the anemometers. This creates a collision risk as the birds will frequent the area due to the presence of the roost, a fact which is supported by the flight data gathered during VP watches. The booms on the wind mast need to be modified in order to prevent the birds from being able to roost on them, which will force the birds to roost elsewhere e.g. in the grove of poplar trees at Maralla East. It is likely that unless the issue of the booms is addressed, that the birds will always be at risk as they will always be drawn to the wind mast as a potential roost, irrespective of where the permanent wind mast will be located. This would necessitate the implementation of a substantial no-turbine zone. However, the issue was raised with BioTherm and they have undertaken to implement the necessary modifications to the booms, in consultation with the avifaunal specialist, which will eliminate the need for a buffer zone.
- Despite being potential collision candidates based on morphology and flight behaviour, bustards do not seem to be particularly vulnerable to wind turbine collisions, indicating a high avoidance rate (A. Camiña 2012a). To date, no Ludwig's Bustard collisions have been recorded at operational South African wind farms (Ralston, M. in litt. 2016). Obviously it is too early to make conclusive statements about the vulnerability of the species to wind turbine collisions, but these early indications are promising
- Landscape features are likely to play an important role at the site. The site basically consists of rolling hills and low mountains with steep slopes, exposed ridge lines and low cliffs. These landscape features at the site provide ample opportunities for slope soaring for large raptors using declivity currents and orographic lift which could them at risk of collisions.
- The study area is not located on any known migration route. The flight data collected during the 288 hours of vantage point watches provides some clues to the areas most frequented by large soaring species. The results of the pre-construction monitoring have indicated areas of high flight activity which are frequented by Red Data Martial Eagles, Verreaux's Eagles and Black Harriers. These areas were considered in the final lay-out.
- In semi-arid zones such as where this proposed wind farm is located, food availability is often linked to rainfall. It is a well-known fact that insect outbreaks may occur after rainfall events, which could draw in various priority species such as Ludwig's Bustard, and possibly Lesser Kestrel. This in turn could heighten the risk of collisions. Rock piles left after construction of the wind farm can become a micro habitat for rock hyrax which could draw in large eagles.

DISPLACEMENT OF PRIORITY SPECIES DUE TO HABITAT TRANSFORMATION

Priority species that could potentially be vulnerable to displacement due to habitat transformation are listed in **Table 8-3**. The direct habitat transformation at the proposed wind farm is likely to be fairly minimal. The indirect habitat transformation (habitat fragmentation) is likely to have a bigger impact on priority species. It is expected that the densities of some terrestrial priority species (e.g. Southern Black Korhaan and Grey-winged Francolin) will decrease due to this impact, but complete displacement is unlikely. Raptors are unlikely to be affected. Indications are that bustards continue to use the wind farm areas (M. Langlands 2016 pers. comm, Rossouw 2016 pers. comm).

MORTALITY OF PRIORITY SPECIES DUE TO COLLISIONS WITH THE ON-SITE MV POWERLINES

Priority species that could potentially be vulnerable to powerline collision mortality with the internal 132kV powerline are listed in **Table 8-3**. The most likely priority species candidates for collision mortality on the proposed 132kV power lines are medium to large terrestrial species i.e. Southern Black Korhaan and particularly Ludwig's Bustard. Greater Flamingo could also be at risk. The combination of IPP A and Common Substation 1 is strongly preferred due to its short length.

MORTALITY OF PRIORITY SPECIES DUE TO ELECTROCUTIONS WITH THE ON-SITE MEDIUM VOLTAGE NETWORK

The medium voltage collector system will comprise of cables (11kV up to and including 33kV) that will be run underground, expect where a technical assessment suggest that overhead lines are applicable. This will greatly reduce the threat of electrocution. However, in those areas where overhead lines will be required, large raptors could be exposed to electrocution risks on the reticulation poles, unless bird-friendly structures are used.

DECOMMISSIONING PHASE

DISPLACEMENT OF PRIORITY SPECIES DUE TO DISTURBANCE

The de-commissioning of the wind farm and associated infrastructure, including the on-site powerline and road network, will result in a significant amount of movement and noise, which will lead to temporary displacement of avifauna from the site. It is highly likely that most priority species will vacate the area for the duration of these activities. None of the priority species are likely to be permanently displaced due to disturbance, although displacement in the short term during the de-commissioning phase is very likely. The risk of permanent displacement is larger for large species such as Ludwig's Bustard, although displacement of the closely related Denham's Bustard (Neotis denhami) is evidently not happening at existing wind farms in the Eastern Cape (M. Langlands 2016 pers. comm, Rossouw 2016 pers. comm). If the wind farm follows the modern trend of fewer, larger turbines, the risk of displacement is also lower. However, this will only be established through a post-construction monitoring programme.

IMPACT ASSESSMENT

The impact assessment for the above-mentioned impacts is included in **Table 9-4**.

Table 9-4: Assessment of Avifauna Impacts for the Maralla West WEF

REF.		EXTENT	DURATION	MAGNITUDE	PROBABILITY	SIGNIFICANCE	STATUS
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)	(+ve or -ve)
Construction Phase							
AV1	**Impact**	Displacement of priority species due to disturbance during construction operations					

	Without Mitigation	1	1	10	4	**48**	**Medium**	-ve
	degree to which impact can be reversed:	High						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	1	1	8	4	**40**	**Medium**	-ve
Operational Phase								
AV2	**Impact**	Priority species mortality due to collision with the turbines						
	Without Mitigation	2	4	10	4	**64**	**High**	-ve
	degree to which impact can be reversed:	Irreversible						
	degree of impact on irreplaceable resources:	High						
	With Mitigation	2	4	10	3	**48**	**Medium**	-ve
AV3	**Impact**	Displacement of priority species due to habitat transformation						
	Without Mitigation	1	4	6	4	**44**	**Medium**	-ve
	degree to which impact can be reversed:	Irreversible						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	1	4	4	3	**27**	**Low**	-ve
AV4	**Impact**	Priority species mortality due to collision with the on-site powerlines						
	Without Mitigation	2	4	10	4	**64**	**High**	-ve
	degree to which impact can be reversed:	Medium						
	degree of impact on irreplaceable resources:	High						
	With Mitigation	2	4	10	3	**48**	**Medium**	-ve
AV5	**Impact**	Priority species mortality due to electrocution on the on-site powerlines						
	Without Mitigation	2	4	10	3	**48**	**Medium**	-ve
	degree to which impact can be reversed:	Medium						
	degree of impact on irreplaceable resources:	High						
	With Mitigation	2	4	10	1	**16**	**Low**	-ve

Decommissioning Phase									
AV6	**Impact**	Displacement of priority species due to disturbance during decommissioning operations							
	Without Mitigation	1	1	4	4	**24**	**Low**	-ve
	degree to which impact can be reversed:	High.							
	degree of impact on irreplaceable resources:	Low							
	With Mitigation	1	1	4	3	**18**	**Low**	-ve
No Go Alternative									
	Impact	The no-go option will result in no additional impacts on avifauna and will result in the ecological status quo being maintained.							

MITIGATION MEASURES

The following mitigation and management measures have been recommended:

→ Displacement of priority species due to disturbance during construction operations:

- A site-specific Construction Environmental Management Plan (CEMP) must be implemented, which gives appropriate and detailed description of how construction activities must be conducted. All contractors are to adhere to the CEMP and should apply good environmental practice during construction.
- Environmental Control Officers to oversee activities and ensure that the site-specific construction environmental management plan (CEMP) is implemented and enforced;
- The appointed Environmental Control Officer (ECO) must be trained by an avifaunal specialist to identify the potential priority species as well as the signs that indicate possible breeding by these species. The ECO must then, during audits/site visits, make a concerted effort to look out for such breeding activities of Red Data species, and such efforts may include the training of construction staff to identify Red Data species, followed by regular questioning of staff as to the regular whereabouts on site of these species. If any of the Red Data species are confirmed to be breeding (e.g. if a nest site is found), construction activities within 500m of the breeding site must cease, and an avifaunal specialist is to be contacted immediately for further assessment of the situation and instruction on how to proceed.
- Prior to construction, an avifaunal specialist should conduct a site walkthrough, covering the final road and power line routes as well as the final turbine positions, to identify any nests/breeding/roosting activity of priority species, as well as any additional sensitive habitats. The results of which may inform the final construction schedule in close proximity to that specific area, including abbreviating construction time, scheduling activities around avian breeding and/or movement schedules, and lowering levels of associated noise.
- No turbines should be constructed in no-go areas, while associated infrastructure (roads, powerlines and substations) should be avoided where possible in these areas;
- During the construction phase, an avifaunal specialist must conduct surveys/exploration of the WEF site (particularly focussing on potential Martial Eagle and Verreaux's Eagle roost sites as well as suitable nesting habitat). This should be done during and after, the breeding season (i.e. approximately in July and again in September) of large Eagles (e.g. Martial and Verreaux's Eagle). The aim will be to locate nest sites, so that these may continue to be monitored during the construction and operation phase.

- Priority species mortality due to collision with the turbines
  - The results of the pre-construction monitoring must guide the lay-out of the turbines, especially as far as proposed no-turbine zones are concerned. No turbines must be constructed in the high-risk areas which were identified based on the results of the pre-construction monitoring, with a specific view to limiting the risk of collisions to Verreaux's Eagle, Martial Eagle, Black Harrier and Greater Flamingo.
  - Once the turbines have been constructed, post-construction monitoring should be implemented under the guidance of an avifaunal specialist to assess collision rates, in accordance with the latest version of the Best practice guidelines for avian monitoring and impact mitigation at proposed wind energy development sites in southern Africa.
  - If collision rates indicate unacceptable mortality levels of priority species, curtailment of selective turbines should be implemented if sufficient evidence emerges to link mortality to specific turbines.
  - Care should be taken not to create habitat for prey species that could draw priority raptors into the area and expose them to collision risk. Rock piles must be removed from site or covered with topsoil to prevent them from becoming habitat for Rock Hyrax (Dassie).
  - The booms on the wind mast must be modified to prevent them from becoming roost sites for large raptors. It is recommended that a horizontal thick steel cable is installed 300 - 400mm above the boom to create a physical barrier to prevent large raptors from perching on the boom).
- Displacement of priority species due to habitat transformation
  - A site-specific construction EMPr must be implemented, which gives appropriate and detailed description of how construction activities must be conducted to reduce unnecessary destruction of habitat. All contractors are to adhere to the EMPr and should apply good environmental practice during construction
  - Existing roads and farm tracks should be used where possible;
  - The minimum footprint areas of infrastructure should be used wherever possible, including road widths and lengths;
  - No off-road driving;
  - Environmental Control Officers to oversee activities and ensure that the site-specific construction EMPr is implemented and enforced;
  - Any clearing of stands of alien trees on site should be approved first by an avifaunal specialist.
  - Following construction, rehabilitation of all areas disturbed (e.g. temporary access tracks and laydown areas) must be undertaken and to this end a habitat restoration plan is to be developed by a rehabilitation specialist and included within the construction EMPr.
- Priority species mortality due to collision with the on-site powerlines
  - An avifaunal specialist must conduct a site walk through of final pylon positions prior to construction to determine if, and where, bird flight diverters (BFDs) are required.
  - Install bird flight diverters as per the instructions of the specialist following the site walkthrough, which may include the need for modified BFDs fitted with solar powered LED lights on certain spans.
  - The operational monitoring programme must include regular monitoring of the internal power lines for collision mortalities.
- Priority species mortality due to electrocution on the on-site powerlines
  - An avifaunal specialist must certify that the pole structures to be used on the internal MV network is bird-friendly.

- Displacement of priority species due to disturbance during decommissioning operations
  - A site-specific Decommissioning EMPr must be implemented, which gives appropriate and detailed description of how decommissioning activities must be conducted to reduce unnecessary destruction of habitat. All contractors are to adhere to the EMPr and should apply good environmental practice during decommissioning.
  - Following decommissioning, rehabilitation of all areas disturbed must be undertaken and to this end a habitat restoration plan is to be developed by a rehabilitation specialist and included within the Decommissioning EMPr

9.6 BATS

FINDINGS AND IMPACT DESCRIPTION

CONSTRUCTION PHASE

The following impacts on Bats, during the construction phase, were identified:

DESTRUCTION OF BAT ROOSTS DUE TO EARTH WORKS

Destruction of bat roosts due to earthworks and blasting. During construction, the earthworks and especially blasting can damage bat roosts in rock crevices. Any type and duration of blasting in close proximity to a rock crevice roost or man-made structure (barns, sheds, abandoned houses, pump houses etc.), can cause mortality to the inhabitants of the roost.

LOSS OF FORAGING HABITAT

Loss of foraging habitat. Foraging habitat will be permanently lost by construction of turbines, crane pads, infrastructure and access roads. Temporary foraging habitat loss will occur during construction due to storage areas and movement of heavy vehicles.

OPERATIONAL PHASE

The following impacts on Bats, during the operational phase, were identified:

BAT MORTALITIES DUE TO DIRECT BLADE IMPACT OR BAROTRAUMA DURING FORAGING (NOT MIGRATION)

Bat mortalities due to direct blade impact or barotrauma during foraging activities (not migration). If the impact is too severe (e.g. in the case of no mitigation) local bat populations may never recover from mortalities.

ARTIFICIAL LIGHTING

During operation, strong artificial lights that may be used at the turbine base or immediate surrounding infrastructure will attract insects and thereby also bats. This will significantly increase the likelihood of impact to bats foraging around such lights. Additionally, only certain species of bats will readily forage around strong lights, whereas others avoid such lights even if there is insect prey available, which can draw insect prey away from other natural areas and thereby artificially favour only certain species.

DE-COMMISSIONING PHASE

The following impacts on Bats, during the de-commissioning phase, were identified:

LOSS OF FORAGING HABITAT

Loss of foraging habitat. Foraging habitat will be permanently lost by construction of turbines, crane pads, infrastructure and access roads. Temporary foraging habitat loss will occur during construction due to storage areas and movement of heavy vehicles.

IMPACT ASSESSMENT

The impact assessment for the above mentioned impacts is included in **Table 9-5**.

Table 9-5: Assessment of Bat Impacts for the Maralla West WEF

REF.		EXTENT (E)	DURATION (D)	MAGNITUDE (M)	PROBABILITY (P)	SIGNIFICANCE (S=(E+D+M)*P)		STATUS (+ve or -ve)
Construction Phase								
BAT1	**Impact**	Destruction of bat roosts due to earthworks and blasting						
	Without Mitigation	1	2	10	3	**39**	**Medium**	-ve
	degree to which impact can be reversed:	Blasting occurring at bat roosts will cause damage to the bat population in the area. It is reversible over a longer time period.						
	degree of impact on irreplaceable resources:	If blasting and earthworks occurs close to a bat roost, it will be destroyed and lost.						
	With Mitigation	1	2	6	1	**9**	**Low**	-ve
BAT2	**Impact**	Loss of foraging habitat.						
	Without Mitigation	1	4	4	4	**36**	**Medium**	-ve
	degree to which impact can be reversed:	Depending on the degree of habitat loss, it will be partly reversed with some mitigation measures, especially in more sensitive areas. Minimal foraging habitat will be permanently lost.						
	degree of impact on irreplaceable resources:	In areas where vegetation is removed for roads and turbines, there will be a loss of habitat resources, but the scale is relatively small.						
	With Mitigation	1	3	2	2	**12**	**Low**	-ve
Operational Phase								
BAT3	**Impact**	Bat mortalities due to direct blade impact or barotrauma during foraging activities (not migration).						
	Without Mitigation	2	4	10	5	**80**	**High**	-ve
	degree to which impact can be reversed:	The impact will occur throughout the lifespan of the wind facility. Population numbers may take very long to recover. Population and diversity genetics may be permanently altered.						
	degree of impact on irreplaceable resources:	Bat population numbers will decrease in the area.						
	With Mitigation	2	4	6	3	**36**	**Medium**	-ve
BAT4	**Impact**	Artificial Lighting						
	Without Mitigation	1	4	6	5	**55**	**Medium**	-ve

	degree to which impact can be reversed:	On completion of the operational phase, the artificial lighting will be removed, whereby certain bat species won't be favoured in the area.						
	degree of impact on irreplaceable resources:	No loss of resources.						
	With Mitigation	1	2	2	1	**5**	**Low**	-ve
Decommissioning Phase								
BAT5	**Impact**	Loss of foraging habitat.						
	Without Mitigation	1	4	4	4	**36**	**Medium**	-ve
	degree to which impact can be reversed:	Depending on the degree of habitat loss, it will be partly reversed with some mitigation measures, especially in more sensitive areas. Minimal foraging habitat will be permanently lost.						
	degree of impact on irreplaceable resources:	In areas where vegetation is removed for roads and turbines, there will be a loss of habitat resources, but the scale is insignificant.						
	With Mitigation	1	3	2	2	**12**	**Low**	-ve
No Go Alternative								
	Impact	No impacts are associated with the No-Go alternative as the status quo will remain.						

MITIGATION MEASURES

The mitigation schedule outlined in **Table 9-6** is based on the passive data collected. The data infers that mitigation be applied during the peak activity periods and times, and when the advised wind speed and temperature ranges are prevailing simultaneously (considering conditions in which 80% of bat activity occurred). Bat activity at 80m height of the Met Mast was used with wind speed data at 78.8m and temperature data at 4.5 meters. Bat activity at 10m height of the Met Mast were used, with wind speed data at 38m and temperature data at 4.5 meters.

Table 9-6: The Wind Turbine Mitigation Schedule for Maralla West WEF

	TERMS OF MITIGATION IMPLEMENTATION
Peak activity Met Mast (times to implement curtailment/ mitigation)	Met Mast (80m): 18 November – 01 February; sunset – 04:20
Environmental conditions in which to implement curtailment/ mitigation	Met Mast (80m): Wind speed below 5.5m/s and temperature above 12°C
Peak activity (times to implement curtailment/ mitigation)	Met Mast (10m): 25 November - 06 January; sunset – 22:00
Environmental conditions in which to implement curtailment/ mitigation	Met Mast (10m): Wind speed below 5.5m/s and temperature above 12°C
Peak activity (times to implement curtailment/ mitigation)	Met Mast (10m): 18 January – 22 March; sunset – 01:10
Environmental conditions in which to implement curtailment/ mitigation -	Met Mast (10m): Wind speed below 6.0m/s and temperature above 15.0°C
Peak activity (times to implement curtailment/ mitigation)	Met Mast (10m): 12 September – 29 October; sunset – 01:30

	TERMS OF MITIGATION IMPLEMENTATION
Environmental conditions in which to implement curtailment/ mitigation	Met Mast (10m): Wind speed below 6m/s and temperature above 9.5°C

Where mitigation by location is not possible, other options that may be utilized include curtailment, blade feathering, blade lock, acoustic deterrents or light lures. The following terminology applies:

- **Curtailment:**

  Curtailment is defined as the act of limiting the supply of electricity to the grid during conditions when it would normally be supplied. This is usually accomplished by locking or feathering the turbine blades.

- **Cut-in speed:**

  The cut-in speed is the wind speed at which the generator is connected to the grid and producing electricity. For some turbines, their blades will spin at full or partial RPMs below cut-in speed when no electricity is being produced.

- **Feathering or Feathered:**

  Adjusting the angle of the rotor blade parallel to the wind, or turning the whole unit out of the wind, to slow or stop blade rotation. Normally operating turbine blades are angled almost perpendicular to the wind at all times.

- **Free-wheeling:**

  Free-wheeling occurs when the blades are allowed to rotate below the cut-in speed or even when fully feathered and parallel to the wind. In contrast, blades can be “locked” and cannot rotate, which is a mandatory situation when turbines are being accessed by operations personnel.

- **Increasing cut-in speed:**

  The turbine’s computer system (referred to as the Supervisory Control and Data Acquisitions or SCADA system) is programmed to a cut-in speed higher than the manufacturer’s set speed, and turbines are programmed to be feathered at 90° until the increased cut-in speed is reached over some average number of minutes (usually 5 – 10 min), thus triggering the turbine blades to pitch back “into the wind” and begin to spin normally and produce power. Blade locking or feathering that renders blades motionless below the manufacturers cut in speed, and don’t allow free rotation without the gearbox engaged, is more desirable for the conservation of bats than allowing free rotation below the manufacturer’s cut in speed. This is because bats can still collide with rotating blades even when no electricity is being produced.

- **Acoustic deterrents:**

  Are a developing technology and will need further investigation closer to the time of the wind farm operation, opportunities to test such devices may be available during operation of the facility.

- **Light lures:**

  Refers to the concept where strong lights are placed on the periphery (or only a few sides) of the wind farm to lure insects and therefore bats away from the turbines. However, the long term effects on bat populations and local ecology of this method is unknown.

- **Habitat modification:**

  With the aim of augmenting bat habitat around the wind farm in an effort to lure bats away from turbines, is not recommended. Such a method can be adversely intrusive on other fauna and flora and the ecology of the areas being modified. Additionally, it is unknown whether such a method may actually increase the bat numbers of the broader area, causing them to move into the wind farm site due to resource pressure.

Currently the most effective method of mitigation, after correct turbine placement, is alteration of blade speeds and cut-in speeds under environmental conditions favourable to bats.

A basic "6 levels of mitigation" (by blade manipulation or curtailment), from light to aggressive mitigation is structured as follows:

- Level 1 - No curtailment (free-wheeling is unhindered below manufacturer’s cut in speed so all momentum is retained, thus normal operation).
- Level 2 - Partial feathering (45-degree angle) of blades below manufacturer’s cut-in speed in order to allow the free-wheeling blades half the speed it would have had without feathering (some momentum is retained below the cut in speed).
- Level 3 - Ninety degree feathering of blades below manufacturer’s cut-in speed so it is exactly parallel to the wind direction as to minimise free-wheeling blade rotation as much as possible without locking the blades.
- Level 4 - Ninety degree feathering of blades below manufacturer’s cut-in speed, with partial feathering (45-degree angle) between the manufacturer’s cut-in speed and mitigation cut-in conditions.
- Level 5 - Ninety degree feathering of blades below mitigation cut in conditions.
- Level 6 - Ninety degree feathering throughout the entire night.

It is recommended that curtailment be applied initially at the start of operation at Level 3 during the climatic conditions and time frames outlined in **Table 9-6**. However, actual impacts on bats will be monitored during the operational phase monitoring, and the recommended mitigation measures and levels of curtailment will be adjusted according to the results of the operational monitoring. This is an adaptive management approach, and it is crucial that any suggested changes to the initial proposed mitigation schedule be implemented within a maximum of 2 weeks from the date of the recommendation, unless the recommendation refers to a time period later in the future (e.g. the following similar season/climatic condition).

9.7 SURFACE WATER

FINDINGS AND IMPACT DESCRIPTION

CONSTRUCTION PHASE

The anticipated impacts for the Maralla West site during the construction phase include:

- Alterations of flow regimes of watercourses, in close proximity to the site, or that is proposed to be traversed by roads.
- Increased potential of soil erosion due to vegetation clearance, soil disturbance and a high traffic movement on site. Subsequent potential sedimentation of watercourses.
- Potential land contamination from hazardous substances. This includes spillage of concrete onto soil surface, as well as oils, fuel, grease (from construction vehicles) and sewage from temporary on-site ablution facilities.
- Potential degradation of wetland habitat due to the proposed positioning of turbines, cables and road access.

There are no fatal flaws identified for the construction phase associated with the proposed Maralla West project, other than the potential impact to Depressional pans located within 500m radius of the proposed infrastructure of wind turbines, roads and cables. Potential impacts of soil erosion and spillage of hazardous substances were both classified with a low environmental significance, before and after mitigation measures, due to the lower probability of significant erosion or spills occurring.

OPERATIONAL PHASE

The anticipated impacts for the Maralla West site during the operational phase include:

- Alterations of flow regimes of watercourses, in close proximity to the site, or where the road accesses traverse watercourses.
- Increased potential of soil erosion due to vegetation clearance, and more run-off from harden surfaces (i.e. roads). Subsequent potential sedimentation of watercourses.
- Potential land contamination from hazardous substances. This includes spillage of oils, fuel, grease (from site operational and maintenance vehicles) and permanent onsite sewage systems.

Similar to the construction phase, there were no fatal flaws identified during this phase of the project, other than the potential impact to Depressional pans located within 500m radius of the proposed infrastructure of wind turbines, roads and cables. The other negative impacts of potential soil erosion and spillage of hazardous substances were assigned a low environmental significance before and after mitigation measures, due to the majority of the risk/impact being isolated to the construction phase (therefore short term) and the lower probability of significant erosion or spills occurring.

DE-COMMISSIONING PHASE

The anticipated impacts for the Maralla West site during the de-commissioning phase include:

- Increased potential of soil erosion due to removal of wind turbine infrastructure, soil disturbance and a high traffic movement on site.
- Alterations of flow regimes of watercourses, in close proximity to the site, or that is proposed to be traversed.
- Potential land contamination from hazardous substances. This includes spillage of oils, fuel, grease (from construction vehicles) and sewage from on-site systems.

The decommissioning phase exhibited the lowest environmental significance rating scores for the associated impacts of the proposed Maralla West project. There were no fatal flaws identified during this phase of the project, other than the potential impact to Depressional pans located within 500m radius of the proposed infrastructure of wind turbines, roads and cables. The potential for soil erosion and spillage of hazardous substances were classified as a low environmental significance rating before and after mitigation measures.

IMPACT ASSESSMENT

The impact assessment for the above mentioned impacts is included in **Table 9-7**.

Table 9-7: Assessment of Surface Water Impacts for the Maralla West WEF

REF.		EXTENT (E)	DURATION (D)	MAGNITUDE (M)	PROBABILITY (P)	SIGNIFICANCE (S=(E+D+M)*P)		STATUS (+ve or -ve)
Construction Phase								
SW1	**Impact**	Alterations of flow regimes of watercourses, in close proximity to the site, or that is proposed to be traversed by roads.						
	Without Mitigation	2	2	8	4	**48**	**Medium**	-ve

	degree to which impact can be reversed:	High						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	2	2	4	3	**24**	**Low**	-ve
SW2	**Impact**	Increased potential of soil erosion due to vegetation clearance, soil disturbance and a high traffic movement on site. Subsequent potential sedimentation of watercourses.						
	Without Mitigation	2	2	4	3	**24**	**Low**	-ve
	degree to which impact can be reversed:	High						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	1	2	2	2	**10**	**Low**	-ve
SW3	**Impact**	Potential land contamination from hazardous substances. This includes spillage of concrete onto soil surface, as well as oils, fuel, grease (from construction vehicles) and sewage from temporary on-site ablution facilities						
	Without Mitigation	2	2	2	2	**12**	**Low**	-ve
	degree to which impact can be reversed:	High						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	1	2	0	1	**3**	**Low**	-ve
SW4	**Impact**	Temporary potential degradation of wetland habitat due to the proposed positioning of road access.						
	Without Mitigation	2	2	6	4	**40**	**Medium**	-ve
	degree to which impact can be reversed:	High						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	1	2	4	3	**21**	**Low**	-ve
Operational Phase								
SW5	**Impact**	Alterations of flow regimes of watercourses, in close proximity to the site, or that is proposed to be traversed.						
	Without Mitigation	2	5	6	4	**52**	**Medium**	-ve
	degree to which impact can be reversed:	High						

	degree of impact on irreplaceable resources:	Low						
	With Mitigation	2	1	2	2	**10**	**Low**	-ve
SW6	**Impact**	Increased potential of soil erosion due to vegetation clearance, and more run-off from harden surfaces (i.e. roads). Subsequent potential sedimentation of watercourses.						
	Without Mitigation	2	4	4	3	**30**	**Low**	-ve
	degree to which impact can be reversed:	High						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	1	4	2	2	**14**	**Low**	-ve
SW7	**Impact**	Potential land contamination from hazardous substances. This includes spillage of oils, fuel, grease (from site operational and maintenance vehicles) and permanent onsite sewage systems						
	Without Mitigation	2	4	2	2	**16**	**Low**	-ve
	degree to which impact can be reversed:	High						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	1	4	2	1	**7**	**Low**	-ve
Decommissioning Phase								
SW8	**Impact**	Alterations of flow regimes of watercourses, in close proximity to the site, or that is proposed to be traversed.						
	Without Mitigation	2	3	6	5	**55**	**Medium**	-
	degree to which impact can be reversed:	High						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	2	1	2	2	**10**	**Low**	-ve
SW9	**Impact**	Increased potential of soil erosion due to removal of wind turbine infrastructure, soil disturbance and a high traffic movement on site.						
	Without Mitigation	2	2	4	3	**24**	**Low**	-
	degree to which impact can be reversed:	High						
	degree of impact on irreplaceable resources:	Low						

	With Mitigation	1	2	2	2	**10**	**Low**	-ve
SW10	**Impact**	Potential land contamination from hazardous substances. This includes spillage of oils, fuel, grease (from construction vehicles) and sewage from on-site systems						
	Without Mitigation	2	2	2	2	**12**	**Low**	-
	degree to which impact can be reversed:	High						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	1	2	0	1	3	**Low**	-ve
No Go Alternative								
	Impact	No impacts are associated with the No-Go alternative as the status quo will remain.						

MITIGATION MEASURES

The following mitigation and management measures have been recommended:

- Alterations of flow regimes of watercourses, in close proximity to the site, or that is proposed to be traversed.
  - Construction of the turbines and associated infrastructure (e.g. access roads and cables) should, where feasibly possible, occur during the dry season and the site rehabilitated before major rainfall events occur. Access roads and cables must only cross perpendicular to a watercourse and the chosen alignment must endeavour that the span across the watercourse is minimalised. Regular inspections during operation are required to ensure the structural integrity of the roads and cables. These crossings (and infrastructure located within 500m of a wetland) have a potential of requiring a Water Use Licence in terms of the National Water Act.
- Increased potential for soil erosion (especially wind driven) due to vegetation clearance, soil disturbance and high traffic movement on site.
  - Areas of construction should be (where practical) limited to the extent of the project footprint, and activities outside of the site should be kept to a minimum. Traffic of construction vehicles should be kept to a minimum to reduce soil compaction, and limited to existing or proposed roadways where practical. Soils excavated during construction of the facility should be appropriately stored in stockpiles which are protected from erosion (i.e. through use of vegetation cover in the case of long-term stockpiles- this should form part of the rehabilitation process after the construction phase). Wind erosion is dominant for the region. Water erosion action is considered limited, however backfilling with soil and use of gabions or Reno Mattresses should be used where evidence of erosion is present.
- Potential spillage of hazardous substances such as oils, fuel, grease from construction and operational vehicles, and sewage from on-site sanitation systems
  - The proper handling and storage of hazardous materials, the use of hardstanding in storage areas of hazardous substances and where spillages are possible. The use of bunding around storage of hazardous materials and proper upkeep of machinery and vehicles.
- Degradation of wetland habitat due to the proposed positioning of cables and road access

- Should BioTherm be recognised as a Preferred Bidder, the required application for a Water Use Licence (WUL) in terms of Section 21 of the National Water Act (NWA) (Act 36 of 1998) may commence. This application (WULA) will require detailed functional assessments (i.e. PES, EIS and EcoServices) of freshwater habitats potentially affected by the roads and infrastructure. At this stage design details should be available allowing the freshwater specialist to assess specific areas within the site. Therefore, a more in-depth and thorough freshwater functional assessment should be conducted should BioTherm be recognised as a Preferred Bidder. The detailed freshwater habitat assessment must provide recommendations in terms of road access in relation to freshwater habitats.

9.8 HERITAGE

FINDINGS AND IMPACT DESCRIPTION

This study notes that the proposed wind turbines are located on high lying ridges and hills and that these areas are generally devoid of heritage resources.

The most significant heritage sites, both colonial settlements and archaeological sites, are located in river valleys and kloofs, and they will not be impacted by the construction of the turbines. However, impacts may occur when access roads, underground cabling or powerlines cross these river valleys/kloofs. This is where careful placement of the access roads through river valleys will be required.

In general, heritage resources are non-renewable, and once they are destroyed they cannot be recovered or re-introduced. This applies to palaeontological and archaeological resources, buildings that are older than 60 years as well as cemeteries and graves. It is therefore important that heritage resources are identified and their significance assessed prior to development.

It is preferable that archeological sites are conserved. Mitigation, in the form of archaeological excavations, means that while the material may have been retained and while conserved in a museum, the context of the archaeological site has been lost forever.

CONSTRUCTION PHASE

It is expected that most of the damage to the heritage resources on Maralla West will occur during construction. Heritage sites are concentrated along river valleys, while the turbines are generally located along the tops of the mountain ridges. Therefore, the following activities may result in direct impacts to the landscape and any heritage that lies on it:

- → Bulldozing of roads, or excavation of linear trenches for cables, through river valleys to the turbine sites. This may result in the destruction of archaeological sites or graves on the banks of rivers;
- → Upgrading of existing roads particularly where they cut through river valleys or are in close proximity to ruined settlements and graves or existing settlements (i.e. farmhouse of Wolven Hoek);
- → Construction of electrical infrastructure in the form of substations

OPERATIONAL PHASE

During the operational phase of the wind facility the only risks are potential vandalism of heritage sites by staff of the wind facility(s). This includes stripping of fittings from abandoned farm buildings, careless damage to kraal walls, graffiti on rock art sites, etc. No further impacts to heritage would occur during operation of the currently proposed facility, although any expansion to the facility (effectively a new construction phase), would introduce new impacts.

- → The potential adaptive re-use of the Wolven Hoek or Die Kom farmhouses may result in vandalism and damage

DECOMMISSIONING PHASE

The decommissioning phase of the wind farm facilities may include the dumping of electrical infrastructure on heritage sites. At this stage, indirect impacts to heritage resources that were experienced during construction and operation can be reduced or removed with the successful rehabilitation of the site. Direct impacts to heritage resources would, however, remain the same. These impacts are all considered to be negative

IMPACT ASSESSMENT

The impact assessment for the above mentioned impacts is included in **Table 9-8**.

Table 9-8: Assessment of Heritage Impacts for the Maralla West WEF

REF.		EXTENT (E)	DURATION (D)	MAGNITUDE (M)	PROBABILITY (P)	SIGNIFICANCE (S=(E+D+M)*P)		STATUS (+ve or -ve)
Construction Phase								
H1	**Impact**	Impacts to a ruined settlement (Road Settlement) and graveyard on public access road through De Kom						
	Without Mitigation	2	5	8	4	**60**	**Medium**	-ve
	degree to which impact can be reversed:	Heritage resources are non-renewable and impacts cannot be reversed						
	degree of impact on irreplaceable resources:	High impacts on graveyard						
	With Mitigation	1	5	2	2	**16**	**Low**	-ve
H2	**Impact**	Impacts to Late Stone Age sites along river bed (River Settlement)						
	Without Mitigation	2	5	6	3	**39**	**Medium**	-ve
	degree to which impact can be reversed:	Heritage resources are non-renewable and impacts cannot be reversed						
	degree of impact on irreplaceable resources:	High impacts on 19th century stockpost						
	With Mitigation	1	5	4	2	**20**	**Low**	-ve
H3	**Impact**	Impacts to the farm house of Wolvenhoek						
	Without Mitigation	2	5	6	4	**53**	**Medium**	-ve
	degree to which impact can be reversed:	Heritage resources are non-renewable and impacts cannot be reversed						
	degree of impact on irreplaceable resources:	High impacts on rock art and graves.						
	With Mitigation	1	5	4	2	**20**	**Low**	-ve
No Go Alternative								

	Impact	There will be no additional impacts on heritage resources. The status quo will remain.

MITIGATION MEASURES

The following mitigation and management measures have been recommended:

- Construction Phase
  - The access road and underground cabling which run within a few metres of the Wolven Hoek farmhouse must be relocated. This will require careful placement, since there is a stone kraal on the opposite side of the road;
  - Since heritage resources (in particular LSA sites with pottery) are concentrated in the river valleys, it is important that access roads and underground cabling is carefully placed to avoid negative impacts to heritage sites along rivers. This will require a final walk down during the EMP phase, of all river crossings;
  - The gravel farm road which bisects Drie Rode Heuvels, has cut through an historic ruined settlement, separating the ruins from the graveyard. Any widening of the gravel road will result in the destruction of the graves; and
  - If any human remains are uncovered during the excavations for the Wind Farm, work must stop in that area and SAHRA must be alerted immediately.
- Operational Phase:
  - Any abandoned farm buildings (such as Wolven Hoek) should be protected from vandalism during the operational phase of the wind farm. If there are any proposals for adaptive re-use of the building during the operational phase of the wind farm, then the provisions of the NHRA must be complied with regarding any restoration or renovation of the building.

9.9 PALAEONTOLOGY

FINDINGS AND IMPACT DESCRIPTION

CONSTRUCTION PHASE

In terms of the palaeontological sensitivity of the rock units represented within the Maralla West WEF project area, the outcrop area of the Lower Beaufort Group is generally considered to be high to very high sensitivity because of its rich record of Permian vertebrates and plants (MacRae 1999, McCarthy & Rubidge 2005, Almond & Pether 2008a, 2008b, Smith et al. 2012, SAHRIS website). The overlying Late Caenozoic superficial deposits (alluvium etc) are generally of low sensitivity but may also be locally high (e.g. fossil mammals). Fieldwork in the Klein-Roggeveld region backed-up by desktop analysis indicates that fossil material such as vascular plants, vertebrate skeletal material (bones, teeth) and trace fossils are present within the Karoo Supergroup here (See References). However, well-preserved specimens of special scientific interest and conservation significance are very rare indeed. No vertebrate bones, teeth or tetrapod trace fossils (trackways, burrows), nor any petrified wood, were found during the field study of the Maralla West WEF project area. The fossils seen here – predominantly low diversity invertebrate traces and reedy plant remains - consist almost entirely of taxa that occur widely within the region and that are therefore not of exceptional conservation significance.

All South African fossil heritage is protected by law (South African Heritage Resources Act, 1999) and fossils may not be collected, damaged or disturbed without a permit from the relevant Provincial Heritage Resources Agency (in this case Heritage Western Cape). The construction phase of the proposed WEF will entail extensive surface clearance as well as excavations into the superficial sediment cover and underlying bedrock. The development may adversely affect potential fossil heritage within the study area by destroying, damaging, disturbing or permanently sealing-in fossils preserved at or beneath the surface of the ground that are then no longer available for scientific research or other public good. The operational and de-commissioning phases of the WEF are very unlikely to involve further adverse impacts on local palaeontological heritage and are therefore not separately assessed here.

This assessment refers to impacts on fossil heritage preserved at or beneath the ground surface within the Maralla West WEF project area during the construction phase, mainly due to surface clearance and excavation activities. Such impacts on fossil heritage are limited to the site (development footprint) and are generally direct, negative and of permanent effect (non-reversible). While fossils of some sort (including microfossils, invertebrate trace fossils and plant debris) are of widespread occurrence within the project area, unique or scientifically-important fossils are very scarce indeed here, even where bedrock exposure levels are locally high. It is concluded that impacts on scientifically important palaeontological heritage resources are improbable and of minor magnitude since (1) significant fossil sites are unlikely to be affected and (2) in many cases these impacts can be mitigated. The overall impact significance of the Maralla West WEF without mitigation is rated as LOW in terms of palaeontological heritage resources. Should the proposed mitigation measures outlined in Section 6 below be fully implemented, the impact significance would remain low. However, residual negative impacts such as the inevitable loss of fossil heritage would be partially offset by an improved understanding of Karoo fossil heritage which is considered a positive impact.

There are no objections on palaeontological heritage grounds to authorisation of the proposed Maralla West WEF development. Given the overall low impact significance of the Maralla West WEF project, and the paucity of high-sensitivity fossil sites recorded here, there are no suggested modifications on palaeontological heritage grounds to the proposed layout, including wind turbine sites, access and internal roads and associated infrastructure. Likewise, there is no preference for one or other of the two sites under consideration for the on-site IPP substation and associated Operations and Maintenance Building. Once identified, any borrow pit sites will require separate palaeontological heritage assessment before excavation commences.

Confidence levels for this assessment are rated as medium, given the necessarily superficial nature of the short field assessment counterbalanced by the number of palaeontological field studies recently carried out within the broader Klein-Roggeveld study region.

The impact assessment for the No-Go Option considers future impacts on local fossil heritage that are likely to occur in the absence of WEF development, using the present status of fossil heritage in the area as a baseline. Destruction of near-surface or surface fossil material by natural bedrock weathering and erosion will be partially offset by on-going exposure of fresh fossil material by erosion. Improvements in our understanding of palaeontology of the area (a possible positive impact) will depend on whether or not field-based academic or impact studies are carried out here, which is inherently unpredictable (There is an on-going research project on the palaeontology of the SW Karoo by Wits University)..

IMPACT ASSESSMENT

The impact assessment for the above mentioned impacts is included in **Table 9-9**.

Table 9-9: Assessment of Palaeontological Impacts for the Maralla West WEF

REF.		EXTENT	DURATION	MAGNITUDE	PROBABILITY	SIGNIFICANCE	STATUS
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)	(+ve or -ve)
Construction Phase							
P1	**Impact**	Disturbance, damage or destruction of fossils (direct, negative impacts) preserved at or beneath the ground surface within the development footprint					

		during the construction phase, mainly due to surface clearance or excavation activities.						
	Without Mitigation	1	5	2	2	**16**	**Low**	-ve
	degree to which impact can be reversed:	Irreversible						
	degree of impact on irreplaceable resources:	Minor						
	With Mitigation	1	5	2	2	**16**	**Low**	-ve
No Go Alternative								
	Impact	There will be no additional impacts on heritage resources. The status quo will remain.						

MITIGATION MEASURES

None of the few fossil sites identified within the Maralla West WEF project area are considered to be of conservation significance since they represent fossil taxa (low-diversity invertebrate traces, reedy plant material) that occur widely within the broader Klein-Roggeveld region and that are not of great scientific interest.

Given the scarcity of scientifically-important, unique fossil heritage recorded within the study area, no further specialist palaeontological studies or mitigation are recommended for this development, pending the potential discovery of significant new fossils before or during the construction phase. There are no suggested modifications on palaeontological heritage grounds to the proposed layout, including wind turbine sites, access and internal roads, IPP substation and associated infrastructure.

The following general palaeontological mitigation measures apply to the construction phase:

- Monitoring of all surface clearance and substantial excavations (>1 m deep) by the ECO for fossil material (e.g. bones, teeth, fossil wood) on an on-going basis during the construction phase.
- Safeguarding of chance fossil finds (preferably in situ) during the construction phase by the responsible ECO, followed by reporting of finds to SAHRA.
- Recording and judicious sampling of significant chance fossil finds by a qualified palaeontologist, together with pertinent contextual data (stratigraphy, sedimentology, taphonomy) (Phase 2 mitigation).
- Curation of fossil material within an approved repository (museum / university fossil collection) and submission of a Phase 2 palaeontological heritage report to SAHRA by a qualified palaeontologist.

Mitigation of significant chance fossil finds reported by the ECO would involve the recording, sampling and / or collection of fossil material and associated geological data by a professional palaeontologist during the construction phase of the development. The palaeontologist concerned with potential mitigation work (Phase 2) would need a valid fossil collection permit from SAHRA and any material collected would have to be curated in an approved depository (e.g. museum or university collection). All palaeontological fieldwork and reporting should meet the minimum standards outlined by SAHRA (2013).

Significant further impacts on palaeontological heritage resources are not anticipated during the planning, operational, decommissioning and rehabilitation phases of the WEF so no further mitigation or management measures in this respect are proposed here.

These monitoring and mitigation requirements should be incorporated into the EMPr for the WEF and also included as conditions for authorisation of the development project.

9.10 VISUAL

FINDINGS AND IMPACT DESCRIPTION

VIEWSHED

The viewshed is the topographically defined area, including all the major observation sites, from which proposed structures/activities may be visible. The boundary of the viewshed connects high points in the landscape and demarcates an area of potential visibility. The viewshed calculations are based on worst-case scenario using 360° line-of-sight calculations on a Digital Elevation Model (at 20m contour intervals). The height of existing buildings, trees and small undulations in the surrounding area are not included in the calculation of the viewshed. It is therefore important to remember that the proposed development will not be visible from all points within the viewshed, as views may be obstructed by visual elements such as built structures, minor local variations in topography and vegetation. For this reason it is often referred to as the 'zone of theoretical visibility'.

The viewshed for Maralla West (**Figure 9-1**) indicates the area from which a selection of turbines (at 195m high) may potentially be visible; it is calculated within a 20km radius, but visibility beyond 10km will be marginal (see ZVI). As can be seen from the figure:

- Except for small pockets (predominantly on ridges or elevated viewpoints), most of the area beyond a 10km radius is excluded from the viewshed area. This is due to the undulating nature of the landscape, which screens the facility.
- A stretch of the Klein Roggeveld Road, from just before the Komsberg Pass to just after the De Plaat turn-off, is included in the viewshed area.
- Within the 20km radius, only two short stretches of the R345, one of approximately 5km and one of approximately 2,5km fall within the viewshed area. Both of these are outside of the 10km radius.
- The proposed development is likely to be visible from elevated points on the Klein Roggeveld and Komsberg Mountains (particularly the southern slopes).

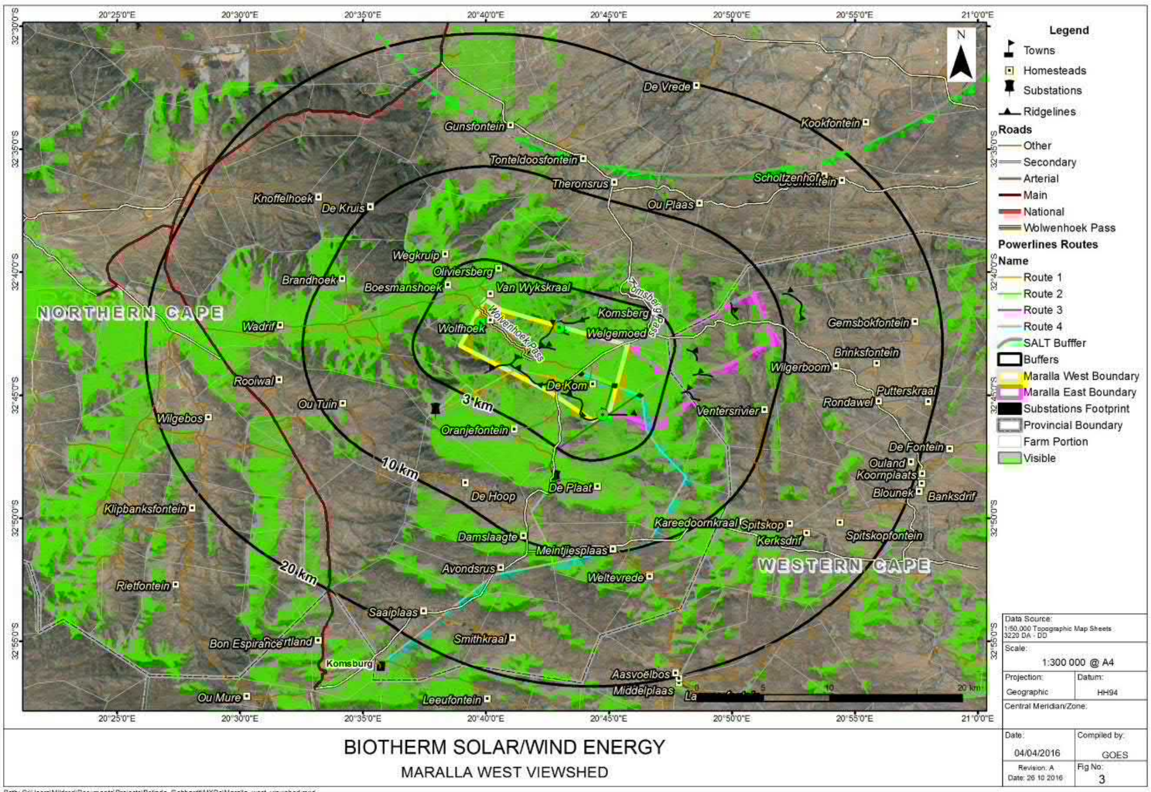

Figure 9-1: Maralla West WEF Viewshed

CONSTRUCTION PHASE

CONSTRUCTION EQUIPMENT AND DUST

Construction vehicles, dust and equipment will have a visual impact on viewers and general visibility (clarity of the air) within close proximity to the site. The visual impacts during construction are over a limited time period and will be temporary.

CLEARING

Loss of vegetation during land clearing increases the visibility of contrasting soils, resulting in changes to the colour and texture of the site. Clearing vegetation will also result in increased windblown dust, reducing visibility of both day and night skies.

PHYSICAL IMPACT ON LANDFORMS

Roads, turbine platforms and other earthworks may impact on the physical landscape form particularly of steeper slopes, where cut and fill is required.

OPERATIONAL PHASE

INTRUSION ON THE SENSE OF PLACE AND SCENIC LANDSCAPE

The remote and rural character of the area is typical of the Moordenaars Karoo. It is characterised by the rugged topography with low vegetation and clear air. The repeated patterns of the strong vertical structures will differ from the current visual landscape and will have an impact on the current nature of the landscape.

WIND TURBINES

The clean lines of the turbines and the repetition of like elements, often results in greater unity and less clutter than many other types of development. However, the 195m high turbines will be visible in the landscape. The number of turbines has been reduced from 125 in the preliminary plans to 70 in the layout plan on which the assessment is based . Turbines at higher elevation and on ridgelines will be more visible against the skyline. The revised layout has attempted to avoid the very highest tips of the ridges, but due to other sensitivities and wind requirements a limited number of turbines remain in elevated positions. Turbines likely to be the most visible will be a string of about 14 turbines that run across roughly the middle of the site from SW to NE.

SHADOW FLICKER

Shadow flicker occurs when the sun is shining directly behind a wind turbine and the turning blades cast moving or flickering shadows on nearby residences through constrained openings such as windows. This occurs only during low sun angles (just after dawn and before sunset) and usually only a few hours per year, but it can present an annoyance to nearby residents or places of work. Shadow flicker has been proven to occur only within ten rotor diameters of a turbine position (UK Department of Energy and Climate Change). The Maralla West turbines have a maximum diameter of 150m, which means that beyond 1,5km shadow flicker will not be experienced.

LIGHTING

The SACAA determines the required hazard lighting on turbines. Usually wind turbines are required to be lit at night only (provided the turbines are white or off-white) with flashing red lights located at intervals along the turbine strings. Until the turbines are connected and functioning, randomly flashing red temporary lighting is required for all objects over 25m high.

At night the landscape is observed differently as there is less visible context and lights are more likely to be seen in isolation. While red lights have less contrast than white lights in the night sky, they differ markedly from colours typically observed in the night landscape; the flashing on and off makes them particularly noticeable. However there are few viewers in close proximity to the site that could potentially be affected by lighting.

SUBSTATION AND OTHER BUILDINGS AND INFRASTRUCTURE

The proposed substations are located at relatively low elevation, and have a maximum height of 15m. They are therefore not anticipated to be highly visible beyond 3km.

ROADS AND /OR ROAD WIDENING

Access and on-site roads could also contribute to visual impacts during operations. In addition to vegetative clearing, roads may introduce long-term visual contrasts to the landscape colour and texture.

DE-COMMISSIONING PHASE

CONSTRUCTION EQUIPMENT AND DUST

In terms of visual impact the decommissioning process is anticipated to be broadly similar to that of the construction phase, effects on visual receptors and landscape character during decommissioning are anticipated to be consistent with those assessed for the construction phase

IMPACT ASSESSMENT

The impact assessment for the above mentioned impacts is included in **Table 9-10**.

Table 9-10: Assessment of Visual Impacts for the Maralla West WEF

REF.		EXTENT (E)	DURATION (D)	MAGNITUDE (M)	PROBABILITY (P)	SIGNIFICANCE (S=(E+D+M)*P)		STATUS (+ve or -ve)
Construction Phase								
V1	**Impact**	Visual impact during construction due to dust, vehicles and equipment						
	Without Mitigation	2	2	6	4	**40**	**Medium**	-ve
	degree to which impact can be reversed:	The visual impact can be completely reversed if vehicles, equipment, rubble and any other construction materials are removed after construction.						
	degree of impact on irreplaceable resources:	Dust and equipment are not likely to impact on any irreplaceable visual resources.						
	With Mitigation	2	2	4	3	**24**	**Low**	-ve
V2	**Impact**	Visual impact during construction due to vegetation clearing						
	Without Mitigation	2	2	6	4	**32**	**Medium**	-ve
	degree to which impact can be reversed:	The visual impact can be completely reversed after closure of facility, if vegetation is rehabilitated.						
	degree of impact on irreplaceable resources:	Vegetation is classified as Least Threatened, and from a visual perspective can be re-established. The value of vegetation loss is considered in the ecological report.						
	With Mitigation	2	2	2	4	**24**	**Low**	-ve
V3	**Impact**	Visual impact during construction on landforms						
	Without Mitigation	1	5	3	4	**32**	**Medium**	-ve
	degree to which impact can be reversed:	Visual impacts on landforms can be reversed with effective rehabilitation measures.						
	degree of impact on irreplaceable resources:	Most visual impacts are reversible, some cut and fill scars may remain if rehabilitation insufficient.						
	With Mitigation	1	4	2	4	**28**	**Low**	-ve
Operational Phase								
V3	**Impact**	Intrusion on sense of place and rural landscape						
	Without Mitigation	2	4	8	4	**56**	**Medium**	-ve
	degree to which impact can be reversed:	The visual impact can completely reversed after closure of facility, if structures and buildings removed and vegetation rehabilitated.						
	degree of impact on irreplaceable resources:	No impact on irreplaceable resource, if site effectively rehabilitated.						
	With Mitigation	2	4	6	4	**48**	**Medium**	-ve

V4	**Impact**	Visual impact of wind turbines						
	Without Mitigation	2	4	8	5	**70**	**High**	-ve
	degree to which impact can be reversed:	The visual impact can completely reversed after closure of facility, if turbines removed.						
	degree of impact on irreplaceable resources:	No impact on irreplaceable resource, if site effectively rehabilitated.						
	With Mitigation	2	4	6	5	**60**	**Medium**	-ve
V5	**Impact**	Visual impact of substation and other buildings and infrastructure						
	Without Mitigation	2	4	6	4	**48**	**Medium**	-ve
	degree to which impact can be reversed:	The visual impact can be completely reversed after closure of facility, if structures and buildings removed.						
	degree of impact on irreplaceable resources:	No impact on irreplaceable resource, if site effectively rehabilitated.						
	With Mitigation	2	4	4	4	**40**	**Medium**	-ve
V6	**Impact**	Visual impact of shadow flicker						
	Without Mitigation	2	4	4	2	**20**	**Low**	-ve
	degree to which impact can be reversed:	The visual impact can completely reversed after closure of facility, if removed.						
	degree of impact on irreplaceable resources:	No impact on irreplaceable resource.						
	With Mitigation	2	4	2	1	**8**	**Low**	-ve
V7	**Impact**	Visual impact of lighting from facility						
	Without Mitigation	2	4	6	4	**48**	**Medium**	-ve
	degree to which impact can be reversed:	The visual impact can completely reversed after closure of facility, if lighting removed.						
	degree of impact on irreplaceable resources:	No impact on irreplaceable resource.						
	With Mitigation	2	4	6	4	**48**	**Medium**	-ve
V8	**Impact**	Visual impact of additional roads and road widening						
	Without Mitigation	2	4	4	3	**30**	**Low**	-ve
	degree to which impact can be reversed:	The visual impact can completely reversed after closure of facility.						
	degree of impact on irreplaceable resources:	No impact on irreplaceable resource, but visible roads may remain.						
	With Mitigation	2	4	2	3	**24**	**Low**	-ve

De-commissioning Phase								
V9	**Impact**	Visual impact during decommissioning due to dust, vehicles and equipment						
	Without Mitigation	2	2	6	4	**40**	**Medium**	-ve
	degree to which impact can be reversed:	The visual impact can be almost completely reversed after closure of facility, if structures and buildings removed and vegetation rehabilitated.						
	degree of impact on irreplaceable resources:	Low visual impact if cut and fill scars remain.						
	With Mitigation	2	2	2	4	**24**	**Low**	-ve
No Go Alternative								
	Impact	No visual impacts are associated with the no-go alternative.						

MITIGATION MEASURES

The following mitigation and management measures have been recommended:

- Detailed design and specification
  - Design structures and buildings close together in clusters as far as possible.
  - Cables and pipelines should be located underground wherever possible.
  - Cluster or group turbines to break up overly long lines of turbines.
  - Ensure that the revised alternative layout, with reduced number of turbines, and fewer turbines in elevated positions, is approved.
  - Create visual order and unity among turbine clusters.
  - Ensure uniformity in shape and colour of turbines.
  - No corporate or advertising signage is to be permitted on turbines.
  - Use non-reflective paints and coatings on turbines and other structures to minimise visibility and avoid reflectivity and glare.
  - If security lighting is required:
    - Use light fixtures that provide precisely directed illumination;
    - If possible, use lighting that is activated only on movement of illegal entry to the site;
    - Avoid high pole top security lighting if possible;
  - Specify wire mesh or Clear-Vu type fencing for perimeter fencing.
  - Signage related the project must be discreet and confined to the entrances.
- Site clearing
  - The construction footprint must be kept as small as possible, to avoid unnecessary disruption to the existing vegetation.
  - No blanket clearing or removal of vegetation outside of the building zone is allowed.
- Excavation and construction of facility
  - Site perimeter (building zone) must be clearly demarcated.

- The handling and transportation of materials which may generate dust must be avoided during high wind conditions.
- Ground level at site boundary should remain natural ground level.
- The building site and construction facilities must be well maintained and strictly controlled.
- Dust and litter control measures must be included in the EMPr
- No dumping in unauthorised and/or highly visible areas is permitted.

→ Operations

- Establishing vegetative screens /shelterbelts around affected homesteads should be considered in consultation with the owners.
- An ecologist (preferably the ecological specialist appointed to undertake the assessment) must be appointed to assist with the plant selection for vegetative screening.
- Natural vegetation must be re-established on disturbed areas after construction;
- Roads and drainage for runoff should be appropriately stabilised to avoid erosion and visual scars.
- Turbines must be kept in good repair and cleaned as required.

→ Rehabilitation

- A detailed rehabilitation plan must be prepared.
- An ecologist must be appointed to assist with the plant selection and methods for vegetative rehabilitation.
- Mitigation measures applicable to the construction phase are also applicable to decommissioning.

9.11 NOISE

FINDINGS AND IMPACT DESCRIPTION

CONSTRUCTION PHASE

Based on a worst-case cumulative PWL of 116.9 dB(A) stemming from the construction equipment located at an individual turbine the resultant noise levels at specified distances from the source are presented in **Table 9-11**. Noise levels in the immediate vicinity of the construction activities are predicted to be high, as would be expected. From 500 m from the source, noise levels will reduce considerably, with noise levels at 1,483 m from the source dropping to below the SANS rural guideline level of 45 dB(A). It must be noted that these noise levels are purely associated with noise related to the construction of a proposed wind turbine and do not include baseline (existing) noise levels. It must also be noted that this is an absolute worst case scenario, with all construction equipment operational simultaneously which will not occur in reality. Such an approach was utilised as detailed construction plans are not yet available.

Table 9-11: Worst-case noise levels associated with the construction of a wind turbine at the Maralla West site

Distance from Wind Turbine Site (m)	Calculated Noise Level dB(A)
100	69
200	63
500	55
1,000	49
2,000	43
3,000	39

Distance from Wind Turbine Site (m)	Calculated Noise Level dB(A)
4,000	37
5,000	35

Resultant noise levels and predicted impacts at the receptor locations are presented in **Table 9-12**. This includes baseline (monitored) noise levels in order to assess changes in noise levels at each location. It must be noted that since sound levels are represented in logarithmic units, simple addition cannot be applied to obtain the cumulative sound levels, but rather logarithmic addition. Two scenarios are presented, namely construction phase and construction phase during a blasting event. Construction will only take place during day-time hours, so no night-time results are presented.

Table 9-12: Predicted day-time noise levels at the farmhouse receptors during the construction phase

Receiver	Noise Level from Construction Activities dB(A)	Baseline Noise Level dB(A)	Cumulative Noise Level dB(A)	Change in Noise Level dB(A)	Estimated Community Response
FH 1	54.9	43.8	55.3	+11.5	Medium
FH 1 (during blast)	66.3	43.8	66.4	+22.6	Very Strong
FH 2	36.6	47.8	48.1	+0.3	Little
FH 2 (during blast)	48.0	47.8	50.9	+3.1	Little
FH 3	38.8	46.9	47.5	+0.6	Little
FH 3 (during blast)	50.2	46.9	51.9	+5.0	Little

The change in noise levels associated with the construction (without blasting) of the proposed wind energy facility will result in “little” estimated community response at two of the three receptor locations (FH 2 and FH 3). Noise levels are anticipated to increase by between 0.3 and 0.6 dB(A) at these farmhouse receptors. Such increases in noise levels are anticipated to be negligible, resulting in sporadic complaints and are deemed to go unnoticed during the noisier day-time hours. At FH 1, the change in current noise levels with the introduction of construction activities will result in “medium” estimated community response, with an increase of 11.5 dB(A) predicted.

Since all three receptors are located within the Northern Cape Province, assessment must also be made against the Noise Control Regulations as no province-specific regulations apply. A noise is considered disturbing when noise levels from a new source exceed the ambient sound level by 7 dB(A). Increases in noise levels at FH 2 and FH 3 are below 7 dB(A) and as such are not considered as disturbing, having little impact on these receptors. At FH 1, however, changes in noise levels exceed 7 dB(A) and as such are considered as disturbing. It must be noted that this represents a worst-case scenario with all construction equipment operational simultaneously, which will not occur in reality.

During a blasting event, noise levels at two of the three receptors (FH 2 and FH 3) are predicted to increase slightly, resulting in “little” community response. Noise levels are anticipated to increase by between 3.1 and 5.0 dB(A) at these farmhouse receptors. According to the Noise Control Regulations, such increases are not considered to be disturbing. At FH 1, however, noise levels during a blasting event are predicted to increase by 22.6 dB(A), resulting in “very strong” community response. Due to the immediate location of this farmhouse to the wind turbines, it is advised that no blasting take place at this location or alternatively new locations for the turbines in the immediate vicinity of this receptor be considered.

It must be noted that blasting is instantaneous and periodic and such impacts will only endure for as long as a blast occurs. Blasting may not even be necessary at many of the turbine sites, but this will be dependent on the underlying geology and will be decided at the time of construction. It must also be noted that in addition to the noise impacts of a blasting event, air over pressure and ground-borne vibration impacts may also be noted. Such impacts were beyond the scope of this Environmental Acoustic Impact Assessment and as such were not assessed here.

Figure 9-2 presents the projected construction road traffic noise levels over distance from the source as a result of the construction of the Maralla West wind energy facility. It must be noted that these noise levels are purely associated with noise related to construction traffic and do not include baseline (existing) noise levels. Calculations were based on the SANS 10210 methodology using the road traffic statistics as provided in the Traffic Impact Assessment (WSP, 2016), namely 50 construction vehicle trips (in and out combined) per day. From this, it was assumed that an equal number of light duty vehicles would also frequent each turbine site per day. Noise levels in the immediate vicinity of the roads will be elevated, with noise levels dropping considerably from 400 m, with predicted noise levels below the SANS rural guideline level from 600 m onwards.

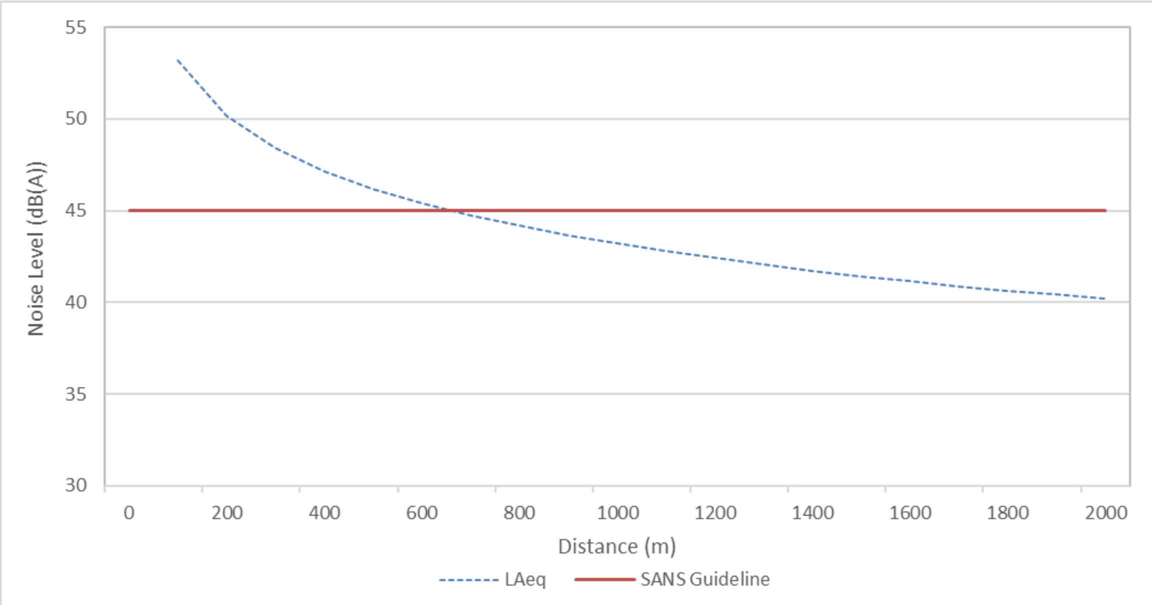

Figure 9-2: Construction phase projected road traffic noise levels as distance between roads and receivers increase

OPERATIONAL PHASE

Predicted noise levels from the operation of the wind turbines at the proposed Maralla West wind energy facility are presented in this section. The turbines will operate 24-hours a day depending on the prevailing wind conditions and as such only one output plot is presented for each wind class scenario. It must be noted that the visual outputs presented here are for the operation of the wind energy facility only and are not cumulative (i.e. taking the existing background sound levels into account). For each farmhouse receptor, the current ambient sound levels are evaluated against the predicted noise levels (modelled) to assess the change in sound levels as a result of the proposed wind energy facility. Cumulative sound levels (current and predicted) are also presented for each receiver, however, it must be noted that since sound levels are represented in logarithmic units, simple addition cannot be applied to obtain the cumulative sound levels, but rather logarithmic addition.

Table 9-13 and **Table 9-14** present the predicted day-time and night-time noise levels respectively at the three receiver locations during the operational phase of the proposed Maralla West wind energy facility when winds at a 10 m height are blowing at 6 m/s. Predicted noise levels were compared with the existing baseline noise levels to assess any changes in noise levels and the resultant community responses. A graphical output of the modelled results is presented in **Figure 9-3**.

Predicted day-time noise levels at all receiver locations are low with noise associated with the operation of the proposed wind energy facility only perceived at one receiver location (FH 1). This farmhouse is located 500 m from the nearest wind turbine. The increase in noise at this location is only predicted to be 1.6 dB(A), resulting in "little" impact and community response. Such an increase is also well below the 7 dB(A) threshold for annoyance as per the Noise Control Regulations.

At night, noise levels are expected to increase at one receptor location (FH 1). Such an increase is deemed to have "medium" to "strong" impact on this receptor location with a 14.8 dB(A) increase. Such an increase exceeds the 7 dB(A) threshold for annoyance as per the Noise Control Regulations. It must be noted that the night-time scenario represents a worst-case, using the lowest monitored background levels in the area. Should the ambient noise levels be higher than this in reality, the expected increases will diminish. Additionally, it is understood that the farmhouse belongs to one of the landowners who is in support of the Proposed Project.

Table 9-13: Day-time acoustic model results during the operational phase of the proposed Maralla West wind energy facility with winds at 10 m height blowing at 6 m/s

Receiver	Predicted Noise Level (dB(A))	Baseline Day-time Noise Level (dB(A))	Cumulative Noise Level (dB(A))	Change in Noise Level (dB(A))	Estimated Community Response
FH 1	40.3	43.8	45.4	+1.6	Little
FH 2	0.0	47.8	47.8	0.0	Little
FH 3	0.0	46.9	46.9	0.0	Little

Table 9-14: Night-time acoustic model results during the operational phase of the proposed Maralla West wind energy facility with winds at 10 m height blowing at 6 m/s

Receiver	Predicted Noise Level (dB(A))	Baseline Night-time Noise Level (dB(A))	Cumulative Noise Level (dB(A))	Change in Noise Level (dB(A))	Estimated Community Response
FH 1	40.3	25.6	40.4	+14.8	Medium to Strong
FH 2	0.0	25.6	25.6	0.0	Little
FH 3	0.0	25.6	25.6	0.0	Little

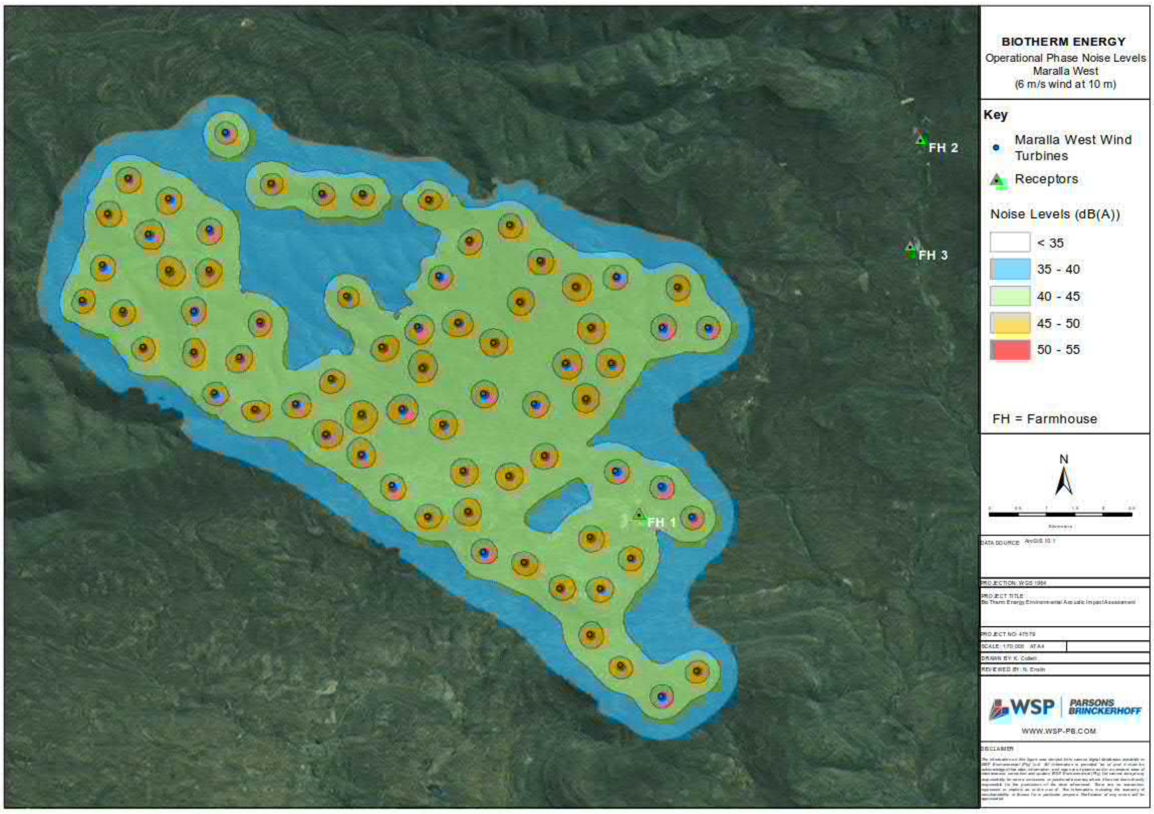

Figure 9-3: Predicted noise levels during the operational phase of the Maralla West wind energy facility when the wind at 10 m height is blowing at 6 m/s

Table 9-15 and **Table 9-16** present the predicted day-time and night-time noise levels respectively at the three receiver locations during the operational phase of the proposed Maralla West wind energy facility when winds at a 10 m height are blowing at 8 m/s. Predicted noise levels were compared with the existing baseline noise levels to assess any changes in noise levels and the resultant community responses. A graphical output of the modelled results is presented in **Figure 9-4**.

Predicted day-time noise levels at all receiver locations are low with noise associated with the operation of the proposed wind energy facility only perceived at one receiver location (FH 1). This farmhouse is located 500 m from the nearest wind turbine. The increase in noise at this location is only predicted to be 1.9 dB(A), resulting in “little” impact and community response. Such an increase is also well below the 7 dB(A) threshold for annoyance as per the Noise Control Regulations.

At night, noise levels are expected to increase at one receptor location (FH 1). Such an increase is deemed to have “strong” impact on this receptor location with a 15.7 dB(A) increase. Such an increase exceeds the 7 dB(A) threshold for annoyance as per the Noise Control Regulations. It must be noted that the night-time scenario represents a worst-case, using the lowest monitored background levels in the area. Should the ambient noise levels be higher than this in reality, the expected increases will diminish. Additionally, it is understood that the farmhouse belongs to one of the landowners who is in support of the Proposed Project.

Table 9-15: Day-time acoustic model results during the operational phase of the proposed Maralla West wind energy facility with winds at 10 m height blowing at 8 m/s

Receiver	Predicted Noise Level (dB(A))	Baseline Day-time Noise Level (dB(A))	Cumulative Noise Level (dB(A))	Change in Noise Level (dB(A))	Estimated Community Response
FH 1	41.2	43.8	45.7	+1.9	Little
FH 2	0.0	47.8	47.8	0.0	Little
FH 3	0.0	46.9	46.9	0.0	Little

Table 9-16: Night-time acoustic model results during the operational phase of the proposed Maralla West wind energy facility with winds at 10 m height blowing at 8 m/s

Receiver	Predicted Noise Level (dB(A))	Baseline Night-time Noise Level (dB(A))	Cumulative Noise Level (dB(A))	Change in Noise Level (dB(A))	Estimated Community Response
FH 1	41.2	25.6	41.3	+15.7	Strong
FH 2	0.0	25.6	25.6	0.0	Little
FH 3	0.0	25.6	30.3	0.0	Little

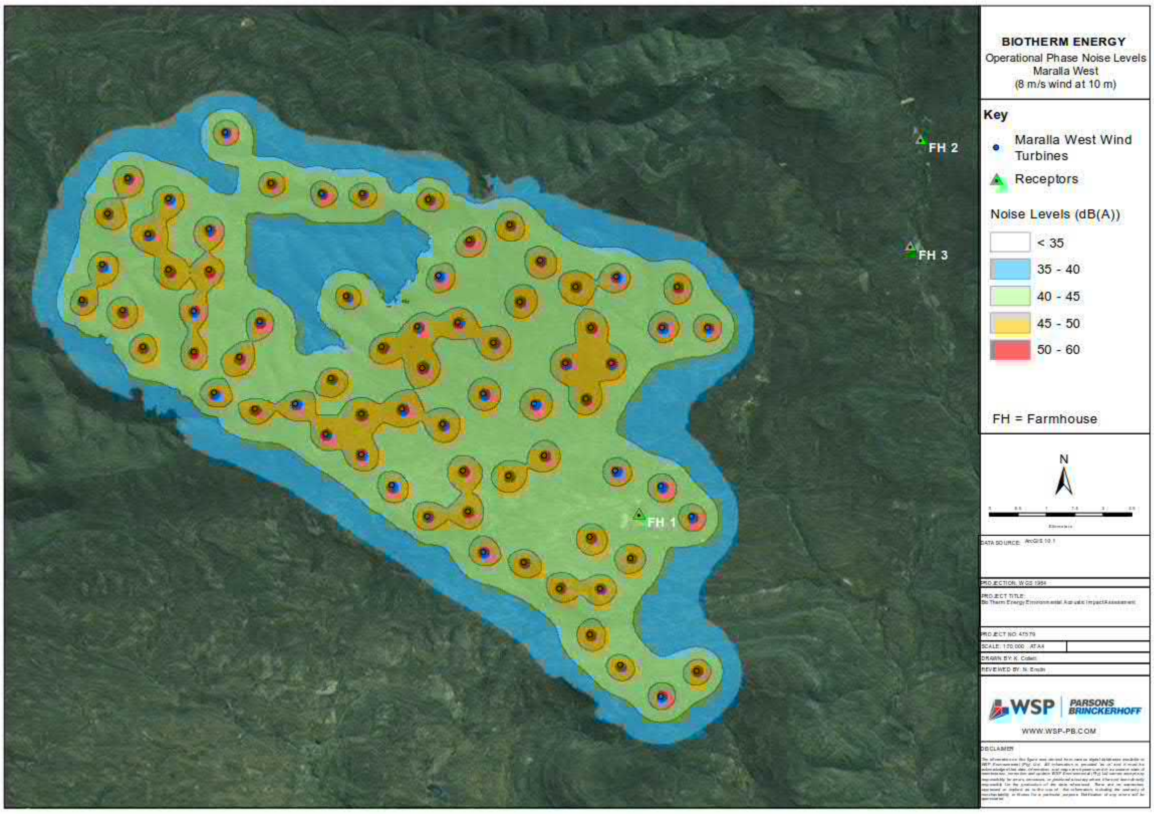

Figure 9-4: Predicted noise levels during the operational phase of the Maralla West wind energy facility when the wind at 10 m height is blowing at 8 m/s

Table 9-17 and **Table 9-18** present the predicted day-time and night-time noise levels respectively at the three receiver locations during the operational phase of the proposed Maralla West wind energy facility when winds at a 10 m height are blowing at 10 m/s. Predicted noise levels were compared with the existing baseline noise levels to assess any changes in noise levels and the resultant community responses. A graphical output of the modelled results is presented in **Figure 9-5**.

Predicted day-time noise levels at all receiver locations are low with noise associated with the operation of the proposed wind energy facility only perceived at one receiver location (FH 1). This farmhouse is located 500 m from the nearest wind turbine. The increase in noise at this location is only predicted to be 1.7 dB(A), resulting in “little” impact and community response. Such an increase is also well below the 7 dB(A) threshold for annoyance as per the Noise Control Regulations.

At night, noise levels are expected to increase at one receptor location (FH 1). Such an increase is deemed to have “strong” impact on this receptor location with a 15.2 dB(A) increase. Such an increase exceeds the 7 dB(A) threshold for annoyance as per the Noise Control Regulations. It must be noted that the night-time scenario represents a worst-case, using the lowest monitored background levels in the area. Should the ambient noise levels be higher than this in reality, the expected increases will diminish. Additionally, it is understood that the farmhouse belongs to one of the landowners who is in support of the Proposed Project.

Table 9-17: Day-time acoustic model results during the operational phase of the proposed Maralla West wind energy facility with winds at 10 m height blowing at 10 m/s

Receiver	Predicted Noise Level (dB(A))	Baseline Day-time Noise Level (dB(A))	Cumulative Noise Level (dB(A))	Change in Noise Level (dB(A))	Estimated Community Response
FH 1	40.7	43.8	45.5	+1.7	Little
FH 2	0.0	47.8	47.8	0.0	Little
FH 3	0.0	46.9	46.9	0.0	Little

Table 9-18: Night-time acoustic model results during the operational phase of the proposed Maralla West wind energy facility with winds at 10 m height blowing at 10 m/s

Receiver	Predicted Noise Level (dB(A))	Baseline Night-time Noise Level (dB(A))	Cumulative Noise Level (dB(A))	Change in Noise Level (dB(A))	Estimated Community Response
FH 1	40.7	25.6	40.8	+15.2	Strong
FH 2	0.0	25.6	25.6	0.0	Little
FH 3	0.0	25.6	25.6	0.0	Little

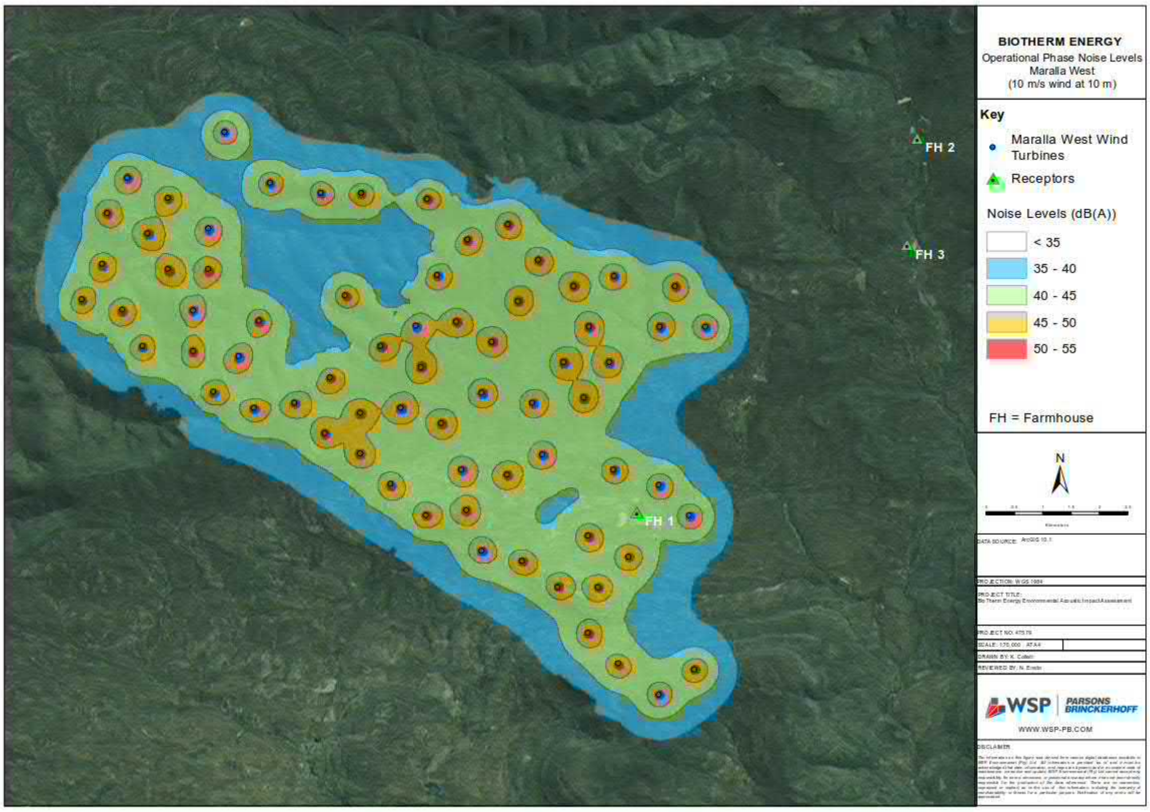

Figure 9-5: Predicted noise levels during the operational phase of the Maralla West wind energy facility when the wind at 10 m height is blowing at 10 m/s

DECOMMISSIONING PHASE

The noise impacts during the decommissioning phase are anticipated to be similar to those of the construction phase.

IMPACT ASSESSMENT

The impact assessment for the above mentioned impacts is included in **Table 9-19**.

Table 9-19: Assessment of Noise Impacts for the Maralla West WEF

REF.		EXTENT (E)	DURATION (D)	MAGNITUDE (M)	PROBABILITY (P)	SIGNIFICANCE (S=(E+D+M)*P)		STATUS (+ve or -ve)
Construction Phase								
N1	**Impact**	Acoustic impact on residential receptors						
	Without Mitigation	2	2	4	4	**32**	**Medium**	-ve
	degree to which impact can be reversed:	High						
	degree of impact on irreplaceable resources:	None						
	With Mitigation	2	2	4	3	**24**	**Low**	-ve

Operational Phase								
N2	**Impact**	Acoustic impact on residential receptors						
	Without Mitigation	2	4	4	4	**40**	**Medium**	-ve
	degree to which impact can be reversed:	High						
	degree of impact on irreplaceable resources:	None						
	With Mitigation	2	4	2	2	**16**	**Low**	-ve
De-commissioning Phase								
N3	**Impact**	Acoustic impact on residential receptors						
	Without Mitigation	2	2	4	4	**32**	**Medium**	-ve
	degree to which impact can be reversed:	High						
	degree of impact on irreplaceable resources:	None						
	With Mitigation	2	2	4	3	**24**	**Low**	-ve
No Go Alternative								
	Impact	There will be no additional noise impacts. The status quo will remain.						

MITIGATION MEASURES

CONSTRUCTION PHASE

In order to minimise the acoustic impacts from the construction phase of the Proposed Project, various mitigation techniques can be employed. These options include both management and technical options:

- Planning construction activities in consultation with local communities so that activities with the greatest potential to generate noise are planned during periods of the day that will result in least disturbance. Information regarding construction activities should be provided to all local communities. Such information includes:
  - Proposed working times;
  - Anticipated duration of activities;
  - Explanations on activities to take place and reasons for activities; and
  - Contact details of a responsible person on site should complaints arise.
- When working near (within 500 m) a potential sensitive receptor, limit the number of simultaneous activities to a minimum as far as possible;
- Avoiding or minimizing project transportation through community areas;
- Using noise control devices, such as temporary noise barriers and deflectors for impact and blasting activities, and exhaust muffling devices for combustion engines;
- Selecting equipment with the lowest possible sound power levels; and

- Ensuring equipment is well-maintained to avoid additional noise generation.

In addition, should blasting activities be required, adequate blast management techniques should be employed. These include:

- Informing nearby residents as to when blasting will occur on a certain day at a given time;
- Displaying highly visible blast notices along the roadside within a certain vicinity of the site in order to notify any passing receptors;
- Not blasting after day-time hours; and
- Not allowing any blasting activities at the turbine locations surrounding the Farmhouse 1 receptor, which is located in close proximity (500 m) form the proposed turbines.

OPERATIONAL PHASE

The significance of the environmental acoustic impact of the operation of the wind energy facility is considered to be low at two of the three sensitive receptor locations and as such, further mitigation measures in these areas are not required. Noise levels around the Farmhouse 1 receptor are, however, elevated and re-location of the surrounding turbines should be considered or mitigation measures should be employed:

- Operating turbines in reduced noise mode should any complaints be received (IFC, 2015);
- Building walls/appropriate noise barriers around potentially affected buildings (IFC, 2015);
- Limiting turbine operations above the wind speed at which turbine noise becomes unacceptable in the project-specific circumstances (IFC, 2015);
- Ensuring a larger setback distance from potentially sensitive receptor locations; and
- Consideration of installing larger capacity wind turbines, limiting the number of turbines to be installed but having the same power generation potential.

DECOMMISSIONING PHASE

As the impacts during the decommissioning phase will be similar to those of the construction phase, the construction phase mitigation measures also apply to the decommissioning phase.

9.12 TRAFFIC

FINDINGS AND IMPACT DESCRIPTION

CONSTRUCTION PHASE

The construction phase of the facility will generate the only notable vehicle volumes that requires assessment. Construction traffic will include vehicles for material and component deliveries, construction staff and all other associated personnel. Trips will include the delivery of over-sized components such as rotor blades, mast sections and generators. The route/s between the origin of the material and components and the facility may be National, Provincial or Local roads, and each authority will be required to provide the necessary permits for the transportation of any oversized or weight components. The construction phase traffic was estimated based on the assumptions listed per traffic type below.

CONSTRUCTION STAFF TRIP GENERATION

- An estimated construction period of 24 months, with a variable number of staff required depending on the construction phase.

- Approximately 600 workers will be on-site every day during the peak construction period.
- Workers will not be accommodated on-site.
- 85% of the work force (unskilled and semi-skilled workers) will utilise public transport to site from neighbouring towns, most notably Laingsburg which is located approximately 90 km away.
- Skilled personnel will travel by private car with an average occupancy of 1.5 persons.
- 80% of Public Transport will be by bus, with a 65 person per bus occupancy.
- 20% of Public Transport will be by mini-bus, with a 16 person per vehicle occupancy.
- Staff will not utilise NMT to site due to the excessive distances to the closest towns.
- It is assumed that the public transport vehicles will not remain on-site during the workday, therefore all these vehicles will arrive and again depart during the AM and PM peaks.

CONSTRUCTION MATERIAL TRIP GENERATION

- It is proposed to install 70 turbines.
- The turbine towers are expected to have a hub height of up to 120 m, with a rotor diameter of up to 150m.
- Each 150 m diameter turbine rotor will require 3 blades of up to 75 m long (maximum). Rotor blades will be manufactured off-site, and could also be imported from abroad via the most suitable Port. The dimensions of the blades, their point of origin and the resultant route to the facility will determine the vehicle type and special permits that may be required for the transportation of these blades.

  The route/s between the origin of the components and the facility may be National, Provincial or Local roads, and each authority will be required to provide the necessary permits for the transportation of all oversized/weight components.

  It is recommended that an abnormal vehicle route management plan be undertaken when the port/s of entry become known. This plan will cover all aspects such as horizontal and vertical requirements, bridges along the route, speed limits, etc. These plans and the application for the abnormal permits is normally the responsibility of the logistics company that will transport the components to site.
- The tower masts will be constructed of tubular steel, pre-cast or in-situ cast concrete or a steel and concrete hybrid. The material type is primarily determined by the height of the tower. Steel tower masts are constructed in sections of up to 30 m, and are lifted into place on site. Pre-cast concrete masts are usually constructed in sections off-site, and also lifted into place on-site. Concrete and steel hybrid masts are usually constructed from a concrete base section of up-to 80 m, and an upper section of steel. These components are also manufactured off site and lifted into place on site.

  The type of tower mast components (steel, concrete, hybrid) will determine their origin, port of entry (if imported) and delivery route to the site. Road based delivery of any oversized or overweight components will require abnormal freight permits from the relevant road authorities and a route management plan, similar to that for the transportation of the rotor blades, will be required.
- Masts are manufactured from 4 x 30 m steel segments. One segment can be delivered per vehicle trip.
- 1 rotor blade can be transported on an abnormal size vehicle.
- The foundation quantities for a typical steel tower of 120m is approximately 600 m^3 of concrete reinforced with 60 tons of steel.
- Ready-mix concrete is transported in 6m^3 loads.
- Steel is transported in 40 ton loads on standard flatbed vehicles.

- Component and material deliveries will take place over a period of 18 months.
- A total of 15,610 delivery trips (in & out total) will be required, which is approximately 40 trips a day (In & out total).
- The delivery of materials during the AM and PM peak hours will therefore be low, as trucks will arrive and depart throughout the day. If a conservative maximum 15% of the daily trips are generated during the AM and PM peaks, a total of 6 trips per peak hour is expected.

Table 9-20 outlines the expected combined trip generation for the Maralla East WEF.

Table 9-20: Total maximum peak hour trip generation

ESIZAYO FACILITY	VEHICLE TRIPS PER PEAK HOUR		
	Staff (In : Out : Total)	Material deliveries (In : Out : Total)	Total (In : Out : Total)
Total	74 : 14 : 88	3 : 3 : 6	**77 : 17 : 94**

The above analysis and resultant trip generation represents an unlikely worse- case scenario. The background vehicle volumes along the R354 from where all trips will distribute onto the major road network is low. In conclusion, the Transport impact of the facilities on the local major road network is expected to be low.

OPERATIONAL PHASE

The operational phase of the facility will require very few permanent staff. The vehicle trips that will be generated by the personnel will be low and the associated traffic impact on the surrounding road network will therefore be negligible.

DE-COMMISSIONING PHASE

Following the initial 20-year operational period of the facility, 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 of. The site will be returned to its current use.

It is not possible to determine the volume of traffic that will be generated during the decommissioning phase. It can however be expected that the volumes will be lower than during the construction phase, and the resultant traffic impact on the local road network will be lower than during the Construction phase. Any damage to the road caused by the decommissioning phase traffic should be repaired at the cost of the developer.

IMPACT ASSESSMENT

The impact assessment for the above mentioned impacts is included in **Table 9-21**.

Table 9-21: Assessment of Traffic Impacts for Maralla West WEF

REF.		EXTENT (E)	DURATION (D)	MAGNITUDE (M)	PROBABILITY (P)	SIGNIFICANCE (S=(E+D+M)*P)		STATUS (+ve or -ve)
Construction Phase								
T1	**Impact**	Noise, dust and exhaust pollution due to vehicle trips on-site						
	Without Mitigation	2	2	2	4	**24**	**Low**	-ve
	degree to which impact can be reversed:	Temporary impact, no long term effect						
	degree of impact on irreplaceable resources:	N/A						
	With Mitigation	2	2	2	4	**24**	**Low**	-ve
T2	**Impact**	Noise, dust and exhaust pollution due to additional trips on the access roads						
	Without Mitigation	2	2	4	4	**32**	**Medium**	-ve
	degree to which impact can be reversed:	Temporary impact, no long term effect						
	degree of impact on irreplaceable resources:	N/A						
	With Mitigation	2	2	4	4	**32**	**Medium**	-ve
T3	**Impact**	Noise and exhaust pollution due to additional vehicle trips on R354						
	Without Mitigation	2	2	2	4	**24**	**Low**	-ve
	degree to which impact can be reversed:	Temporary impact, no long term effect						
	degree of impact on irreplaceable resources:	N/A						
	With Mitigation	2	2	2	4	**24**	**Low**	-ve
No Go Alternative								
	Impact	There will be no additional traffic impact. The status quo will remain.						

MITIGATION MEASURES

The overall significance of each impact during the Construction Phase of the facility is Low or Medium. The impacts are limited to the peak construction period only, local in nature, and minor and will not result in an impact on processes or low and will cause a slight impact on processes. Mitigating measures are therefore not recommended for the expected trip generation of the facility.

9.13 SOCIAL ENVIRONMENT

FINDINGS AND IMPACT DESCRIPTION

CONSTRUCTION PHASE

INCREASE IN EMPLOYMENT OPPORTUNITIES

It is anticipated that the construction phase for the Maralla West Wind Facility site, which will span a 12 to 18-month period, will generate approximately 27.5[2] new skilled employment opportunities and approximately 36.7[3] new unskilled employment opportunities. This is a total peak number of employment opportunities of 64.2. It is anticipated that 70% (44.9) 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 available in the local area[4], it is most likely that the skilled labour required during the construction phase will need to be sourced from outside of the Karoo Hoogland Local Municipality. The construction phase, however, will generate a 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 (28.3%) for Karoo Hoogland Local Municipality 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 Karoo Hoogland 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 44.9 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.

The prioritised employment for historically disadvantaged individuals could contribute to social upliftment and poverty alleviation. Local opportunities will contribute to the development goals of the Karoo Hoogland Local Municipality.

INCREASED ECONOMIC DEVELOPMENT OPPORTUNITIES

The proposed project has the potential to generate positive socio-economic outcomes through the provision of LED opportunities. 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.

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

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[2] *Estimate provided by BioTherm for Maralla East and West is 55.*
[3] *Estimates provided by BioTherm for Maralla East and West is 73.4.*
[4] *pers. comm. Harding, 2017*

- Ensuring participation of South African entities in the project.
- Sourcing of materials (steel, aluminium, concrete, etc.).
- Manufacturing of primary components (i.e. blades, masts, other components).
- Utilising local service providers as far as possible (i.e. security, transportation, accommodation, catering, vehicle repairs, etc.).

The total capital expenditure for the construction phase of the Maralla West Wind Facility is estimated at R 2.875 billion[5]. 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 towns of Sutherland and Laingsburg could provide services such as accommodation and cleaning services. Other local towns, such as Matjiesfontein and Touws River, may experience positive impacts. The town of Beaufort West could provide services that are more substantial as a regional centre. Fraserburg, while located over 100km from the site, may provide necessary support services at a regional level.

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 local resources and employment opportunities. This in-migration may have an impact on the Karoo Hoogland Local Municipality and their ability to service additional people within the municipal area.

It has been recognised in other areas where renewable energy projects have been developed that an influx of job-seekers is not easily managed by the municipality or the proponent of the development. This influx can result further pressure on basic and social services, including establishment of informal settlements. These individuals are generally from outside the local municipality and from other provinces, resulting in conflicts in cultural beliefs and resentment of the local community, which further disrupts local social networks and stability.

The Karoo Hoogland Local Municipality currently experiences a number of social issues, including low levels of education and skills development, reliance on social grants, teenage pregnancy, and drug and alcohol abuse (*pers. comm.* Harding, 2017, and Karoo Hoogland Local Municipality, 2015)). The low level of economic and social development is both a partial cause and effect of the existing social issues.

It was noted during the primary data collection that the Laingsburg area has experienced other types of linear or large development in the immediate vicinity of the town, such as roads and telecommunications construction activities (van Wyk, 2017). These have resulted in positive economic impacts, including provision of accommodation and catering services. Based on discussions with local representatives, previous developments did not seem to result in significant

[5] *Estimate provided by BioTherm for Maralla East and West is R 5.75 billion.*

negative impacts on the local communities. The use of labour from outside[6] the local area was managed effectively through provision of housing, supply of basic services, and provision of sufficient leave time to return home by the proponent (*pers. comm.* Harding, 2017 and van Wyk, 2017).

INCREASE IN COMMUNICABLE DISEASES AND REDUCED PUBLIC HEALTH

Skilled labour requirements are likely to be sourced from outside the local municipality. This labour force of approximately 64.2 individuals will need to be housed during the construction period. The project proponent has not yet defined housing arrangements. It is likely that skilled labour will be housed in nearby towns or alternatively within the development footprint or neighbouring farm[7].

As the majority of the population within the local municipality live within urban areas, and because the site is located within a rural context some distance from urban centres, it is considered likely that 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, may 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[8] and other sexually transmitted diseases (STDs). HIV/AIDS is known to be a significant issue within the Northern and Western Cape (Shisana, 2014).

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 proposed Maralla West Wind Facility is located within a remote Karoo landscape, which has a high visual value, but which also has a good visual absorption capacity due to its undulating topography (Gebhardt, 2017). The area is considered remote, with few daily views of the site, but it has been noted that local residents have a "great affinity for the land and landscape" (Gebhardt, 2017).

The change in the nature of the site because of the construction activities of the proposed project, as well as presence of construction staff, is likely to change the local sense of place for the immediate neighbouring homesteads and users of the Klein Roggeveld Road. The overall impact on sense of place, may change temporarily during the construction phase with the increased traffic and people on the site, but is unlikely to change the activities or sense of place significantly during this period.

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

[6] *Labour from outside the area was noted to be used as local individuals did not want to undertake the required tasks.*

[7] *Previous construction labour force have been housed on a farm adjacent to Laingsburg, in purpose-built accommodation units. These units were left to the farmer and can be leased.*

[8] *Human immunodeficiency virus infection and acquired immune deficiency syndrome*

through the area). These may include the generation of dust, noise and traffic associated with the construction of the proposed project and associated infrastructure.

There are farming settlements located on the adjacent property to the proposed project site (approximately 1 km from north of the sit boundary). The construction activities, including increased dust, noise and traffic, may impact on these settlements, as well as on the Roggeveld Road (tourist and commuting route), which lies near the northern boundary of the site.

Appropriate mitigation measures have been identified to manage potential traffic and noise impacts. The Environmental Management Programme (EMPr) will include mitigation measures to reduce dust and noise generation during the construction phase to mitigate the potential nuisance to social receptors adequately.

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 and areas near to where labour is housed (if different).

The project proponent has not yet defined the type and location of temporary accommodation of labour during the construction phase. It is likely that labour will be accommodated within the broader development or farm footprint thereby potentially affecting surrounding farmers.

INCREASED RISK OF VELD FIRES

Construction phase activities could result in veld fires, which may affect 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 will increase should labour be temporarily housed within the development footprint. This may affect the livelihoods of neighbouring farmers through the potential loss of grazing, stock and infrastructure.

OPERATIONAL PHASE

INCREASED EMPLOYMENT OPPORTUNITIES

It is anticipated that the operational phase for the Maralla West Wind Facility will generate a total of 19.5[9] new employment opportunities over a minimum operational period of 20 years. Of this total, 8.7[10] new skilled opportunities and 10.8[11] unskilled opportunities will be generated. The expected current value of the employment opportunities for the Maralla West Wind Facility during the first 10 years is estimated at R 48 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 Western and Northern Cape provinces, 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

[9] *Estimate provided by BioTherm for Maralla East and West is 39.*
[10] *Estimate provided by BioTherm for Maralla East and West is 17.4.*
[11] *Estimate provided by BioTherm for Maralla East and West is 21.6.*

limited to 8.7 skilled and 10.8 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 Maralla West Wind Facility is estimated at R 2.625 billion.

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

- → Ensuring participation of South African entities in the project.
- → Utilising local service providers as far as possible (i.e. security, transportation, accommodation, catering, fuel provision and vehicle repairs, cleaning, etc.).
- → Sourcing of specialised services regionally and nationally as far as possible.
- → 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 wind turbines 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 near 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 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. A change in the sense of place will primarily result from the visual impact of the proposed infrastructure, namely wind turbines. The turbines will be visible from the nearest sensitive receptors immediately adjacent to the site, namely farm settlement north of the site, as well as the Roggeveld Road. 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 (Gebhardt, 2017). The overall visual impact of the proposed project operational phase was assessed as medium (after mitigation) in the Visual Impact assessment (Gebhardt, 2017).

Due to the location of the site in a sparsely populated area, the change in sense of place during the operational phase is likely to be limited to local residents and tourists traveling on the Roggeveld Road network closest to the site. The presence of the turbines mare likely to impact on the skyline and therefore visual sense of place of the area.

DECOMMISSIONING PHASE

LOSS OF PERMANENT EMPLOYMENT

There is the potential for the loss of the 8.7 skilled and 10.8 unskilled permanent employment positions following the closure and decommissioning of the Maralla West Wind 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 and infrastructure away from the site. The nearest sensitive receptors are the nearby farm settlement (1 km north of the site), and the Roggerveld Road. The Traffic Impact Assessment and Acoustic Impact Assessment studies have 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, traffic and noise generation during the decommissioning phase must be included in the decommissioning EMPr.

Following the decommissioning and removal of the Maralla West Wind 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. Issues related to accommodation of labour in this area, such as petty theft and community safety issues, are 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 affect 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.

NO-GO ALTERNATIVE IMPACTS

LOSS OF EMPLOYMENT AND LOCAL ECONOMIC DEVELOPMENT OPPORTUNITIES

There will be a loss of 64.2 new employment opportunities in the construction phase and 19.5 permanent operational employment opportunities should the proposed Maralla West Wind Facility not be developed. 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 Maralla West Wind 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 Maralla West Wind Facility

IMPACT ASSESSMENT

The impact assessment for the above mentioned impacts is included in **Table 9-22**.

Table 9-22: Assessment of Social Impacts for Maralla West WEF

REF.		EXTENT	DURATION	MAGNITUDE	PROBABILITY	SIGNIFICANCE		STATUS
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)
Construction Phase								
S1	**Impact**	Increase in Employment Opportunities						
	Without Mitigation	4	2	4	4	**40**	**Medium**	+ve
	degree to which impact can be reversed:	None						
	degree of impact on irreplaceable resources:	None						
	With Mitigation	4	2	8	5	**70**	**High**	+ve
S2	**Impact**	Increased Economic Development Opportunities						
	Without Mitigation	4	2	2	4	**32**	**Medium**	+ve
	degree to which impact can be reversed:	None						
	degree of impact on irreplaceable resources:	None						
	With Mitigation	4	2	8	5	**70**	**High**	+ve
S3	**Impact**	Disruption due to influx of job seekers						
	Without Mitigation	2	2	6	5	**50**	**Medium**	-ve

	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						
	With Mitigation	2	2	6	4	**40**	**Medium**	-ve
S4	**Impact**	Increase in communicable diseases and reduced public health						
	Without Mitigation	2	2	8	4	**48**	**Medium**	-ve
	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						
	With Mitigation	2	2	6	4	**40**	**Medium**	-ve
S5	**Impact**	Change in sense of place						
	Without Mitigation	2	2	4	4	**32**	**Medium**	-ve
	degree to which impact can be reversed:	High - Project could be removed						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	2	2	4	3	**24**	**Low**	-ve
S6	**Impact**	Nuisance from noise, dust and traffic disturbances						
	Without Mitigation	2	2	4	4	**32**	**Medium**	-ve
	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						
	With Mitigation	2	2	4	3	**24**	**Low**	-ve
S7	**Impact**	Increased risk to neighbouring land users						
	Without Mitigation	2	2	6	3	**30**	**Low**	-ve
	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						
	With Mitigation	2	2	4	3	**24**	**Low**	-ve
S8	**Impact**	Increased risk of veld fires						
	Without Mitigation	2	2	6	4	**40**	**Medium**	-ve

	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						
	With Mitigation	2	2	4	3	**24**	**Low**	-ve
Operational Phase								
S9	**Impact**	Increased employment opportunities						
	Without Mitigation	4	4	4	3	**36**	**Medium**	+ve
	degree to which impact can be reversed:	None						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	4	4	8	4	**64**	**High**	+ve
S10	**Impact**	Increased economic development opportunities						
	Without Mitigation	4	4	4	3	**36**	**Medium**	+ve
	degree to which impact can be reversed:	None						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	4	4	4	4	**48**	**Medium**	+ve
S11	**Impact**	Change in sense of place						
	Without Mitigation	2	4	4	4	**40**	**Medium**	-ve
	degree to which impact can be reversed:	High - removal of the proposed development						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	2	4	4	4	**40**	**Medium**	-ve
De-Commissioning Phase								
S12	**Impact**	Loss of permanent employment						
	Without Mitigation	2	5	4	3	**33**	**Medium**	-ve
	degree to which impact can be reversed:	Not Applicable						
	degree of impact on irreplaceable resources:	Low						

	With Mitigation	2	5	2	3	**27**	**Low**	-ve
S13	**Impact**	Gain of short term employment						
	Without Mitigation	2	1	6	3	**27**	**Low**	+ve
	degree to which impact can be reversed:	Not Applicable						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	2	1	6	4	**36**	**Medium**	+ve
S14	**Impact**	Nuisance from dust, noise and traffic						
	Without Mitigation	2	1	4	4	**28**	**Low**	-ve
	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						
	With Mitigation	2	1	4	3	**21**	**Low**	-ve
S15	**Impact**	Increased risk to neighbouring land users						
	Without Mitigation	2	1	6	3	**27**	**Low**	-ve
	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						
	With Mitigation	2	1	4	3	**21**	**Low**	-ve
S16	**Impact**	Increased risk of veld fires						
	Without Mitigation	2	2	6	4	**40**	**Medium**	-ve
	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						
	With Mitigation	2	2	4	3	**24**	**Low**	-ve
No Go Alternative								
S17	**Impact**	Loss of employment and local economic development opportunities						
	Without Mitigation	4	5	2	5	**55**	**Medium**	-ve
	degree to which impact can be reversed:	Not Applicable						

	degree of impact on irreplaceable resources:	Not Applicable						
	With Mitigation	4	5	2	5	**55**	**Medium**	-ve
S18	**Impact**	Maintenance of the existing landscape and sense of place						
	Without Mitigation	3	5	2	5	**50**	**Medium**	-ve
	degree to which impact can be reversed:	Not Applicable						
	degree of impact on irreplaceable resources:	Not Applicable						
	With Mitigation	3	5	2	5	**50**	**Medium**	-ve

MITIGATION MEASURES

The following mitigation and management measures have been identified in order to enhance the potential benefits of the project and to mitigation potential negative impacts to an acceptable level:

→ Maximise local employment and business opportunities

- Appointment of local contractors and use of local suppliers and manufacturers where possible.
- Development of a database of local companies for service provision.
- Target 40% of the construction labour and 60% during operation, particularly semi and unskilled opportunities could be sourced locally.
- Communication with Karoo Hoogland Local Municipality and community representatives in respect of employment opportunities.
- Ongoing engagement with the Karoo Hoogland Local Municipality in respect of anticipated community investment and upliftment projects.
- 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

- Communicate employment opportunities to Karoo Hoogland 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.
- Engage with, and gain support from, the Laingsburg Local Municipality in respect of accommodation of labour brought into the area by contractors / developers.

→ Minimise the increase in communicable diseases and reduced public health

- Preparation and implementation of a labour force Health and Safety Plan.
- In consultation with local HIV/AIDS organisations and government structures all contractors must design and implement a proactive and ongoing HIV/AIDS awareness and prevention campaign.
- 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.
- 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.

- Minimise nuisance from dust, noise and traffic
  - Implement EMPr conditions in respect of mitigating dust, noise and traffic related impacts.
  - Establish a grievance mechanism to provide a means for affected stakeholders to communicate.
- Minimise risk to neighbouring land users
  - Development of a code of conduct for workers, signed by the contractor, and communicated to work force.
  - Contractor to be held liable for compensating farmers for any losses / damage that can be linked to workers.
- Minimise risk of veld fires
  - EMPr to include mitigation in respect of activities that may pose a fire risk:
    - 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.
- Minimise impacts of loss of permanent employment
  - Relocation of employees to other renewable energy facilities where possible.
  - Provision of adequate retrenchment packages that as a minimum meet relevant South African Labour legislation

10 CUMULATIVE IMPACT ASSESSMENT

Although the S&EIR process is essential to assessing and managing the environmental and social impacts of individual projects, it often may be insufficient for identifying and managing incremental impacts on areas or resources used or directly affected by a given development from other existing, planned, or reasonably defined developments at the time the risks and impacts are identified.

The IFC Good Practice Handbook: Cumulative Impact Assessment and Management defines cumulative impacts as follows:

"Cumulative impacts are those that result from the successive, incremental, and/or combined effects of an action, project, or activity (collectively referred to in this document as "developments") when added to other existing, planned, and/or reasonably anticipated future ones. For practical reasons, the identification and management of cumulative impacts are limited to those effects generally recognized as important on the basis of scientific concerns and/or concerns of affected communities."

With reference to Maralla West WEF, there are a number of EAs (either issued or in progress) within an 80km radius of the proposed project site, over and above the other wind energy projects proposed by BioTherm. These EAs are illustrated in **Figure 10-1** and detailed in **Table 10-1**.

It is important to note that the existence of an approved EA does not directly equate to actual 'development'. The surrounding projects, except for the Preferred Bidders, are still subject to the REIPPPP bidding process like the Maralla West project. Depending on the next bid window Maralla West due to its competitive nature could potentially be selected as the next Preferred Bidder and commence with construction prior to other facilities with existing EA approvals. Some of the surrounding proposed Wind Energy facilities secured their EA several years ago, but have not obtained Preferred Bidder status and as such have not been implemented.

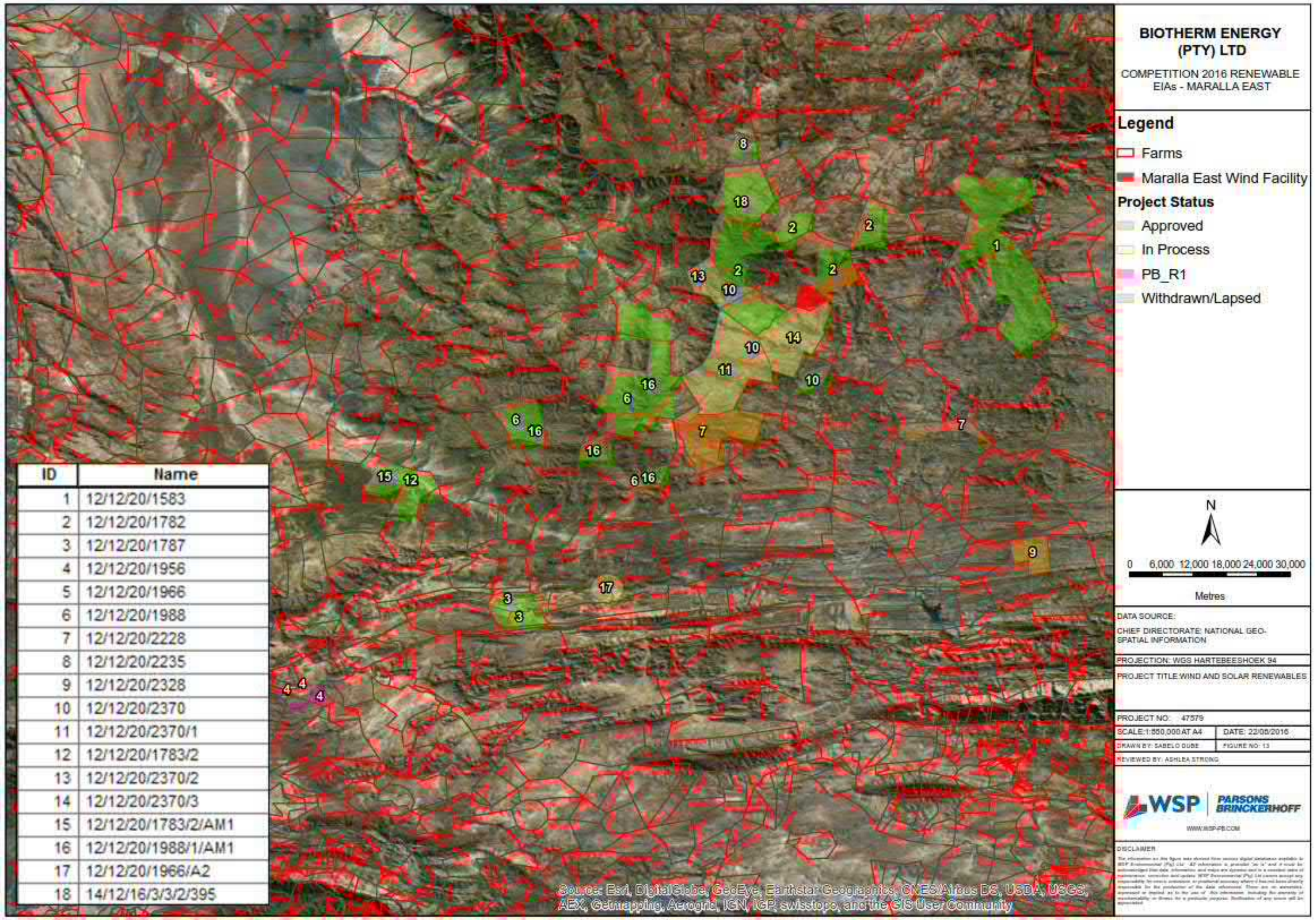


Figure 10-1: The Location of the Existing Environmental Authorisations within 80km of Maralla West WEF

Table 10-1: Existing Environmental Authorisations within 80km of Maralla West WEF

DEA Reference Number	EIA Process	Applicant	Project Title	EAP	Technology	MegaWatt	Hectares	Project Status	EIA Studies Obtained (Y/N)
14/12/16/3/3/2/395 (Map Ref: 18)	S&EIR	Networx Eolos Renewables (Pty) Ltd	Proposed 280 MW Gunstfontein Wind Energy Project	Savannah Environmental Consultants (Pty) Ltd	Onshore Wind	280 MW	12 000	Approved	Y
12/12/20/1782/AM1 (Map Ref: 2)	S&EIR	Mainstream Power Sutherland	Proposed development of renewable energy facility at the Sutherland site, Western and Northern Cape.	Environmental Resource Management (Pty) Ltd	Onshore Wind	811 MW	28 600	Approved	Y
12/12/20/2370/2 (Map Ref: 13)	S&EIR	Hidden Valley Wind- African Clean Energy Developments (Pty) Ltd	Proposed Hidden Valley Wind Energy Facility, Northern Cape	Environmental Resource Management (Pty) Ltd	Onshore Wind	150 MW	9 530	In Process	Y
12/12/20/2370/3 (Map Ref: 14)	S&EIR	Hidden Valley Wind- African Clean Energy Developments (Pty) Ltd	Proposed Hidden Valley wind energy facility , Northern cape	Savannah Environmental Consultants (Pty) Ltd	Onshore Wind	150 MW	9 180	In Process	Y
12/12/20/2370/1 (Map Ref: 11)	S&EIR	Hidden Valley Wind- African Clean Energy Developments (Pty) Ltd	Proposed Hidden Valley wind energy facility , Northern cape	Aurecon South Africa (Pty) Ltd	Onshore Wind	150MW	13 620	Approved	Y
12/12/20/2228 (Map Ref: 7)	S&EIR	Inca Komsberg Wind (Pty) Ltd	Proposed wind energy facility near Komsberg, Western Cape	Environmental Resource Management (Pty) Ltd	Onshore Wind	300 MW	-	Withdrawn or Lapsed	N

DEA Reference Number	EIA Process	Applicant	Project Title	EAP	Technology	MegaWatt	Hectares	Project Status	EIA Studies Obtained (Y/N)
12/12/20/1988/1/AM1 (Map Ref: 16)	Amendment	G7 Renerable Energies (Pty) Ltd	Proposed Construction Of The 140Mw Roggeveld Wind Farm Within The Karoo Hoogland Local Municipality Of The Northern Cape Province And Within The Laingsburg Local Municipality Of The Western Cape Province	Environmental Resource Management (Pty) Ltd	Onshore Wind	140 MW	26 529	Approved	Y
12/12/20/2235 (Map Ref: 8)	BAR	Inca Komsberg Wind (Pty) Ltd	Proposed Photovoltaic (PV) Solar Energy Facility On A Site South Of Sutherland, Within The Karoo Hoogland Municipality Of The Namakwa District Municipality, Northern Cape Province	Environmental Evaluation Unit: UCT	Solar PV	10 MW	2	Approved	Y
12/12/20/1583 (Map Ref: 1)	S&EIR	Moyeng Energy (Pty) Ltd	Proposed establishment of the Suurplaat wind energy facility and associated infrastructure on a site near Sutherland, Western Cape and Northern Cape.	Savannah Environmental Consultants (Pty) Ltd	Onshore Wind	120 MW	28 600	Approved	Y
12/12/20/2328 (Map Ref: 9)	S&EIR	Unknown	Proposed wind and solar project near Laingsburg, Western Cape	CSIR	Onshore Wind	50 MW	-	Withdrawn or Lapsed	N

DEA Reference Number	EIA Process	Applicant	Project Title	EAP	Technology	MegaWatt	Hectares	Project Status	EIA Studies Obtained (Y/N)
12/12/20/1966/A2 (Map Ref: 17)	Amendment	Witberg Wind Power (Pty) Ltd	Proposed establishment of the Witberg Bay wind energy facility, Laingsburg Local Municipality, Central Karoo District, Western cape	Environmental Resource Management (Pty) Ltd	Onshore Wind	Unknown	-	In Process	**N**
12/12/20/1787 (Map Ref: 3)	S&EIR	South Africa Mainstream Renewable Power Development	Proposed renewable energy facility at Konstabel	Environmental Resource Management (Pty) Ltd	Onshore Wind & Solar PV	170 MW	-	Approved	**N**
12/12/20/1783/2/AM1 (Map Ref: 15)	Amendment	South Africa Mainstream Renewable Power Development	Proposed development of a renewable Energy facility at Perdekraal, Western Cape - Split 1	Environmental Resource Management (Pty) Ltd	Onshore Wind	Unknown	-	Approved	**N**
12/12/20/1956 (Map Ref: 4)	S&EIR	Unknown	Proposed Touwsrivier Solar energy facility	University of Cape Town Environmental Evaluation	Solar PV	36 MW	215	Unknown	**Y**

10.1 SPECIALIST FINDINGS

SOILS AND LAND CAPABILITY

The renewable energy projects that have received Environmental Authorisation were investigated to determine any identified potential impacts on land capability and freshwater habitats. These individual impacts were tabulated and assigned a significance rating (Low to High) which allowed for the cumulative assessment of these impacts on the landscape. Overall the cumulative impact of the proposed Maralla West Site is deemed to be of 'Low' significance.

There was no fatal flaw identified for the cumulative impacts for the proposed Maralla West Site. The assessment of these potentially affected ecological features within the four neighbouring renewable energy developments is beyond the scope of this study, and will require an individual assessment for the respective projects in their own scoping and EIA studies. It is assumed that the impacts during the construction, operational and de-commissioning phases are expected to be the same as those summarised above for the Maralla West Site.

The loss of grazing land is unavoidable and was initially assigned a medium environmental significance, which can be reduced to low with the implementation of mitigation measures (i.e. keep the affected area to a minimal during the construction, operational and decommissioning phases). This is under the assumption that farming practices may continue in and around the turbines during the operational phase. Potential impacts of soil erosion and spillage of hazardous substances were both classified with a low environmental significance, before and after mitigation measures, due to the majority of the risk/impact being isolated to the construction phase (therefore short term) and the lower probability of significant erosion or spills occurring.

BIODIVERSITY

The Roggeveld area has a high degree of climatic and topographic diversity, with numerous vegetation types and habitats represented within a relatively small area, driving biological diversity in the area and resulting in the area being recognized as a center of endemism and diversity. The Roggeveld/Komsberg area has however also become a focus of wind energy development and there are a large number of wind energy projects in the area. In order to understand cumulative impacts in the area adequately, specific consideration of the actual habitats affected by development is required as impact is not spread evenly, but tends to be focused on specific environments associated with high wind resources. In addition, each facility tends to impact somewhat different vegetation types or plant communities. There has however been significant cumulative impact on the Central Mountains Shale Renosterveld vegetation type, which occurs on the rugged hills and mountains south of the escarpment and has borne the brunt of most of the approved facilities to date. Cumulative impacts on Central Mountains Shale Renosterveld appear to be a particular concern as this vegetation type has a relatively limited extent and a significant proportion is within renewable energy development application areas. Given this potential impact, specific consideration of cumulative impact on Central Mountains Shale Renosterveld is provided here in context of the potential contribution of the Maralla West site to this impact.

Currently, there are three preferred bidders in the area; the Karusa 142 MW and Soetwater 142MW wind farms which lie immediately west of the site and the 138MW Kareebosch Wind Farm further west of the site. These are the only farms which at this point are certain to be built. The total extent of direct habitat loss from these developments can be estimated at approximately 60ha each, resulting in 180ha of direct habitat loss in the vicinity of the Maralla West site. This is less than 2km2 of the total mapped extent of 1236km2 of Central Mountains Shale Renosterveld. Therefore, it is clear that direct transformation from preferred bidders is not yet a significant concern in the area. In terms of assessing future potential impacts, there are a number of approved facilities in the area as well as a number which are under appeal. Not all of these are considered directly relevant for the current project. The developments on the plateau such as the Gunstfontein and

Mainstream Sutherland projects are within the Roggeveld Shale Renosterveld vegetation type which is associated with the escarpment and is not impacted by the developments below the escarpment. As such, these are not considered in detail here as the environment is not the same and there is little impact shared across the edge of the escarpment.

In terms of the approved projects and those under appeal, of most relevance for the Maralla West project is the associated Maralla East project and then the adjacent Great Karoo and Komsberg East and Komsberg West projects. The Great Karoo and Komsberg West site occupy a broadly similar environment to the combined Maralla development, however, the Komsberg East site is significantly drier and does not contain similar habitats to the current site. Further afield, there is also the Kareebosch wind farm to the west, adjacent to the preferred bidder Roggeveld Wind Farm as well as the Brandvallei and Rietkloof projects to its south. Assuming that each of these projects is approximately 140MW and would require approximately 30km of new roads, the total expected extent of direct habitat loss from these developments would be approximately 540ha of total habitat loss. Even in a worst case scenario, where all developments are built, the total extent of habitat loss would be 720ha which would contribute habitat loss of less than 0.5% to the Central Mountains Shale Renosterveld vegetation type and significantly less to all other affected vegetation types. This is not highly significant and it is clear that cumulative impacts due to direct habitat loss in the area is not likely to lead to significant biodiversity loss, despite the high level of development in the area.

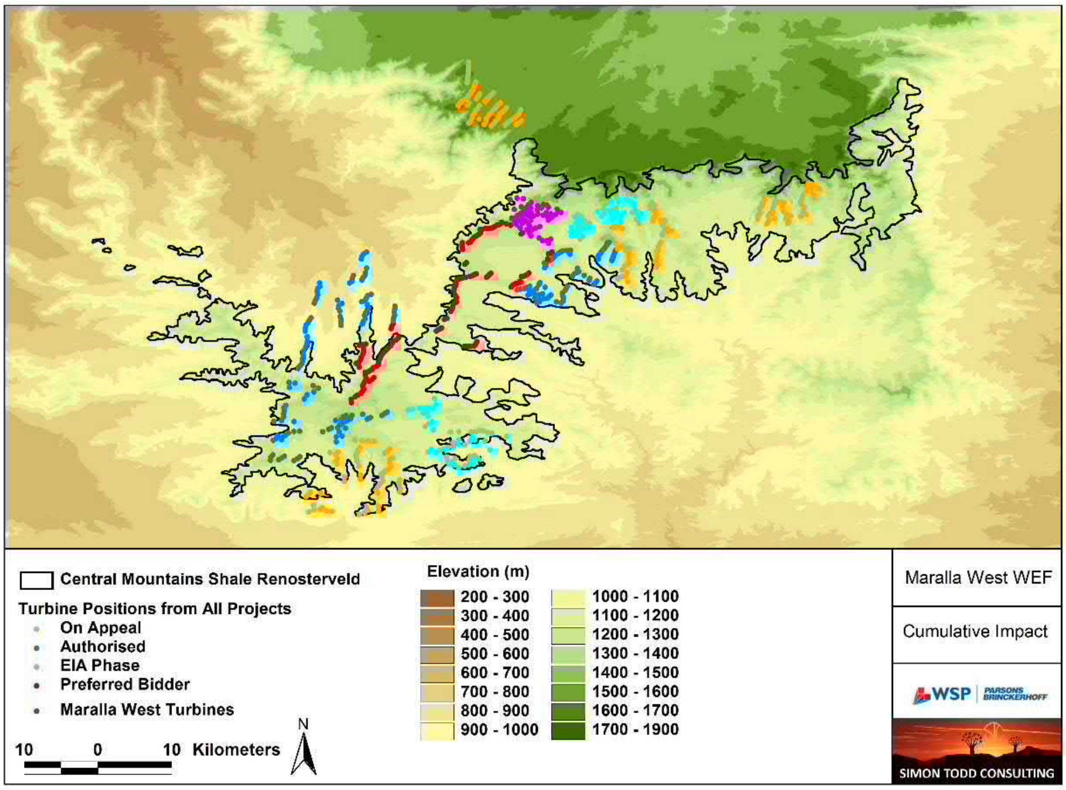


Figure 10-2: Elevation map of the area around the Maralla West site, showing the approved or planned turbine locations of all current projects in the area, as well as the extent of Central Mountain Shale Renosterveld, which receives the brunt of development in the Komsberg area

As mentioned at the beginning of this section, cumulative impacts need to be considered in context of the habitats affected as the total extent to habitat loss as detailed above may be misleading. Due to the distribution of wind resources, turbines tend to be located on the high-lying areas and as the total extent of habitat available declines with altitude, the proportional impact may increase with elevation, leading to significant impact within the higher-elevation ridges which are targeted for development. In order to assess this problem, the elevation of all approved and planned turbines was extracted and compared to the elevation distribution of the Central Mountain Shale Renosterveld vegetation type. This relationship is illustrated below in **Figure 10-3**. It is clear that the low to middle elevations of Central Mountain Shale Renosterveld experience little impact from wind turbines, but those areas above 1250m bear the brunt of development, with areas above 1400m being disproportionately affected. As a large proportion of the listed and endemic species of the Komsberg area are associated with moist lowland habitats, this would reduce the overall impact of development on these species. However, there is also a suite of species that are associated with the high-lying ridges and these may be disproportionately affected by development. However, many of these are associated with areas of exposed bedrock or sheltered rocky outcrops along the sides of the hills, and these areas can be avoided at preconstruction through fine-scale adjustment of the development footprint following walk-through of the final layout. It is not possible to accurately identify these areas during an EIA as these habitats occur at a very fine scale and are mostly just a few square meters in extent.

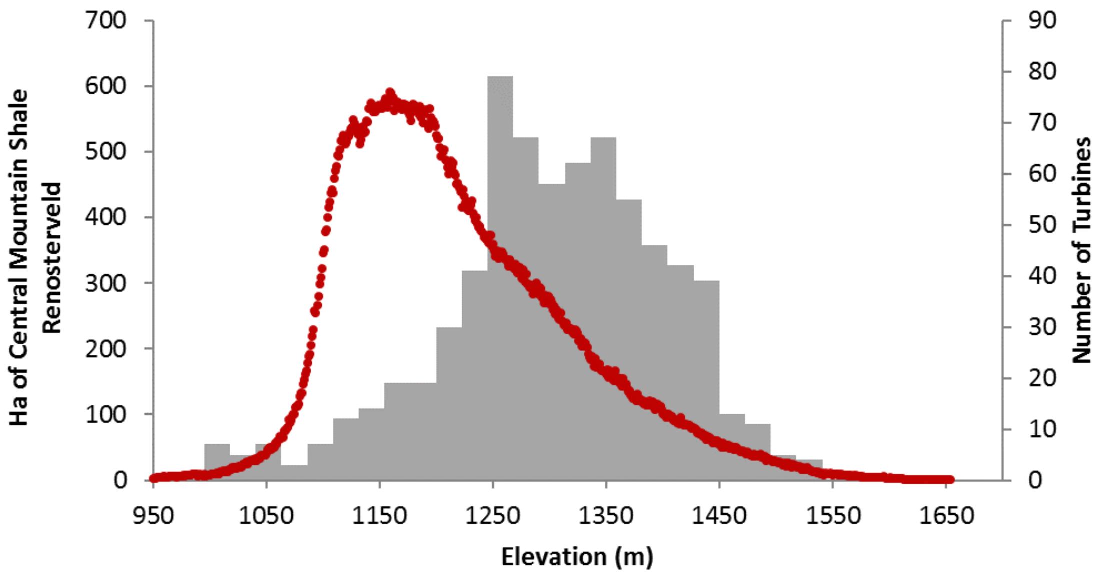


Figure 10-3: Graph showing the elevation distribution of Central Mountain Shale Renosterveld in red, showing that the majority of the extent of this vegetation occurs at around 1200m elevation and trails off after that, with very little habitat above 1500m. The grey bars indicate the number of turbines within each elevation class and show that most turbines are distributed between 1250m and 1450m.

Finally, it is appropriate to consider the direct extent of habitat loss with regards to impacts on flora as above, however, this is not appropriate for fauna which may experience greater habitat loss than the direct footprint and may also be vulnerable to disruption of landscape connectivity. The results of camera trapping in the area indicate that the higher-lying ridges are diverse in terms of fauna and are certainly used more by certain species than the lower-lying areas. In addition, there may be seasonal shifts in habitat use and may species may move to higher-elevation areas in the summer when these areas are cooler and also likely to retain greater forage or prey availability than lower-lying areas which are likely to experience greater livestock impact. Species restricted to the higher-lying ridges includes species such as Klipspringer which favour areas with steep slopes or cliffs available that can be used as refuges. The high-lying areas are also used extensively by Grey Rhebok, but it is likely that this species moves up and down the slopes seasonally. As these areas currently experience little human disturbance, they are also used extensively by predators such as caracal and black-backed jackal. How these species and their movements will be affected by wind energy development is not clear as this has not been investigated in South Africa. However, from casual observations, it is highly likely that some species will quickly adapt to the presence of wind turbines, while others are less likely to do so, especially those that are vulnerable to human disturbance or noise. Furthermore, the increased access to these ridges that the new roads will allow may increase livestock use of these areas or human activity and increased persecution of certain species.

Therefore, in terms of cumulative impact, direct impacts on plant species are likely to be localized and with appropriate avoidance and preconstruction mitigation, this can likely be reduced to an acceptable level across all projects. Impacts on fauna are potentially more significant but not well known and much more uncertain and depend to a large degree on the specific species involved and their sensitivity to wind energy development. For example, if a species avoids the area within 250m of a turbine, the total extent of habitat loss across all projects could be as much as 10 000ha for such species, while if this is only 100m, then the extent of habitat loss would be less than 1700ha, which is significantly less of a threat than the first scenario. For isolated wind farms, this is not a significant issue as impacts will be localized, however, where there is heavy wind energy development such as in the Komsberg area, additional pre-and post-construction monitoring of fauna is warranted to inform our knowledge of these impacts.

The following cumulative impacts have been identified:

→ Impact on CBAs and Broad-Scale Ecological Processes due habitat loss and the presence and operation of the facility

  Cumulative impacts are a significant concern in the area due to the large amount of wind energy development in the area. Furthermore, large parts of the Maralla West development are within CBAs and the loss of habitat within the CBAs may impact the ecological functioning of the CBAs and result in increased habitat fragmentation and reduced landscape connectivity.

→ Impact on NPAES Focus Areas and future conservation options in the area

  The majority of the site is within a NPAES Focus Area and the habitat loss resulting from this as well as the other wind energy developments in the area will contribute to cumulative impacts on the NPAES and this may have consequences for future conservation options in the area and the ability of the county to meet its conservation targets. However, as demonstrated in the report, the direct effects of habitat loss are not likely to be highly significant and the major issue is on broad-scale ecological processes.

AVIFAUNA

Possible impacts by renewable energy projects on birds within this area are temporary displacement due to disturbance associated with the construction of the facility and associated infrastructure, collisions with solar panels and wind turbines, permanent displacement due to habitat transformation, entrapment in perimeter fences and collisions with the associated power lines.

Apart from renewable energy developments, several other threats are currently facing avifauna within the Karoo habitat (Marnewick et al. 2015):

→ Overgrazing

  This results in a depletion of palatable plant species, erosion, and encroachment by Karoo shrubs. The result is loss of suitable habitat and a decrease in the availability of food for large terrestrial birds. Centre-pivot irrigated croplands using underground water are increasing and agriculture is intensifying.

→ Poisoning

  Strychnine poison was used extensively in the past to control damage-causing predators, such as Black-backed Jackal *Canis mesomelas* and Caracal *Caracal caracal*, and reduced scavenging raptor populations. The use of poison may be continuing, and the potential impacts on threatened raptor species has not been confirmed or quantified.

→ Road-kills

Many birds are commonly killed on roads, especially nocturnal species such as Spotted Eagle-Owl.

- Powerlines

  Numerous existing and new power lines are significant threats to some priority species. Power lines kill substantial numbers of all large terrestrial bird species in the Karoo, including threatened species (Jenkins et al. 2010; Shaw, J. 2013) There is currently no completely effective mitigation method to prevent collisions.

- Climate change

  Climate change scenarios for the region predict slightly higher summer rainfall by 2050, and increased rainfall variability. Droughts are expected to become more severe. The climate change is predicted to have both positive and negative consequences for priority species. Increased summer rainfall could improve survival, and conversely drought years can lower long-term average survival. Large, mainly resident species dependent on rainfall are also more vulnerable to climate change. This would include the slow-breeding Verreauxs' Eagle, Tawny Eagle and Martial Eagle, which also exhibit extended parental care. Severe hailstorms kill many priority species and could become more frequent.

- Shale gas fracking

  There is a potential threat of shale gas fracking throughout the Karoo. Populations of bird species may be locally reduced through disturbance caused by lights, vibration, vehicles and dust, and may be affected by pollutants in ponds containing contaminated water produced by returned fracking fluids.

- Persecution

  Although it is difficult to prove, the direct persecution of raptors such as Verreaux’s Eagle and Martial Eagle for stock predation is still taking place (R. Visagie pers. comm).

The greatest potential concern in the 70km radius around Komsberg Substation is for the large raptor species, particularly Verreaux’s Eagle and Martial Eagle, due to their low numbers and vulnerability to turbine collisions. The total estimated area that could potentially be affected by renewable projects are approximately 233 503 ha, which is approximately 15% of the land surface within the 70km radius, although the actual footprint is likely to be smaller, as this figure is based largely on land parcel size, and not the actual infrastructure footprint. Nonetheless, the combined cumulative impact of renewable developments on priority species, and particularly wind energy developments on Red Data Verreaux’s Eagle and Martial Eagle within the 70km radius around the Komsberg Substation, is potentially significant at a local or even regional scale, even with the application of mitigation measures such as buffer zones around nests, should all of these projects eventually get to be constructed. The impact should be less severe at a national level, due to the large distribution ranges of the species, but should nonetheless be carefully monitored.

BATS

The bat sensitivity assessment reports and bat sensitivity maps could not be obtained for all of the neighbouring wind energy developments. The final pre-construction bat sensitivity information for the below listed wind energy facilities were used where applicable:

- Great Karoo WEF
- Karusa WEF
- Esizayo WEF
- Rietrug WEF
- Roggeveld WEF
- Soetwater WEF

- Sutherland WEF
- Suurplaat WEF

Figure 10-5 below displays bat sensitivity maps of several wind farms neighbouring the Maralla West WEF (namely the Suurplaat WEF, Sutherland WEFs, Esizayo WEFs, Soetwater WEF, Great Karoo WEF, Karusa WEF and Roggeveld WEF). **Figure 10-4** displays the sensitivity map of the Rietrug WEF (taken from the Amendment Report for the proposed Rietrug Wind Energy Facility compiled by CSIR). The bat sensitivity maps were inspected for congruency of sensitive areas and similarities in their buffer distances. The sensitivity map of the Maralla West WEF is sufficient when assessed with neighbouring site sensitivity maps.

The sensitivity maps were also used to assess whether the Maralla West WEF turbine layout intersects interlinking bat sensitivity habitats between the different sites i.e. valley areas, rivers and streams, mountain ridges. The Maralla West WEF turbine layout does not traverse large scale ecological corridors or ecological areas of connectivity. The existing bat sensitivity map is sufficient in this regard.

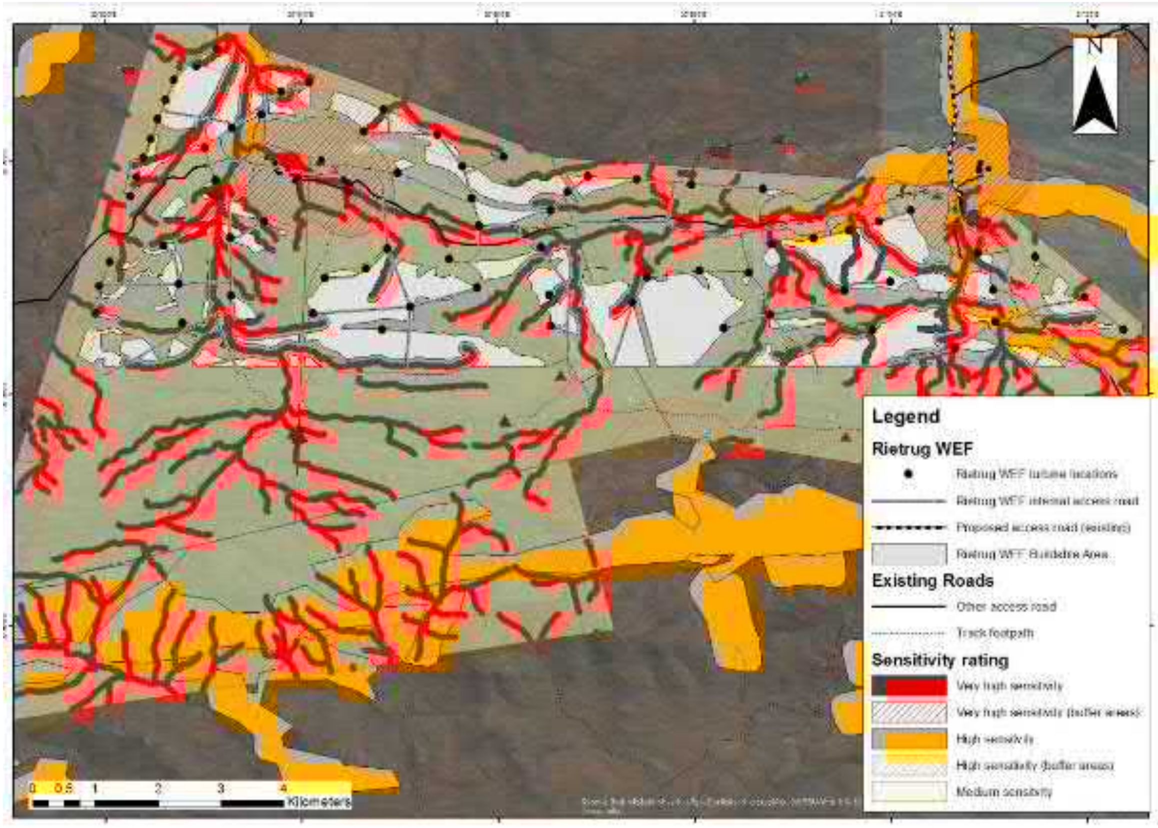
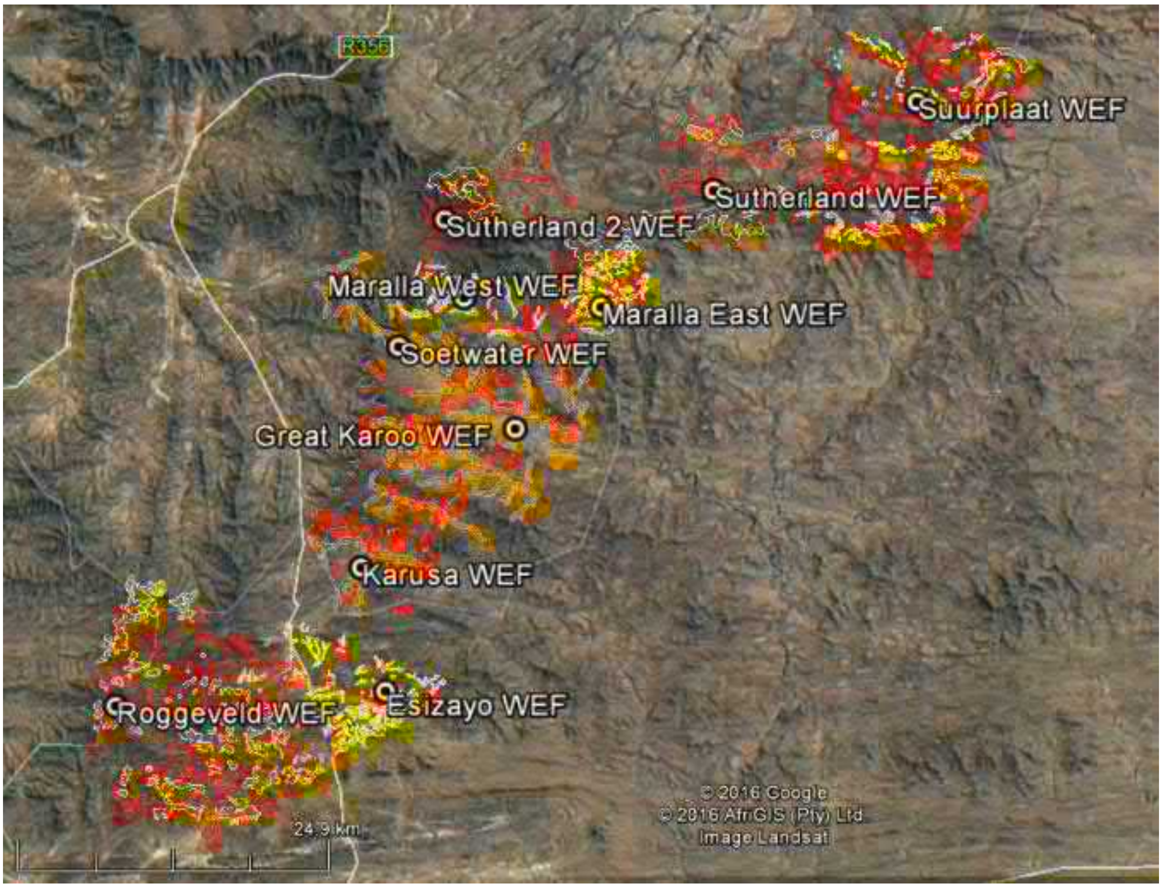


Figure 10-4: Sensitivity map of the Rietrug WEF (taken from the Amendment Report for the proposed Rietrug Wind Energy Facility compiled by CSIR)



High bat sensitivity area — High bat sensitivity buffer

Moderate bat sensitivity area — Moderate bat sensitivity buffer

Figure 10-5: Bat sensitivity maps of wind farm areas neighbouring Maralla West WEF

The main impact on bats that raises concern from a cumulative impact assessment point of view is the bat mortalities due to direct turbine blade collision or barotrauma during operation. There is potential for mass loss of locally active bats and migratory bats from the area due to cumulative mortality from wind turbines of several neighbouring wind farms.

Cumulative bat mortalities due to direct blade collision or barotrauma during foraging – cumulative impact (resident and migrating bats affected). Mortalities of bats due to wind turbines during foraging and migration can have significant ecological consequences as the bat species at risk are insectivorous and thereby contribute significantly to the control of nocturnal flying insects. On a wind farm specific level insect numbers in a certain habitat can increase if significant numbers of bats are killed off. But if such an impact is present on multiple wind farms in close vicinity of each other, insect numbers can increase regionally and possibly cause outbreaks of colonies of certain insect species. There is also the risk of complete loss of certain bat species from the area (namely Tadarida aegyptiaca and Neoromicia capensis).

Drainage areas can serve as commuting corridors for bats in the larger area, potentially lowering the cumulative effects of several WEF's in an area if the drainage areas are avoided during turbine placement and are well buffered. Also, adhere to recommended mitigation measures for this project during the operational phase study, and it is essential that project specific mitigations be applied and adhered to for each project. Adhere to the sensitivity map during any further turbine layout revisions, and avoid placement of turbines in bat sensitive areas and their buffers.

SURFACE WATER

The renewable energy projects that have received Environmental Authorisation were investigated to determine any identified potential impacts on freshwater habitats. These individual impacts were tabulated and assigned a significance rating (Low to High) which allowed for the cumulative assessment of these impacts on the landscape. Overall the cumulative impact of the proposed Maralla West Site is deemed to be of 'Low' significance.

The proposed Maralla West Site (and associated infrastructure) as well as the neighbouring renewable energy developments potentially intersect freshwater habitat systems. The turbines for the Maralla West Site are not located within watercourses, within only a few access roads potentially requiring to traverse ephemeral watercourses. Each of these crossings should not have a regional impact on water resources therefore limiting the cumulative impact on the greater landscape. There was no fatal flaw identified for the cumulative impacts for the proposed Maralla West Site. The assessment of these potentially affected ecological features within the four neighbouring renewable energy developments is beyond the scope of this study, and will require an individual assessment for the respective projects in their own scoping and EIA studies. It is assumed that the impacts during the construction, operational and de-commissioning phases are expected to be the same as those summarised above for the Maralla West Site.

Potential impacts of soil erosion and spillage of hazardous substances were both classified with a low environmental significance, before and after mitigation measures, due to the majority of the risk/impact being isolated to the construction phase (therefore short term) and the lower probability of significant erosion or spills occurring.

HERITAGE

The cumulative impacts of several Wind Energy facilities in this area – increases the probability of negative impacts to heritage resources, of medium to high significance, such as cemeteries and the potential South African War military outpost. This is despite the mitigation measures proposed in each individual HIA report. This is because:

- Heritage resources are non-renewable. The loss of heritage resources during the construction of a wind farm is inevitable, despite implementing robust mitigation measures. Incrementally, this results in the loss of heritage which cannot be renewed;
- Surveys can never achieve a 100% cover of the area which may potentially be impacted. They sample a portion of the proposed area, and make deductions from this. There may be significant sites (such as rock art sites or graves) which were not identified during the survey and which may be destroyed or damaged;
- Many archaeological sites (including graves) are located under the soil surface, and are only exposed once the construction work commences. For this reason, it is necessary to have a robust management plan in place to ensure that significant sites are not destroyed.

PALAEONTOLOGY

Cumulative impacts inferred for the various alternative energy developments in the Klein-Roggeveld region between Matjiesfontein and Sutherland have been assessed here on the basis of desktop and field-based palaeontological impact assessment reports for these projects, the great majority of which were submitted by the present author (See references provided below and SAHRIS website). The projects concerned lie within a radius of some 50 km of the Maralla West WEF project area. Relevant published palaeontological literature for the region has also been taken into account (*e.g.* Loock *et al.* 1994, Nicolas 2007). This assessment applies only to the construction phases of the WEF developments, since significant additional impacts on palaeontological heritage during the operational and de-commissioning phases are not anticipated.

It should be emphasized that, in the case of palaeontological heritage, it only makes sense to consider cumulative impacts on *comparable fossil assemblages* present in the same formations that are represented in the present study area as well as in the broader study region ("Comparable" here refers to assemblages of similar age, taxonomic composition, preservation and palaeoecology). For example, impacts on Permian aquatic fossil invertebrates in the Whitehill Formation (Ecca Group) that crops out in WEF project areas far to the southwest of the Maralla West WEF study area are not directly relevant to impacts on fossil assemblages of terrestrial vertebrates in the Lower Beaufort Group as represented in the latter area. The analysis in Table 2 is therefore restricted to considering cumulative impacts on fossil heritage preserved within rock units and fossil assemblages that are represented in the Maralla West WEF study area as well as in nearby project areas – specifically the Combrinkskraal – Leeuvlei and Koornplaats Members of the lowermost Abrahamskraal Formation (*i.e. Eodicynodon* and basal portion of the *Tapinocephalus* Assemblage Zones). WEF projects in the SW Karoo that potentially share fossil assemblages in the lowermost Abrahamskraal Formation include the following: Kareebosch WEF (Almond 2014), Karusa WEF (Almond 2015c), Soetwater WEF (Almond 2015d), Rietkloof WEF (Almond 2016b), Brandvalley WEF (Almond 2016c), Gunstfontein WEF (Almond 2015g), Maralla East WEF (Almond 2016e and *in prep*.) and Esizayo WEF (Almond 2016f). Further field-based PIAs (palaeontological impact assessments) of relevance include those for the Eskom Gamma-Omega 765kV transmission line (Almond 2010a) and the Komsberg Substation (Almond 2015b).

Other WEF projects in the wider region, such as the Perdekraal East WEF (Almond 2015a), Komsberg West WEF (Almond 2015f), Komsberg East WEF (Almond 2015e), Sutherland WEF (Almond 2010c), Suurplaat WEF (Almond 2010b), and the Great Karoo WEF (for which no field-based palaeontological study was done) are underlain by younger rocks within the Lower Beaufort Group, or by much older Dwyka Group and Ecca Group rocks. These successions contain significantly different fossil assemblages and so are not relevant to the present cumulative impact assessment. This also applies to further alternative energy facilities within the Cape Fold Belt near Touwsrivier and Laingsburg, such as the Konstabel WEF (Almond 2010d) and Witberg WEF (Miller 2010) that are underlain by older pre-Karoo bedrocks and to solar energy facilities above the Great Escarpment near Sutherland that overlie younger portions of the Abrahamskraal Formation.

In all the strictly *relevant* field-based palaeontological studies listed above the palaeontological sensitivity of the project area and the palaeontological heritage impact significance for the developments concerned has been rated as low. In all cases it was concluded by the author that, despite the undoubted occurrence of sporadic scientifically-important fossil remains (notably fossil vertebrates, vertebrate trackways and burrows, petrified wood), the overall impact significance of the proposed developments was low because the probability of significant impacts on *scientifically important, unique or rare fossils* was slight. While fossils do indeed occur within some of the formations present, they tend to be sparse – especially as far as fossil vertebrates are concerned - while the great majority represent common forms that occur widely within the outcrop areas of the rock units concerned. Important exceptions include (1) vertebrate burrows attributed to small therapsids, and possibly also to lungfish (Almond 2016b, Almond 2016c) and (2) well-preserved vertebrate trackways made by temnospondyl amphibians or other, unidentified tetrapods found *l*ess than 10 km east of the Maralla West WEF project area (Almond 2016e).

Cumulative impacts for the Maralla West WEF in the context of comparable alternative energy projects proposed or authorised in the Klein-Roggeveld region are assessed in Table 2. It is concluded that the cumulative impact significance of the Maralla West WEF and other regional projects is *low* (*negative*), *provided that* the proposed monitoring and mitigation recommendations made for all these various projects are followed through. Unavoidable residual negative impacts may be partially offset by the improved understanding of Karoo palaeontology resulting from appropriate professional mitigation. This is regarded as a *positive* impact for Karoo palaeontological heritage. However, *without* mitigation the magnitude of cumulative (negative, direct) impacts of such a large number of WEFs affecting the same (albeit sparsely) fossiliferous rock successions would be significantly higher and probable. The cumulative impact significance without mitigation is accordingly assessed as *medium*.

VISUAL

Cumulative effects, relate to alterations to the perception of character arising from the visibility of the proposed development in conjunction with other solar and wind farms within the study area. Such cumulative effects would be expected to arise during the latter stages of the construction phase and throughout the operational phase.

The assessment considers two types of cumulative visual effect, namely effects arising from combined and sequential views. These comprise:

- Combined views which “occur where the observer is able to see two or more developments from one viewpoint. Combined visibility may either be in combination (where several wind farms are within the observer’s arc of vision at the same time) or in succession (where the observer has to turn to see the various wind farms)”
- Sequential views which “occur when the observer has to move to another viewpoint to see different developments” (Vissering, 2011).

It is not possible to accurately estimate the significance of the cumulative impacts as not all facilities granted environmental approval will be constructed. Without knowing which combination of the 16 applications will be built, there are 65 535 possible scenarios. However, what should be taken into consideration by the decision making authorities regarding cumulative visual impact is noted below:

- The total area affected by all 14 projects considered above is 128 276 ha. If all the BioTherm wind projects are approved that will result in a total area of 143 688 ha.
- A high concentration of solar and wind energy developments will have a greater impact on the visual landscape and will alter the visual character to a greater degree.
- If all the approved projects are constructed they are likely to be sequentially visible particularly when driving along the Klein Roggeveld Road. In relation to Maralla West the Hidden Valley Proposals (4 projects), Networx Eolos Renewable’s Gunstfontein, Mainstream’s Sutherland Renewable Facility and G7’s Roggeveld Wind Farm, Maralla East and Esizayo are most likely to contribute to sequential visual impacts.
- Projects within a 10km radius of Maralla West may have a combined visual impact from some viewpoints, these include Maralla East, Gunstfontein, some of the Hidden Valley sites and some of the Maintream Sutherland sites.
- The impact of Maralla West on the landscape is rated as medium impact in this VIA and it is reasonable to assume that the cumulative impact of any combination of the above projects will therefore have a high impact on the landscape. Maralla West will contribute to this impact primarily from the Klein Roggeveld Road.
- There are not many mitigation measures that can significantly reduce the cumulative visual impact of wind turbines, but the consistent implementation of mitigation measures across all projects can help to reduce visual impact to some extent. Additionally the dissected nature of the topography breaks up views and will partially obscure developments from viewpoints. Mitigation measures are discussed in Chapter 6 below.
- In considering the bigger picture, having energy projects concentrated in indentified areas or zones can be preferable, but opinion regarding this differs and some literature indicates that from a visual perspective greater distance between projects is less visually intrusive.
- If the planning and environmental authorities have decided and approved the REDZ as a guiding tool/strategy, it follows that there will be higher cumulative visual impact within these zones. The other alternative is to ensure developments are specified distances away from any

other development, which would result in lower cumulative visual impact but smaller visual impacts scattered across a greater area. Guidelines specific to this are not yet available and given the high number of approved applications that are never constructed, this could put potential renewable energy providers at a significant and unnecessary disadvantage. Guidelines and timeframes will therefore need to be carefully considered.

NOISE

Overall, the impacts during the construction phase were identified as having a “medium” impact while the operational phase impacts of all other projects were deemed “low”.

Cumulatively, based on the number of hectares covered by all of the facilities, 40% of the total coverage area is deemed as having a “medium” impact and 60% a “low” impact during the construction phase. With the addition of the Maralla West facility, which will also have “medium” impact during the construction phase, the cumulative impact is envisaged to remain the same. Since construction is temporary and not all sites may be constructed simultaneously, as well as the fact that construction activities can be mitigated to a certain degree, the cumulative construction impacts are not deemed to be significant. Additionally, the acoustic impacts are very site specific, with each Proposed Project having its own set of sensitive receptors based on their locality to the site. Acoustic impacts on receptors at great distances from a source are not considered as noise attenuates over distance with no impacts on receptors located many kilometres away.

Cumulatively, based on the number of hectares covered by all of the facilities, 93% of the total coverage area is deemed as having a “low” impact during the operational phase. With the addition of the Maralla West facility, which will have a “medium” impact during operational phase, the cumulative impact is envisaged to remain the same. As noted above, acoustic impacts are very site specific, with each wind energy project having its own set of sensitive receptors based on locality to the site. Acoustic impacts on receptors at great distances from a source are not considered, as noise attenuates over distance with no impacts on receptors located many kilometres away.

TRAFFIC

The traffic assessment identified three neighbouring projects that may potentially take access off the R354 during their construction and operational phases, namely, Sutherland 2 WEF, Roggeveld WEF and the Hidden Valley WEF. It was noted that the EIA documentation available for these projects did not contain any traffic impact assessments.

The maximum traffic generation of each site occurs at an unknown future time period that cannot be determined from the information available. It is known that The Hidden Valley facility will be constructed in 3 phases. It is therefore unlikely that these impacts will occur at the same time, therefore no cumulative Transport impact is foreseen.

It should be noted that the Significance of the Transport impact of each of these facilities is expected to be similar to the Maralla facilities, as their Construction phase trip generation will likely be similar.

Upgrades to the local access intersections off the R354 have been proposed. The need for these upgrades will be more critical if any of the latent developments are constructed concurrently with the Maralla projects. It is recommended that the cost of the upgrades be shared if the developments are constructed during the same period and take access off the R354 via the same local roads.

SOCIAL

The implementation of numerous renewable energy projects in the local municipal and adjacent areas 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.

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 Karoo Hoogland 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. It is recommended that a development forum is used to address potential cumulative impacts.

INCREASED LOCAL ECONOMIC DEVELOPMENT OPPORTUNITIES

Currently most people within the neighbouring Laingsburg area are employed or generate income through agricultural activities, a smaller number through government services, and the hospitality industry (*pers. comm*. Harding 2017). A similar picture is presented in the Karoo Hoogland Local municipality, with over half of the formal employment being in agriculture, followed by households and community services (Karoo Hoogland Local Municipality, 2015).

One PV facility has been constructed 90 km southwest of the site, and a few of the nearby proposed facilities have been awarded preferred bidder status including 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 renewables projects within the local area 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 Karoo Hoogland Local Municipality is likely to put significant pressure on the local municipalities and communities.

The most significant challenge that 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 municipalities. 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. Currently Karoo Hoogland Local Municipality experiences a considerable challenge in terms of providing bulk basic services (water sanitation, housing), as well as a lack of social services, specifically youth development (*pers. comm*. Harding, 2017). These opportunities should be investigated further, and discussed between the development proponents and the Karoo Hoogland Local Municipality.

CHANGE IN SENSE OF PLACE

The nature of the landscape is anticipated to change significantly 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 and land values.

Tourism is a contributor to the local economy of the Karoo Hoogland Local Municipality; however, it is unlikely that the development of multiple renewable projects will have negative economic impacts in respect of the tourism sector, as most of the sites are far from tourist routes. The impact would be dependent on how many of the proposed projects are actually constructed and the proximity of turbines to places of interest (e.g. guesthouses, scenic areas) and density of turbines within the developments (resulting in higher visual intrusion).

10.2 CUMULATIVE ASSESSMENT

The results of the cumulative impact assessment are included in **Table 10-2**.

Table 10-2: Assessment of cumulative impacts associated with the BioTherm Solar Energy Development together with proposed surrounding developments

REF.		EXTENT (E)	DURATION (D)	MAGNITUDE (M)	PROBABILITY (P)	SIGNIFICANCE (S=(E+D+M)*P)		STATUS (+ve or -ve)
Soils and Land Capability								
SLC–C1	**Impact**	Loss of land (including wetlands) previously used for sheep and antelope grazing will be occupied by the wind facility and associated infrastructure						
	Without Mitigation	2	4	6	5	**60**	**Medium**	-ve
	degree to which impact can be reversed:	Medium						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	1	4	2	4	**28**	**Low**	-ve
SLC–C2	**Impact**	Vegetation clearance for wind turbines and roads, soil disturbance and stockpiles, and increased traffic movement on site, resulting in a higher potential for soil erosion						
	Without Mitigation	2	4	4	3	**30**	**Low**	
	degree to which impact can be reversed:	High						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	1	4	2	2	**14**	**Low**	
SLC–C3	**Impact**	Potential spillage of hazardous substances such as oils, fuel, grease from maintenance vehicles, and sewage from on-site sanitation systems						
	Without Mitigation	2	4	2	2	**16**	**Low**	-ve

	degree to which impact can be reversed:	High						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	1	4	2	1	**7**	**Low**	-ve
Biodiversity								
BIO-C1	**Impact**	Impact on CBAs and Broad-Scale Ecological Processes due habitat loss and the presence and operation of the facility						
	Without Mitigation	2	4	6	5	**60**	**Medium**	-ve
	degree to which impact can be reversed:	Medium						
	degree of impact on irreplaceable resources:	Medium						
	With Mitigation	1	4	4	3	**27**	**Low**	-ve
BIO-C2	**Impact**	Impact on NPAES Focus Areas and future conservation options in the area						
	Without Mitigation	2	4	6	5	**60**	**Medium**	-ve
	degree to which impact can be reversed:	Medium						
	degree of impact on irreplaceable resources:	Medium						
	With Mitigation	1	4	4	3	**27**	**Low**	-ve
Avifauna								
AVI-C1	**Impact**	Possible impacts by renewable energy projects on birds within a 70km radius are temporary displacement due to disturbance associated with the construction of the facility and associated infrastructure, collisions with solar panels and wind turbines, permanent displacement due to habitat transformation, entrapment in perimeter fences and collisions with the associated power lines.						
	Without Mitigation	3	4	8	5	**75**	**High**	-ve
	degree to which impact can be reversed:	Low						
	degree of impact on irreplaceable resources:	High						
	With Mitigation	3	4	8	3	**45**	**Medium**	-ve
Bats								
BAT-C1	**Impact**	Cumulative bat mortalities due to direct blade impact or barotrauma during foraging (resident and migrating bats affected)						
	Without Mitigation	4	4	10	4	**72**	**High**	-ve

	degree to which impact can be reversed:	Partly reversible. The impact will occur throughout the lifespan of the wind energy facility as well as other facilities in the area, therefore bat population numbers may take very long to recover. There is a higher probability for population and diversity genetics to be permanently altered in cumulative impacts.						
	degree of impact on irreplaceable resources:	Significant loss of resources. Bat population numbers will decrease across the region, species may be lost regionally.						
	With Mitigation	4	3	6	4	**52**	**Medium**	-ve
Surface Water								
SW-C1	**Impact**	Permanent degradation/loss of wetland/riparian habitat due to the proposed positioning of infrastructure.						
	Without Mitigation	2	2	8	5	**60**	**Medium**	-ve
	degree to which impact can be reversed:	High						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	1	2	4	3	**21**	**Low**	-ve
SW-C2	**Impact**	Temporary potential degradation of wetland habitat due to the proposed positioning of road access.						
	Without Mitigation	2	2	6	4	**40**	**Medium**	-ve
	degree to which impact can be reversed:	High						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	2	2	4	3	**24**	**Low**	-ve
Heritage								
H-C5	**Impact**	Destruction of a number of site of medium to high significance in the region						
	Without Mitigation	2	5	6	4	**52**	**Medium**	-ve
	degree to which impact can be reversed:	Heritage resources are non-renewable and impacts cannot be reversed						
	degree of impact on irreplaceable resources:	The destruction of a number of heritage sites of significance in the region will result in a loss of local heritage						
	With Mitigation	1	5	2	3	**24**	**Low**	-ve
Palaeontology								
P-C1	**Impact**	Disturbance, damage or destruction of fossils (direct, negative impacts) preserved at or beneath the ground surface within the development footprint during the construction phase, mainly due to surface clearance or excavation activities.						

	Without Mitigation	3	5	4	3	**36**	**Medium**	-ve
	degree to which impact can be reversed:	Irreversible						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	3	5	2	2	**20**	**Low**	
Visual								
V-C1	**Impact**	Cumulative visual impact of 16 wind energy facilities						
	Without Mitigation	2	4	8	5	**70**	**High**	-ve
	degree to which impact can be reversed:	The visual impact can completely reversed after closure of facility, if turbines removed.						
	degree of impact on irreplaceable resources:	No impact on irreplaceable resource, if site effectively rehabilitated.						
	With Mitigation	2	4	8	5	**70**	**High**	-ve
Noise								
N-C1	**Impact**	Cumulative impacts on sensitive receptors						
	Without Mitigation	3	4	4	4	**44**	**Medium**	
	degree to which impact can be reversed:	High						
	degree of impact on irreplaceable resources:	None						
	With Mitigation	3	4	4	2	**22**	**Low**	
Traffic								
T-C1	**Impact**	Cumulative traffic impact						
	Without Mitigation	2	2	2	4	**24**	**Low**	-ve
	degree to which impact can be reversed:	Temporary impact, no long term effect						
	degree of impact on irreplaceable resources:	N/A						
	With Mitigation	2	2	2	4	**24**	**Low**	-ve
Social								
SE-C1	**Impact**	Increased local economic development opportunities						
	Without Mitigation	3	4	8	5	**75**	**High**	+ve
	degree to which impact can be reversed:	N/A						

	degree of impact on irreplaceable resources:	Low						
	With Mitigation	3	4	8	5	**75**	**High**	+ve
SE-C2	**Impact**	Increased pressure on local service provision						
	Without Mitigation	3	4	6	4	**52**	**Medium**	-ve
	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						
	With Mitigation	3	4	6	4	**52**	**Medium**	-ve
SE-C3	**Impact**	Change in sense of place						
	Without Mitigation	3	4	4	3	**33**	**Medium**	-ve
	degree to which impact can be reversed:	High - Project could be removed						
	degree of impact on irreplaceable resources:	Low						
	With Mitigation	3	4	4	3	**33**	**Medium**	-ve
SE-C4	**Impact**	Change in employment patterns						
	Without Mitigation	3	4	2	3	**27**	**Low**	+ve
	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						
	With Mitigation	3	4	2	3	**27**	**Low**	+ve

10.3 CUMULATIVE SUMMARY

Table 10-3 provides a summary of the overall impact significance per aspect per project within a 65 km radius of the BioTherm Solar Development. **Table 10-3** provides a summary of the overall impact significance per aspect for the BioTherm Solar Development.

In order to graphically illustrate this information, the impact ratings were allocated the following numerical values:

- Low = 1
- Medium = 2
- High = 3
- No information available = 0

Figure 10-6 and **Figure 10-7** provide graphical illustrations of the overall cumulative impact per aspect with and without the BioTherm Development respectively.

Table 10-3: Summary of the Overall Impact Significance per Aspect per Project (excluding the BioTherm Development)

DEA REFERENCE	IMPACTS										
	Avifauna	Bats	Biodiversity	Heritage	Palaeontology	Land Capability	Surface Water	Social	Visual	Noise	Traffic
14/12/16/3/3/2/395	1	0	2	2	3	0	0	0	1	1	0
12/12/20/1782/AM1	2	1	2	2	3	0	0	0	3	1	0
12/12/20/2370/2	2	1	2	1	1	1	1	2 (+)	2	1	1
12/12/20/2370/3	2	1	2	1	1	1	1	2 (+)	2	1	1
12/12/20/2370/1	2	1	2	1	1	1	1	2 (+)	2	1	1
12/12/20/1988/1/AM1	2	2	3	2	1	2	1	2 (+)	3	1	1
12/12/20/2235	2	0	2	3	1	0	0	0	1	0	0
12/12/20/1583	0	0	0	3	0	0	0	0	0	0	0
12/12/20/1966/A2	0	0	0	0	0	0	0	0	0	0	0
12/12/20/1787	0	0	0	0	0	0	0	0	0	0	0
12/12/20/1783/2/AM1	0	0	0	0	0	0	0	0	0	1	0
12/12/20/1956	2	0	3	1	1	1	3	3 (+)	2	0	0

Table 10-4: Summary of the Overall Impact Significance per Aspect per Project (including the BioTherm Development)

DEA REFERENCE	IMPACTS										
	Avifauna	Bats	Biodiversity	Heritage	Palaeontology	Land Capability	Surface Water	Social	Visual	Noise	Traffic
14/12/16/3/3/2/395	1	0	2	2	3	0	0	0	1	1	0
12/12/20/1782/AM1	2	1	2	2	3	0	0	0	3	1	0
12/12/20/2370/2	2	1	2	1	1	1	1	2 (+)	2	1	1
12/12/20/2370/3	2	1	2	1	1	1	1	2 (+)	2	1	1
12/12/20/2370/1	2	1	2	1	1	1	1	2 (+)	2	1	1
12/12/20/1988/1/AM1	2	2	3	2	1	2	1	2 (+)	3	1	1
12/12/20/2235	2	0	2	3	1	0	0	0	1	0	0
12/12/20/1583	0	0	0	3	0	0	0	0	0	0	0
12/12/20/1966/A2	0	0	0	0	0	0	0	0	0	0	0
12/12/20/1787	0	0	0	0	0	0	0	0	0	0	0
12/12/20/1783/2/AM1	0	0	0	0	0	0	0	0	0	1	0
12/12/20/1956	2	0	3	1	1	1	3	3 (+)	2	0	0
14/12/16/3/3/2/967	2	2	1	1	1	1	1	3 (+)	3	1	1

DEA Reference	Impacts										
	Avifauna	Bats	Biodiversity	Heritage	Palaeontology	Land Capability	Surface Water	Social	Visual	Noise	Traffic
14/12/16/3/3/2/963	2	2	1	1	1	1	1	3 (+)	3	1	1
14/12/16/3/3/2/962	2	2	1	1	1	1	1	3 (+)	3	1	1

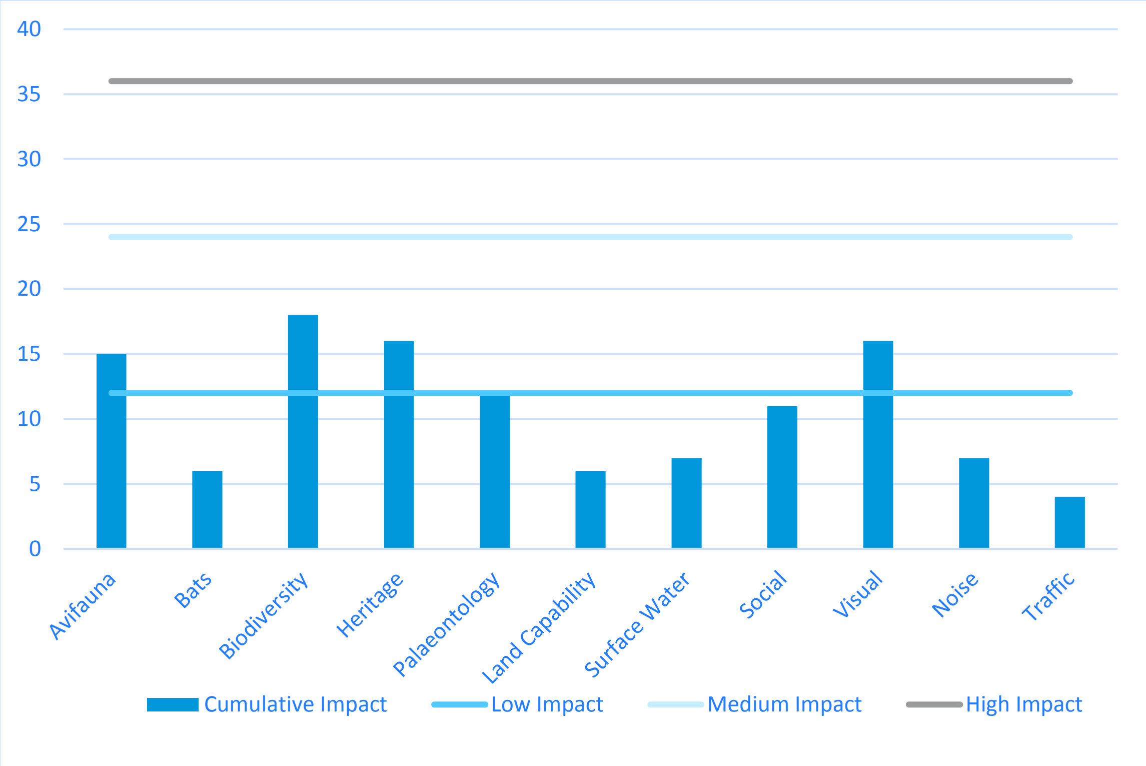


Figure 10-6: Graphical Illustration of the Overall Cumulative Impact per Aspect (excluding the BioTherm Development)

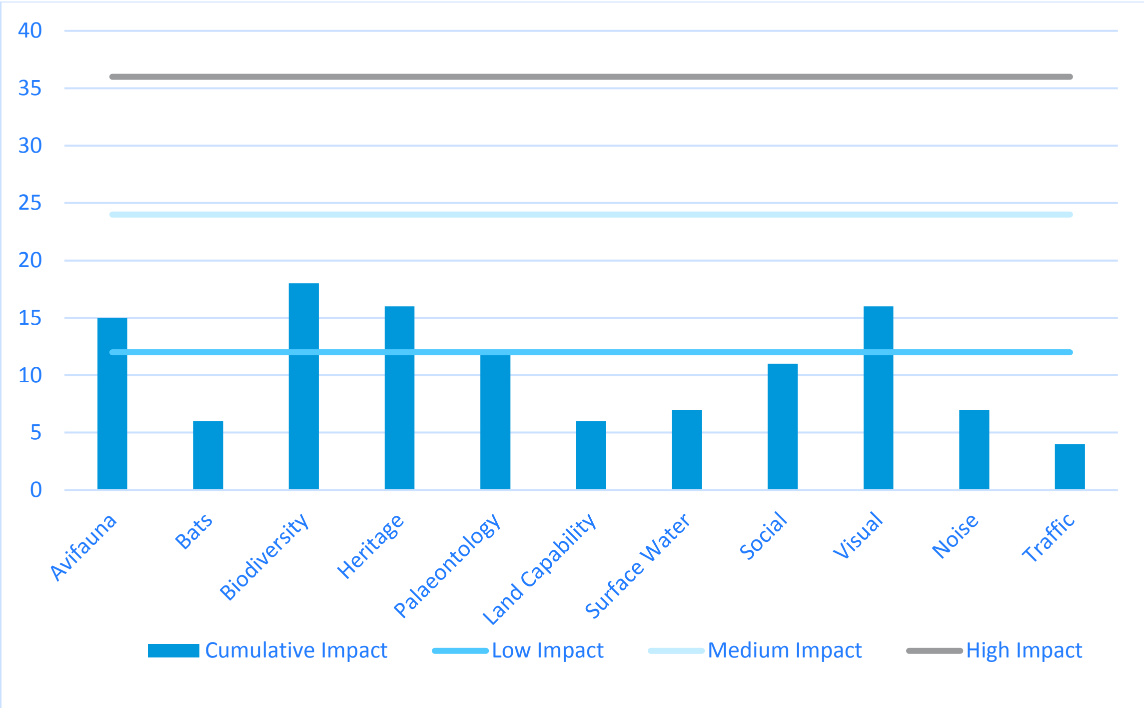


Figure 10-7: Graphical Illustration of the Overall Cumulative Impact per Aspect (including the BioTherm Development)

Considering the findings of the specialist assessments together with the consolidated information presented in the graphs above, the cumulative impacts for the proposed Maralla West WEF project will be acceptable. The cumulative impact can be rated as medium to low for all aspects except social, which can be rated as a medium to high positive impact. It can be concluded that the development of the Maralla West WEF project and the other renewable energy projects in the region are acceptable and will not result in an unacceptable loss or risk or an increase in the existing cumulative impacts.

In addition to the above assessment it is important to note that the Maralla West facility is situated on the same farm portion as a previously authorised wind energy facility (DEA Ref: 12/12/20/1782 and 12/12/20/1782/AM1, Proposed development of Renewable Energy Facility at the Sutherland site, Western and Northern Cape Province).

The abovementioned EA includes the Farm Annex Drie Roode Heuvels 181 (the Remainder) and Farm Wolven Hoek 182 Portion 2. The original applicant was Mainstream Renewable Power Sutherland and the EAP who undertook the EIA process was Environmental Resource Management (Pty) Ltd (ERM). The application was submitted on the 14 of October 2010 and was approved on 22 February 2012.

Mainstream have indicated that they no longer want to develop on Farm Annex Drie Roode Heuvels 181 (the Remainder) or Farm Wolven Hoek 182 Portion 2 and as a result did not renew the lease with the land owner. In addition, Mainstream are in the final process of Amending the EA to split the 811MW facility into three 140MW wind farms (12/12/20/1782/AM2), including:

- Sutherland WEF,
- Sutherland WEF 2, and
- Rietrug WEF.

This will entail the removal of the Farm Welgemoed 268 (the Remainder) on which the Maralla West WEF is located. **Figure 10-8** illustrates the original turbine positions compared to the amended positions.

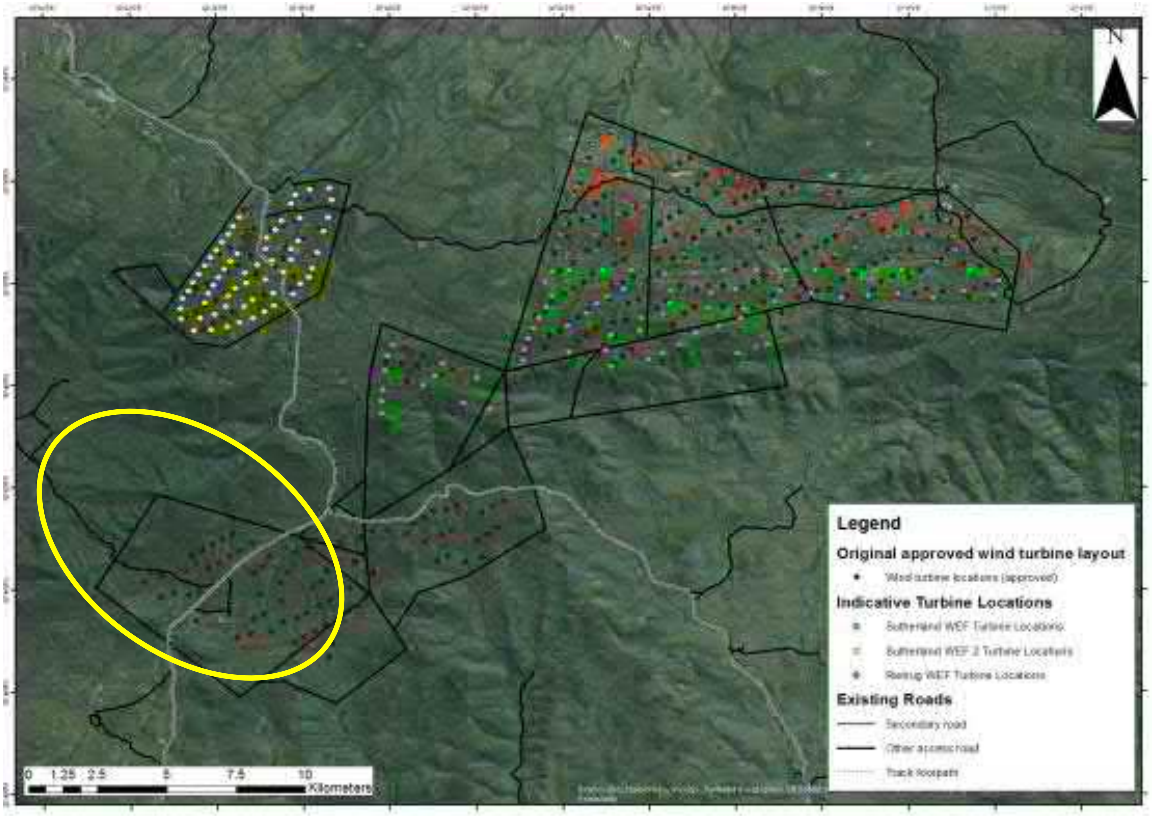


Figure 10-8: Extent of originally approved wind turbines on site (DEA Ref: 12/12/20/1782) compared to the extent of turbines proposed as part of the Sutherland WEF, Sutherland WEF 2 and Rietrug WEF amendments (The Maralla West WEF is indicated by the yellow circle)

The original Sutherland WEF EA was authorised for 747 MW to 1137 MW, which translates into a maximum number of 325 turbines on site. In terms of the Sutherland WEF, Sutherland WEF 2 and Rietrug WEF amendments 159 turbines are being included in the applications (47 + 56 +56 = 159). It can therefore be deduced that the Maralla West WEF is not adding additional cumulative impacts to the region as pre-authorised turbines on the same properties have already been taken into account.

11 ENVIRONMENTAL IMPACT STATEMENT

The essence of any S&EIR process is aimed at ensuring informed decision-making, environmental accountability, and to assist in achieving environmentally sound and sustainable development. In terms of NEMA, the commitment to sustainable development is evident in the provision that "development must be socially, environmentally and economically sustainable…. and requires the consideration of all relevant factors…". NEMA also imposes a duty of care, which places a positive obligation on any person who has caused, is causing, or is likely to cause damage to the environment to take reasonable steps to prevent such damage. In terms of NEMA's preventative principle, potentially negative impacts on the environment and on people's environmental rights (in terms of the Constitution of the Republic of South Africa, Act No. 108 of 1996) should be anticipated and prevented, and where they cannot be altogether prevented, they must be minimised and remedied in terms of "reasonable measures".

In assessing the environmental feasibility of Maralla West WEF, the requirements of all relevant legislation have been considered. The identification and development of appropriate management and mitigation measures that should be implemented in order to minimise potentially significant impacts associated with the project, has been informed by best practice principles, past experience and the relevant legislation (where applicable).

The conclusions of this EIA are the result of comprehensive assessments. These assessments were based on issues identified through the S&EIR process and the parallel process of public participation. The public consultation process has been undertaken according to the requirements of NEMA and every effort has been made to include representatives of all stakeholders within the process.

11.1 PROJECT SUMMARY

BioTherm has proposed the development of three up to 250 MW Wind Energy Projects within the Western Cape and a portion of the Northern Cape, namely Maralla East, Maralla West and Esizayo Wind Energy Projects. **This EIA report is specifically applicable to the Maralla West WEF project. Table 11-1** provides a summary of the Maralla West WEF project.

Table 11-1: Maralla East WEF Project Summary

Technical Details Of The Proposed Maralla West Wind Energy Facility	
Location of Site	The proposed project is to be developed approximately 34km South of Sutherland in the Northern Cape
Farm Names	Farm Drie Roode Heuvels 180, Remainder Farm Annex Drie Roode Heuvels 181, Remainder Farm Wolven Hoek 182, Portion 1 Farm Wolven Hoek 182, Portion 2
SG Codes	C07200000000018000000 C07200000000018100000 C07200000000018200001 C07200000000018200002
Total area of Site	5 646 ha
Area of Buildable Area	Approximately 200 ha

TECHNICAL DETAILS OF THE PROPOSED MARALLA WEST WIND ENERGY FACILITY	
Area Occupied by Each Turbine	0.5 ha (85m x 60m)
Generation Capacity	Up to 250 MW
Technology	Wind
Number of Turbines	Up to 125 (The revised layout has reduced the number of turbines to 56)
Turbine Hub Height	Up to 120m
Rotor Diameter	Up to 150m
Turbine Foundation	20m diameter x 3m deep – 500 to 650m^3 concrete. Excavation area approx. 1000 m^2 in sandy soils due to access requirements and safe slope stability requirements.
Electrical Turbine Transformers	0.5ha (85m x 60m)
Area of Preferred Operations and Maintenance Building Assessment Site	O&M buildings will be in proximity of the Substation due requirements for power, water and access.
Footprint of Operations and Maintenance Building(s)	O&M building includes operations, on site spares storage and workshop. Typical areas indicated below: → Operations = 20 x 8 = 160m^2 → Work shop = 12 x 8 = 96m^2 → Stores = 15 x 8 = 120m^2
Area of Preferred Construction Laydown areas	Construction camp typical area 60m x 40m = 2 400m^2 → Laydown or staging area 150m x 75m = 11 250m^2 → Laydown for concrete towers (only if required) = 40 000m^2 "
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 0.25ha. The maximum height of the cement silo will be 20m. This will be a temporary structure during construction.
Width of Internal Roads	Between 4.0m and 6.0m, however this may increase to 8m on bends
Length of Internal Roads	Approximately 60 km
Type and Height of Fencing	Approximately 5m high palisade or mesh fencing where required
Sewage	Septic tanks (with potable toilets during the construction phase)
Power Evacuation	
Footprint of Internal Onsite Substation	150m x 150m
Onsite Substation Capacity	Up to 132kV
Specifications of onsite switching stations, transformers, invertors, onsite cables etc	The medium voltage collector system will comprise of cables (1kV up to and including 33kV) that will be run underground, except where a technical assessment suggests that overhead

Technical Details Of The Proposed Maralla West Wind Energy Facility	
	lines are applicable, in the facility connecting the turbines to the onsite substation.
Width of the Powerline Servitude	31m (15.5m either side)
Powerline Tower Types and Height	Tower (suspension / strain) / Steel monopole structure, which may be self-supported or guyed suspension.
Closest Grid Connection Point	Komsberg Substation
Proximity to Grid Connection	Komsberg Substation is approximately 25 km from the Maralla East Site.
List of additional infrastructure to be built	Access roads and internal roads. Administration, control and warehouse buildings.

11.2 ENVIRONMENTAL SENSITIVITIES

The specialist studies undertaken during both the scoping and EIA phases of the project identified a number of sensitive areas within the broader wind development area. The resulting sensitivity maps have been utilised to inform the revised turbine layout.

SCOPING PHASE SENSITIVITY MAPPING

The results of the environmental sensitivity mapping undertaken during the scoping phase together with technical input from the applicant resulted in the initial 125 turbine layout (**Figure 11-1**) of the wind energy facility being revisited. **Figure 11-2** illustrates the revised 70 turbine layout. It can be noted that high and very high sensitivity areas were avoided as far as possible. The following sensitive areas were identified during the scoping phase:

- **Ecological Sensitivities:** High sensitivity areas include the very high lying ground in the northeast as well as steep, south-facing slopes distributed across the site. Preferably, the number of turbines within the Very High sensitivity areas should be reduced. At this point it is considered acceptable to have turbines within the High sensitivity areas but specific attention should be paid to these areas in the EIA phase to evaluate the presence of species and habitats of concern in these areas and the potential impact of the development on these features. The relatively high sensitivity of large parts of the site reflects the abundance of species of conservation concern in these areas. The primary implication of these results is that development within this area should proceed with caution as there are numerous sensitive features present and specific avoidance and mitigation is required to reduce the impact of the development to acceptable level.
- **Avifauna Sensitivities:** The Avifauna Study identified the following areas where no turbines should be constructed (i.e. exclusion zones):
  - West-facing slopes (i.e. those facing the dominant wind directions) are likely to be the most sensitive areas for slope soaring raptors; and
  - 500m buffer zones around the dams.
- **Bat Sensitivities**: The bat sensitivity map was based on features identified to be important for foraging and roosting of the species that are most probable to occur on site. Thus the sensitivities are based on species ecology and habitat preferences.
- **Surface Water Sensitivities:** A number of watercourses traverse the site. In addition, two depressional wetlands were identified.

- **Heritage Sensitivities**: Sensitive heritage locations were identified in the valleys along major drainage lines as they had a high probability of containing heritage sites.
- **Visual Sensitivities**: Visual constraints or sensitive features included:
  - Topographical Features:
  - Surrounding Homesteads:
  - Town/ Urban Areas
  - Roads:
  - Other:
    - South African Large Telescope (SALT)
    - Cultural landscapes
- **Noise Sensitivities**: Three farmhouse receptor locations were identified in and around the vicinity of the Maralla East site.
- **Social Sensitivities:** The closest potentially sensitive receptors included the Welgemoed Farm (assumed to be house and infrastructure) (800 m north east of the site) and the Komsberg Farm (assumed to be house and infrastructure) (600 m north east of the site).

Figure 11-1: Initial layout plan for the Maralla West WEF Turbines (125 Turbines)

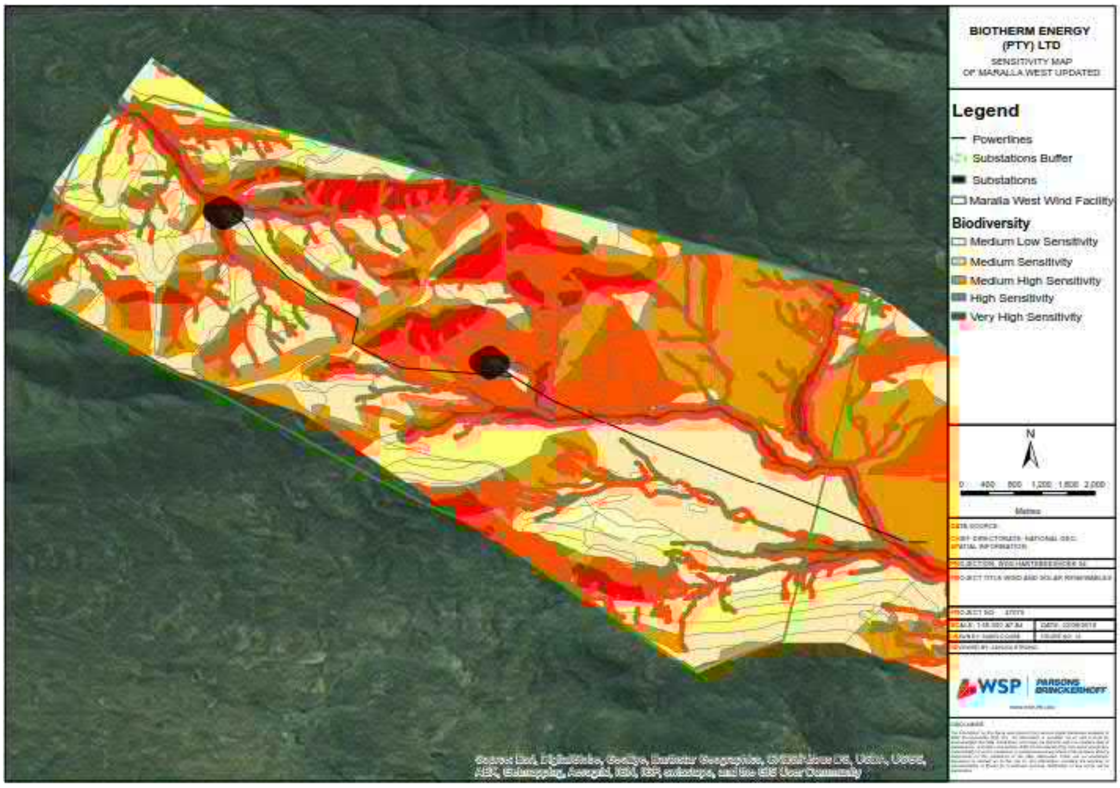


Figure 11-2: Revised layout plan for the Maralla West WEF Turbines (70 Turbines)

EIA PHASE SENSITIVITY MAPPING

The following sensitivity maps were updated as a result of the detailed EIA studies.

BIODIVERSITY

The ecological sensitivity map of the site is depicted in **Figure 11-3**. The ecological sensitivity of the different units identified in the mapping procedure for the broad-scale sensitivity map was rated according to the following scale:

- **Low** – Areas of natural or transformed habitat with a low sensitivity where there is likely to be a negligible impact on ecological processes and terrestrial biodiversity. Most types of development can proceed within these areas with little ecological impact.
- **Medium**- Areas of natural or previously transformed land where the impacts are likely to be largely local and the risk of secondary impact such as erosion low. These areas usually comprise the bulk of habitats within an area. Development within these areas can proceed with relatively little ecological impact provided that appropriate mitigation measures are taken.
- **High** – Areas of natural or transformed land where a high impact may occur due to the high biodiversity value, sensitivity or important ecological role of the area. These areas may contain or be important habitat for faunal species or provide important ecological services such as water flow regulation or forage provision. Development within these areas is generally undesirable and should proceed with caution as additional specific mitigation and avoidance is usually required to reduce impacts within these areas to acceptable levels. High sensitivity areas are also usually more sensitive to cumulative impact and the total footprint within these areas should be kept low.

- **Very High** – Critical and unique habitats that serve as habitat for rare/endangered species or perform critical ecological roles. These areas are essentially no-go areas from a developmental perspective and should be avoided. However, in case of linear features such as drainage lines, it may be necessary for access roads and other infrastructure to traverse such features. However no turbines should be located within such areas and other disturbance should be minimized. Excessive disturbance or impact to such areas may be considered to constitute a fatal flaw of the development and as such should be avoided and minimized as much as possible.
- In some situations, areas were also classified between the above categories, such as Medium-High, where it was deemed that an area did not fit well into a certain category but rather fell most appropriately between two sensitivity categories

The site is spread across the top of a watershed with the western margin of the site draining west into the Tankwa River system and the rest of the site draining east into the Komsberg River. Although most of the development is situated on the high ground, the access roads and some of the associated infrastructure occur in lower-lying areas in proximity to some significant wetlands. In the high-lying areas where many of the turbines are located, sensitive features include rock pavements, rocky outcrops and other localized edaphic features. The terrain is also extremely rugged in the west of the site and there are numerous steep slopes that will need to be negotiated. The central part of the site which forms a large basin around the Roggeveld River occurs at a lower elevation and is more homogenous in nature, with the dominant sensitive feature in this area being the larger drainage lines and wetlands of the site. Many of the listed and endemic geophytes of the Komsberg area are associated with areas of moist ground, usually clay soils associated with wetlands, seeps and drainage areas. These features have been mapped and buffered in the sensitivity map, but the various required river crossings will need to be specifically investigated during the preconstruction phase, should the development reach preferred bidder status.

In terms of the final layout provided for the assessment, there are 4 turbines within areas considered medium low sensitivity and 26 turbines within areas classified as Medium sensitivity. Impacts associated with these turbines are likely to be low as these are located within areas with few species or habitats of concern and the risk of significant impact is low. The remaining 26 turbines are located within areas classified as Medium High sensitivity where there is a somewhat greater risk due to the steeper slopes present or plant communities with a higher ecological value or prevalence of species of concern. There are no turbines within areas of High sensitivity, which is a direct result of avoidance by the developer and the iterative development of the final layout. Some of the turbines are however in close proximity to areas of High sensitivity and any features of concern within these areas are likely to be able to avoided at the preconstruction phase as the sensitivity map was produced at a fine scale and any features not mapped are likely to of small extent. As such, the proximity of the turbines to the higher sensitivity areas is considered acceptable at this stage and no additional buffer beyond those inherent in the sensitivity map is required.

In terms of potential impacts associated with the development and primary mitigation options, the steep nature of large parts of the site especially in the west is a potential concern which will significantly raise the risk of erosion problems, while the access routes also traverse some sensitive wetland areas in the lower-lying parts of the site. In terms of mitigating and avoiding these impacts, specific attention will need to paid to the access routes and ensuring that these avoid overly steep slopes and some re-routing of some short sections of road may be required at some of the wetland sites to ensure that the impact of the access roads on these features can be minimized. Where present, the proposed roads follow existing tracks, but some of these are not well routed and it may be necessary to reroute some of these to reduce their impact. These are however specific localized issues and in general, the development footprint avoids the sensitive parts of the site and as such significantly reduces the impact of the development compared to an unmitigated layout.

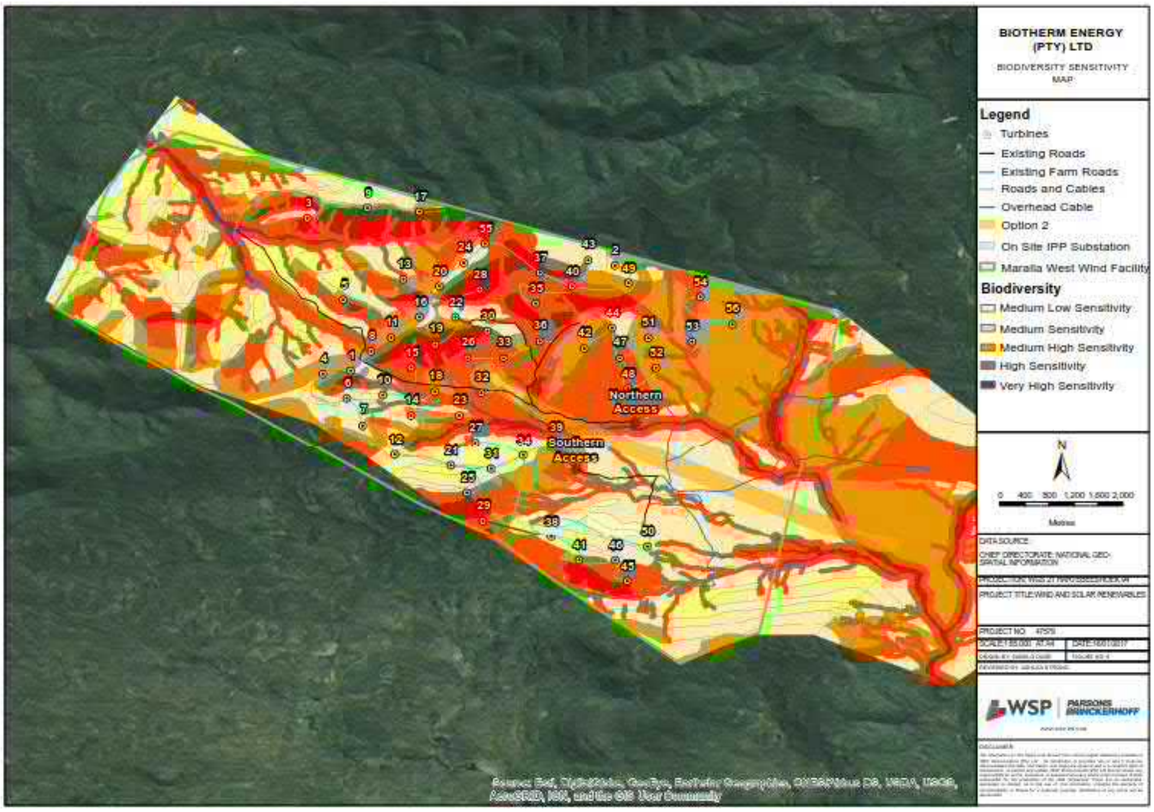


Figure 11-3: Revised Ecological Sensitivity Map

AVIFAUNA

Several turbine exclusion zones have been identified from the flight data gathered during 288 hours of VP watches. These exclusion zones focused on the recorded flight patterns of Martial Eagle, Verreaux's Eagle and Black Harrier. The flight patterns were interpreted taking into account relevant landscape features e.g. slopes and ridges to guide the delineation. Anticipated areas of high avifaunal activity such as dams were also considered, taking into account the fact that numbers of waterbirds can vary greatly seasonally and annually, depending on dam levels. **Figure 11-4** illustrates the avifauna exclusion zones in relation to the revised 56 turbine layout.

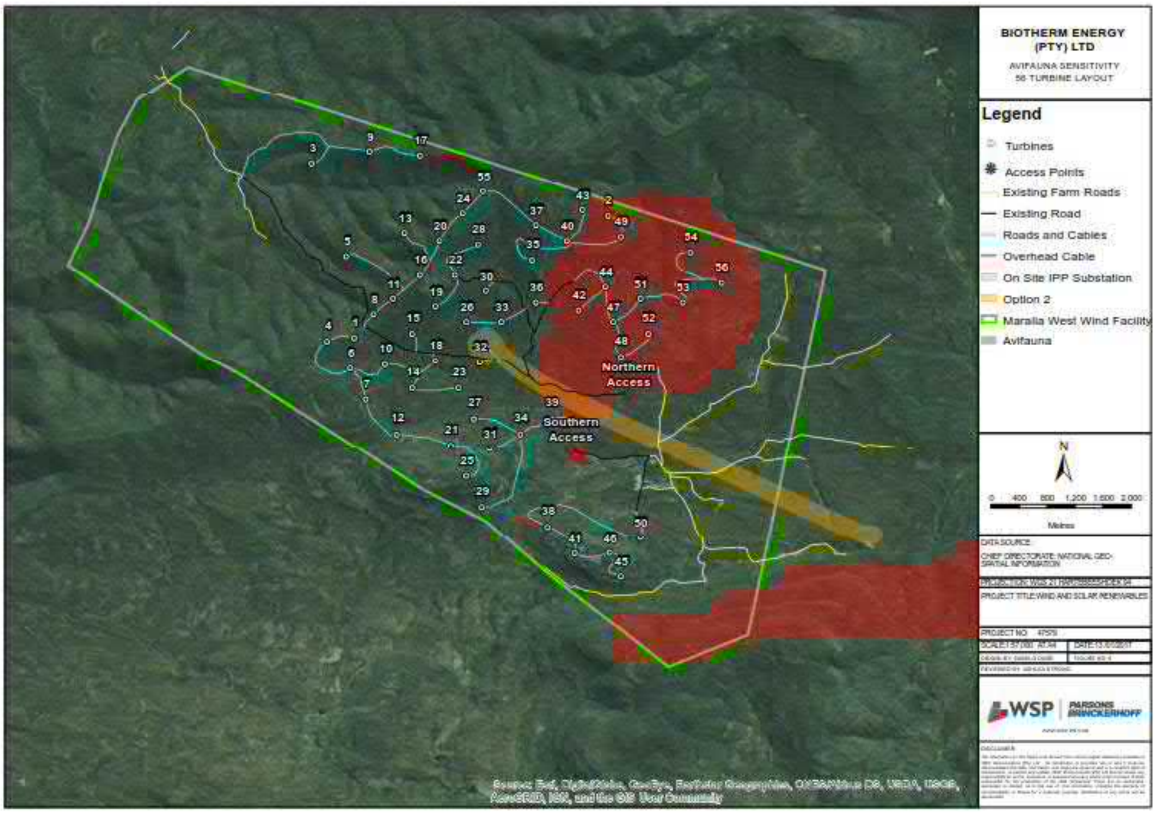


Figure 11-4: Revised Avifauna Sensitivity Map

BATS

Figure 11-5 depicts the sensitive areas of the site, based on features identified to be important for foraging and roosting of the species that are most probable to occur on site. Thus, the sensitivity map is based on species ecology and habitat preferences. This map can be used as a pre-construction mitigation in terms of improving turbine placement with regards to bat preferred habitats on site. The description of the sensitivity categories utilized in the sensitivity map are as follows:

- **Moderate Sensitivity** - Areas of foraging habitat or roosting sites considered to have significant roles for bat ecology. Turbines within or close to these areas must acquire priority (not excluding all other turbines) during pre/post-construction studies and mitigation measures will need to be applied immediately from the start of operation.
- **High Sensitivity** - Areas that are deemed critical for resident bat populations, capable of elevated levels of bat activity and support greater bat diversity than the rest of the site. These areas are 'no-go' areas and turbines must not be placed in these areas and their buffers.

The bat sensitivity map has been reviewed and revised from the original version compiled at the onset of the bat monitoring study. The map has been revised based on the results of this monitoring survey. A number of high sensitivity areas have been downgraded to moderate sensitivity areas. The buffer distances have also been reduced; the high sensitivity buffer distance has been reduced from 200m to 100m and the moderate sensitivity buffer has been reduced from 100m to 50.

All turbines of the Maralla West WEF layout have been removed out of the bat sensitive areas and their respective buffers. Thus, the turbine layout is respective of the bat sensitivity map.

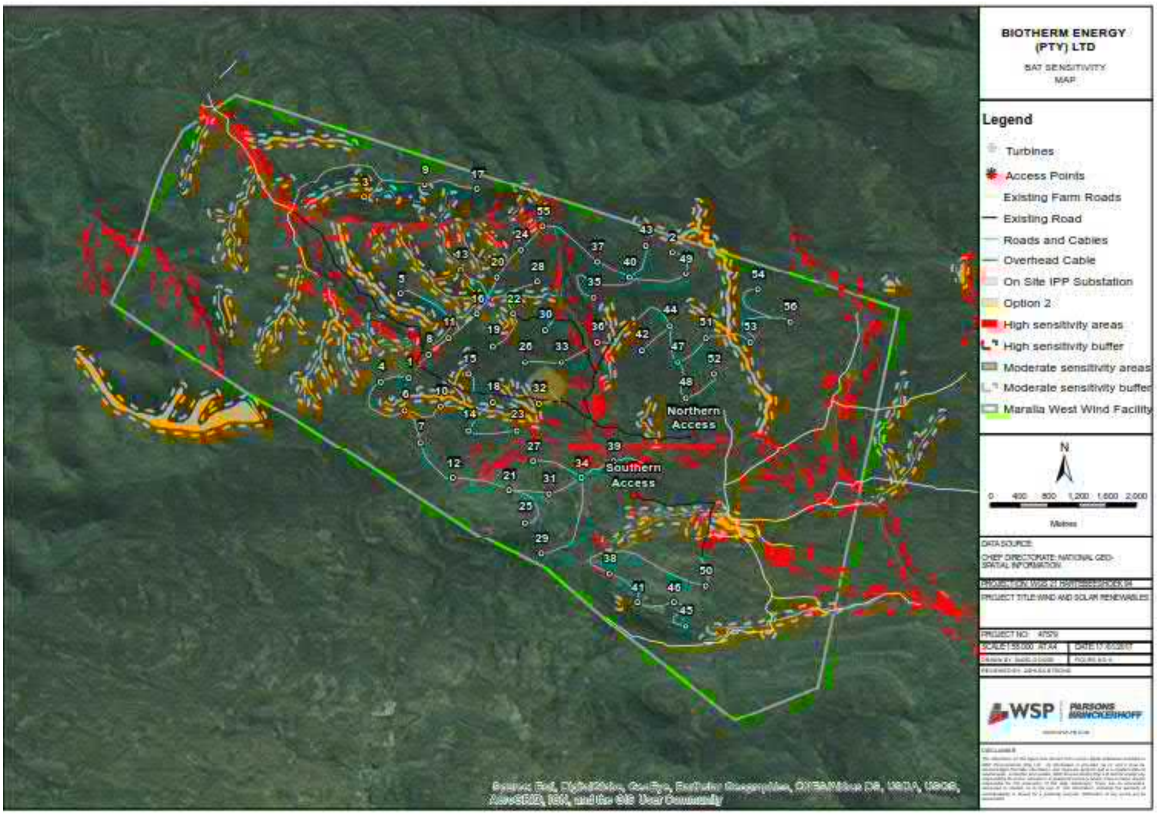


Figure 11-5: Revised Bat Sensitivity Map

HERITAGE

With respect to cemeteries and graves, any impacts which result in a disturbance to a grave are considered high. They are best avoided by development. An extensive consultation process with interested and affected parties is required if exhumation is considered. Apart from the family graveyard on Die Kom, which is fenced and not under any direct threat, there is the informal graveyard next to the gravel access road which will be damaged or destroyed if the road is widened. All graveyard and graves should be declared "No-Go" areas.

The following highly sensitive areas must be declared no-go areas during construction:

- The vernacular cottage on the farm Wolven Hoek;
- River Settlement - LSA sites with pottery along a river bed which will be crossed by the on-site powerline;
- Road Settlement - Remains of a late 19th century settlement (including graveyard) on both sides of the public gravel road on Drie Roode Heuvels (Die Kom) on Maralla West.

The heritage "No-Go" areas are illustrated on **Figure 11-6**.

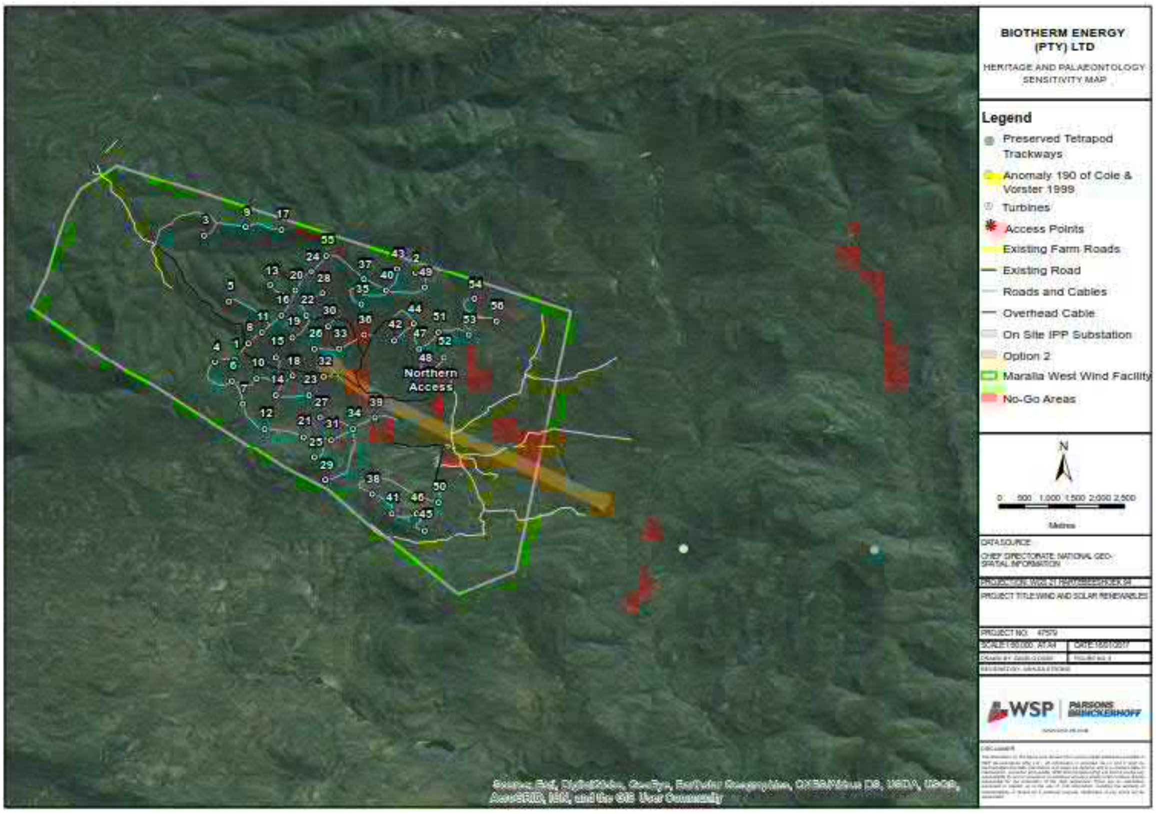


Figure 11-6: Revised Heritage Sensitivity Map

VISUAL

Visual constraints or sensitive features have been mapped and are illustrated in **Figure 11-7**. These included:

- Topographical Features:
  - Prominent ridgelines in the landscape are visually sensitive and should be avoided if possible, when positioning turbines and other infrastructure.
  - Steep slopes (gradients steeper than 1:5) are visually sensitive as construction activities (building of roads, turbine platforms etc.) require cut and fill which can result in scars that are visually prominent on steep slopes.
- Surrounding Homesteads:
  - The following homesteads may be visually affected by the proposed wind turbines on Maralla West: Komsberg, Wilgeboom, Kareedoornkraal, Weltevreden, Damslaagte, De Hoop, De Plaat, Oranjefontein, Boesmanshoek, Wegkruip, Wadrift, Brandhoek, Van Wykskraal and Oliviersberg. Most homesteads are situated at a low elevation in the valleys, often surrounded by large trees, which will significantly reduce visibility of the proposed development.
  - Tondeldoosfontein, Theronsrus, Knoffelhoek, Die Kruis and Ou Plaas are within the ZVI but are on the other side of the Komsberg Mountains.
  - Welgemoed (Maralla East) and De Kom (Maralla West) are situated within the boundaries of the Maralla sites.
- Town/ Urban Areas

- The closest town, Sutherland is situated approximately 32km away and so is too far away to be significantly impacted by the proposed development. Additionally the Komsberg Mountains screen the town from the proposed site.

→ Roads:

- The R354 runs between Matjiesfontein and Sutherland and is therefore considered a local tourism route. However, it is approximately 12,5km away from the proposed site at its closest point. The proposed development at Maralla West may be marginally visible from short sections of the road, but is likely to be screened by local undulations between the road and site.
- District and farm roads in the area from which the proposed development will be visible include stretches of the Klein Roggeveld Road (which runs through the site) and the Spitzkopfontein Road. Additional farm roads in the area will also be affected. These roads all carry very low traffic volumes.
- Although it also carries low traffic volumes, the Komsberg Pass has high scenic value (see cultural landscapes below) and is considered visually sensitive. Additionally the pass through the Wolvenhoek Mountains has scenic value, but is within the boundaries of the proposed site with no access to the public.

→ Nature Reserves:

- There are no conservation areas within the study area.

→ Other:

- The South African Large Telescope (SALT) has an astronomy advantage area of 250km. However, it is situated about 35km away from the site, on the other side of the mountain range.
- Cultural landscapes may include the portions of the warmer valleys which have historically been occupied and farmed. The scenic passes through the mountains and sections of the Great Escarpment could also be regarded as cultural landscapes.

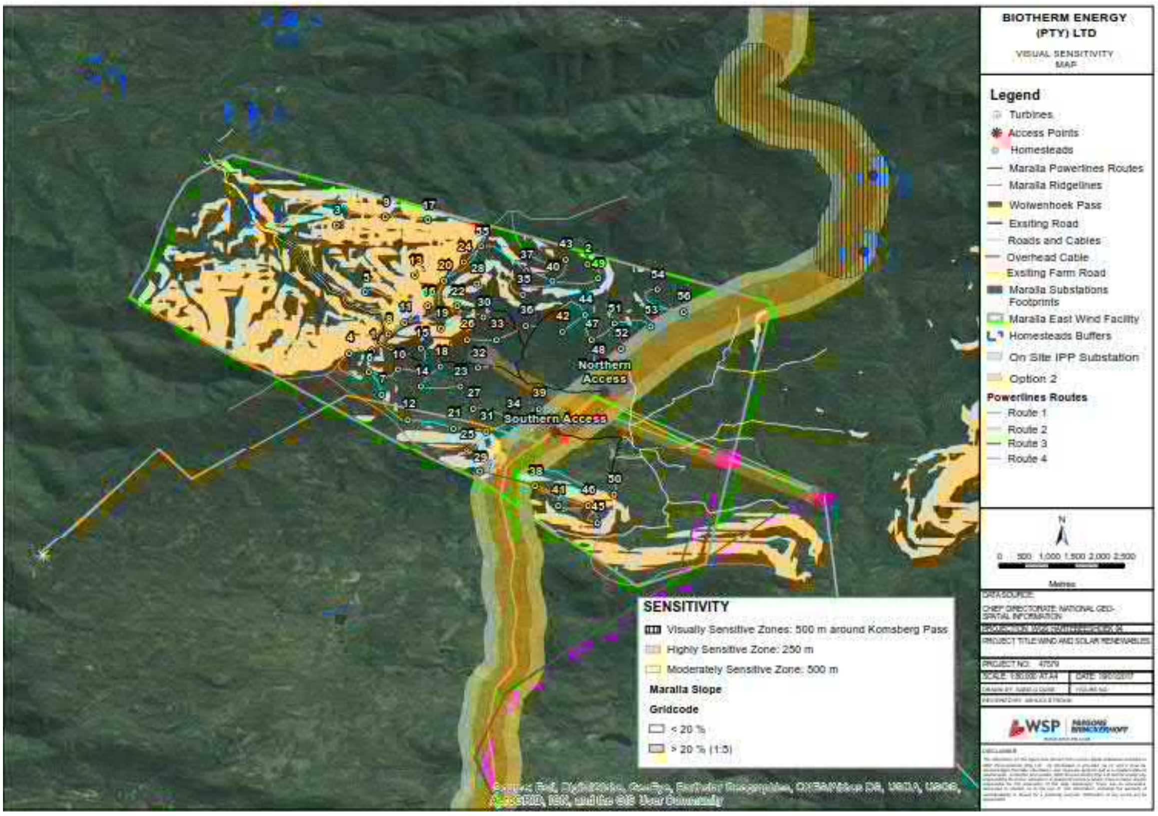


Figure 11-7: Revised Visual Sensitivity Map

FINAL SENSITIVITY MAP

Table 11-2 outlines how the turbine layout has evolved as a result of the constant updating and revision of the sensitivity map through the S&EIR process. **Figure 11-8** illustrates the 70 Turbine layout in relation to the revised sensitivity map, while **Figure 11-9** illustrates how the layout has been revised to ensure that the high and very high sensitivity areas are avoided by the proposed project.

Table 11-2: Turbine Layout Progression through the S&EIR Process

LAYOUT REVISION	NUMBER OF TURBINES	PHASE	SENSITIVITIES CONSIDERED	NUMBER OF TURBINES REMOVED
Initial	125	Planning and Conceptual Design Phase	→ Typography	None
Revision 1	70	Scoping Phase	→ Biodiversity → Avifauna → Bats → Surface Water → Heritage	55
Revision 2	56	EIA Phase		14

Layout Revision	Number of Turbines	Phase	Sensitivities Considered	Number of Turbines Removed
			→ Visual → Noise → Social	

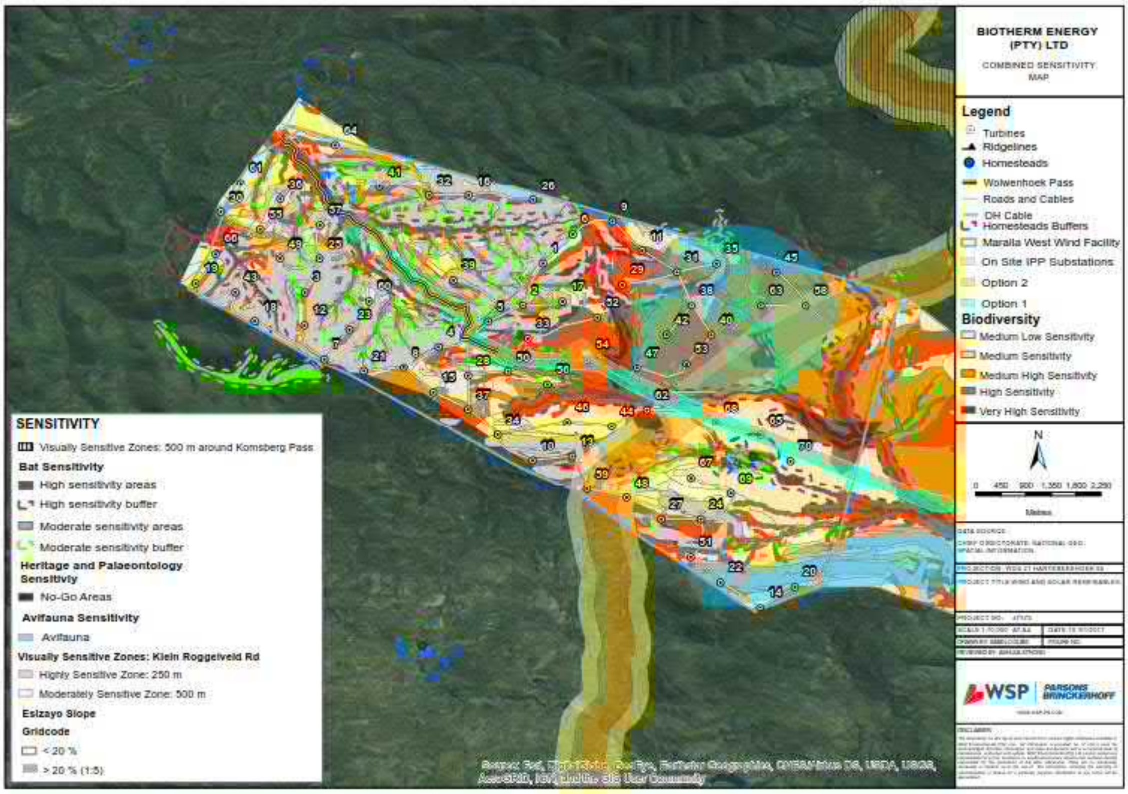


Figure 11-8: Combined Sensitivity Map – 70 Turbine Layout

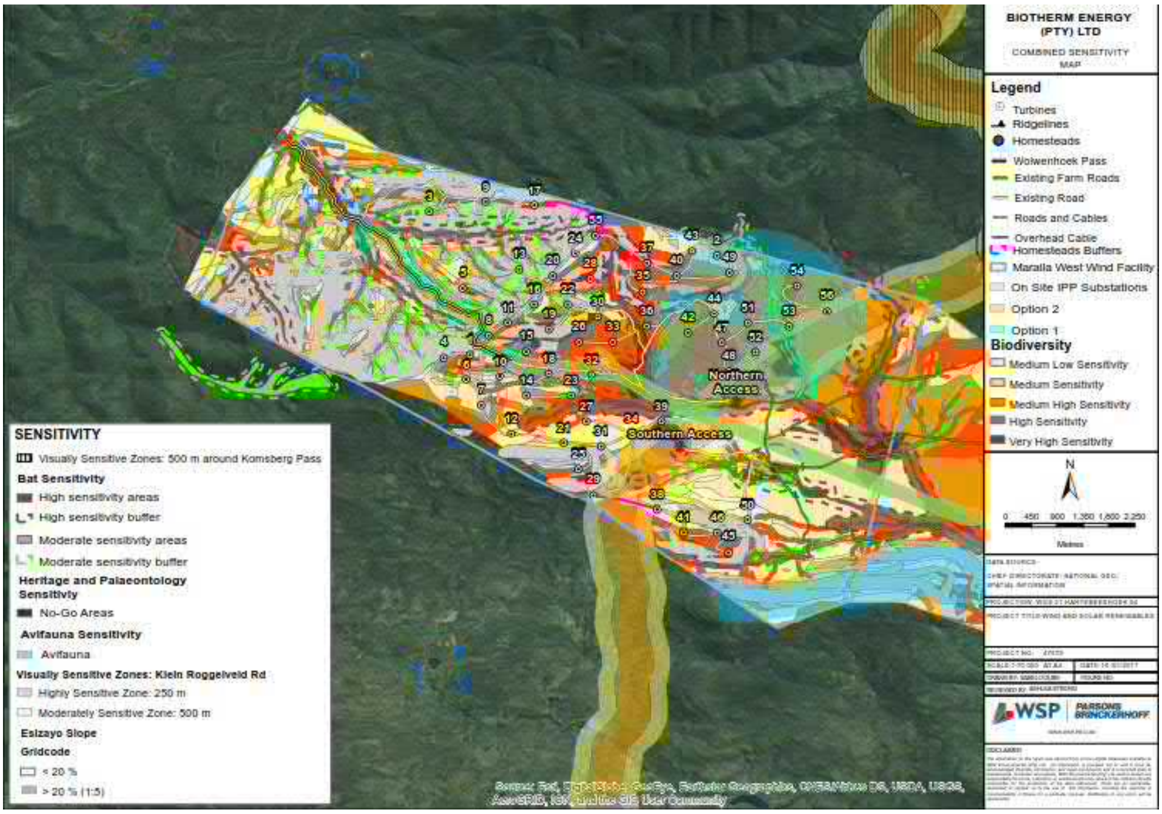


Figure 11-9: Combined Sensitivity Map – 56 Turbine Layout

11.3 SPECIALIST CONCLUSIONS

SOILS AND LAND CAPABILITY

The land capability of the proposed Maralla West Site is defined as non-arable with a low potential for grazing. Grazing activities (mainly sheep) are the dominant land use for the region and has the largest potential to be impacted by the activities of the proposed BioTherm project. Indirect impacts of increased soil erosion are expected at the site given the dry, fragile environment of the region. Furthermore, spillage of hazardous substances onto the land as a result of the activities of the Maralla West project, is a possibility. However, all these potential impacts on the current land capability for the area were classified with a low environmental significance risk, should the appropriate mitigation measure be followed during the construction, operational and decommissioning phases of the project.

There are no fatal flaws anticipated for the proposed Maralla West project, from a land capability perspective. It is recommended that the mitigation and management measures outlined in this report be followed throughout all phases of the project.

BIODIVERSITY

The Maralla West site consists of rugged high-lying areas in the north, west and south and moderate to low-lying more gently sloping areas in the central and eastern parts of the site. In the high-lying areas, the major issues facing development are the many steep slopes present which present a significant erosion risk, and the presence of numerous localized specialised habitats such as rock pavements, outcrops and gravel patches, which frequently contain species of concern. In the low-lying parts of the site, the vegetation is fairly homogenous, but the presence of some fairly large drainage lines and significant wetlands represents a challenge as impact to these areas needs to be minimised. The layout assessed has no turbines in the high sensitivity areas, but some of the access roads traverse some significant wetland areas and the optimal crossing points will need to be identified in the field at the preconstruction stage, should the development reach the preferred bidder status.

Due to the high development pressure from wind energy in the Komsberg area, cumulative impacts are a significant potential concern. However a thorough analysis of all projects in the area was conducted and it is clear that the total direct extent of habitat loss in the area is not sufficient to generate significant direct biodiversity loss as this amounts to less than 0.5% of the area. Direct cumulative impacts on plant species are likely to be localized and with appropriate avoidance and preconstruction mitigation, this can be reduced to an acceptable level across all projects. The contribution of the current project to this impact is moderate as the total footprint of the development will be less than 60ha, but it is also immediately adjacent to the preferred bidder Karusa and Soetwater projects which would increase cumulative impacts in the Komsberg area. Cumulative impacts on fauna are potentially more significant but it is difficult to assess this impact with any degree of certainty as there is no reliable information that can currently be used to assess these types of impacts in South Africa. For isolated wind farms, this is not a significant issue as impacts will be localized, however, where there are high levels of wind energy development such as in the Komsberg area, additional pre-and post-construction monitoring of fauna is warranted to inform our knowledge of these impacts.

A summary of the impacts associated with the Maralla West WEF is provided below. Impacts on fauna and vegetation due the construction of the facility are considered moderate and cannot be mitigated to a low level as transformation and disturbance is required for the establishment of the facility. Faunal impacts during operation are also considered moderate, but this should be interpreted with some degree of caution as there is a lot of uncertainty with regards to terrestrial faunal impacts due to wind farms and the actual number of species affected is likely to be low. The major mitigation measure implemented by the developer, which has resulted in the final layout assessed, is a reduction in the number of turbines from the initial 125 turbines and 250MW down to the final 56 turbine 125MW layout as the various sensitivities associated with the site became apparent. The residual impact associated with the 56 turbine layout is considered acceptable and would be largely local in nature with no impacts of broader significance.

Overall, there are no impacts associated with the development of the Maralla West wind farm that cannot be reduced to an acceptable level. As such, there are no reasons to oppose the development on terrestrial ecological grounds and the site is considered suitable within the context of the area for the development of a wind farm.

AVIFAUNA

The greatest potential concern in the 70km radius around Komsberg Substation is for the large raptor species, particularly Verreaux's Eagle and Martial Eagle, due to their low numbers and vulnerability to turbine collisions. The total estimated area that could potentially be affected by renewable projects are approximately 233 503 ha, which is approximately 15% of the land surface within the 75km radius, although the actual footprint is likely to be smaller, as this figure is based largely on land parcel size, and not the actual infrastructure footprint. Nonetheless, the combined cumulative impact of renewable developments on priority species, and particularly wind energy developments on Red Data Verreaux's Eagle and Martial Eagle within the 70km radius around the Komsberg Substation, is potentially significant at a local or even regional scale, even with the application of mitigation measures such as buffer zones around nests, should all of these projects eventually get to be constructed. The impact should be less severe at a national level, due to the large distribution ranges of the species, but should nonetheless be carefully monitored.

From an avifaunal impact perspective, the proposed development could go ahead, provided the proposed mitigation measures, and especially the no-turbine zones and modifications to the wind mast, are strictly implemented.

BATS

The 12-month preconstruction bat monitoring study for Maralla West WEF was carried out over November 2015 to November 2016, wherein data was collected from four long-term bat monitoring systems installed on one meteorological mast and three short masts. A few technical failures of the monitoring systems occurred over the course of the study. The failures should not compromise the quality of the study since an adequate amount of data was recorded during the 12 months. The data losses have not affected the confidence of the findings stated in this report.

The long-term data from the passive monitoring systems was analysed by means of identifying the bat species detected by the monitoring systems and the periods of high bat activity. Further site work included performing driven transects across the site with a mobile bat detector to understand the geospatial distribution of bat activity across the site. This information was used to inform the bat sensitivity map. Roost searches were also performed in an effort to find temporary and permanent roosts on site. None were found.

A bat sensitivity map was drawn up which highlights habitats and site areas that are important for foraging and roosting purposes. The turbine layout is respective of the map and does not intrude into sensitive areas and their respective buffers.

Four bat species were detected by the passive monitoring systems, namely, *Eptesicus hottentotus, Miniopterus natalensis, Neoromicia capensis* and *Tadarida aegyptiaca*. *Tadarida aegyptiaca* and *Neoromicia capensis* are the most abundant bat species recorded by all systems.

Short Mast 1 monitoring system detected a significantly higher number of bat passes than any of the other monitoring systems, with 5515.

Met Mast 1 monitoring system had its highest bat activity during the summer months, with a peak in December 2015, after which a decrease in activity was shown as the seasons changed from summer to autumn to winter. As the seasons changed to spring, bat activity increased again. March 2016 saw an increase in the average number of *Neoromicia capensis* for Met Mast 1, but a decrease occurred during the remaining autumn months. Short Mast 1 monitoring system showed high bat activity during the summer months, with a peak in January 2016 for *Tadarida aegyptiaca*, whereafter *Neoromicia capensis* increased in February and March 2016. Short Mast 1 bat activity for April 2016 could not be indicated due to system failure, but as seasons changed from winter to spring bat activity increased again with the highest peak in activity during October 2016 by *Neoromicia capensis*. Short Mast 2 and 3 had a peak in activity during December 2015.

Miniopterus natalensis is the only migratory species detected on site. It was detected by all the monitoring systems, except for Short Mast 3. The relative abundance of this species, as detected by the monitoring systems, was over the months of April – July 2016, with it being highest in June 2016 (Short Mast 2). The data did not indicate a migratory event over the monitoring period. The operational phase bat monitoring study must implement further monitoring techniques for quick detection if a migratory event occurs in future.

The peak activity times identified are mostly an amalgamation of the temporal distribution of *Neoromicia capensis* and *Tadarida aegyptiaca* as they were the species detected more often by a substantial margin. This data will be used to inform the peak times that may inform mitigation, if needed.

Peak activity times across the night and monitoring period were identified, as well as wind speed and temperature parameters during which high bat activity was detected. Mitigations are expected to be implemented once the turbines become operational. The proposed mitigation schedule follows the precautionary approach strongly and therefore the mitigations should be adjusted and refined during an operational phase bat monitoring study.

SURFACE WATER

There were two freshwater habitat systems identified within a 500m radius of the Maralla West Site. All of the pans sit within 500m of the proposed wind facility infrastructure, and should be given consideration before the construction phase of the project commences.

There are no fatal flaws anticipated for the proposed Maralla West project, from a freshwater habitat perspective (assuming that the proposed wind facility infrastructure takes into account the identified Depressional pans). It is recommended that the mitigation and management measures outlined in this report be followed throughout all phases of the project.

Indirect impacts of increased soil erosion are expected at the site given the dry environment of the region. Furthermore, spillage of hazardous substances onto the land as a result of the activities of the Maralla West project, is a possibility. However, all these potential impacts were classified with a low environmental significance risk, should the appropriate mitigation measure be followed during the construction, operational and decommissioning phases of the project.

This report provides an initial high-level identification of the freshwater habitat systems within the site boundary. This is due to the extent of the site, accessibility constraints and lack of information relating to the positioning of operational and road infrastructure. Should BioTherm be recognised as a Preferred Bidder, the required application for a Water Use Licence (WUL) in terms of Section 21 of the National Water Act (NWA) (Act 36 of 1998) may commence. This application (WULA) will require detailed functional assessments (i.e. PES, EIS and EcoServices) of freshwater habitats potentially affected. Therefore, it is recommended that a more in-depth and thorough study be conducted by an aquatic specialist should BioTherm be recognised as a Preferred Bidder.

It is also recommended that an aquatic specialist must conduct an in-depth site walkover prior to the construction phase commencing, after the proposed construction footprint has been confirm and demarcated. This is to assess the footprint for any freshwater habitats, allowing for slight alterations in the footprint, to prevent any impacts on the freshwater habitats due to the actions conducted during the construction phase.

HERITAGE

The following highly sensitive areas have been identified and they must be declared no-go areas during the construction:

- The vernacular cottage on the farm Wolven Hoek;
- River Settlement - LSA sites with pottery along a river bed;
- Road Settlement - Remains of a late 19th century settlement (including graveyard) on both sides of the public gravel road on Drie Roode Heuvels (Die Kom) on Maralla West.

The following heritage recommendations are proposed

- The following highly sensitive areas must be declared no-go areas during construction:
  - The vernacular cottage on the farm Wolven Hoek;
  - River Settlement - LSA sites with pottery along a river bed which will be crossed by the on-site powerline;
  - Road Settlement - Remains of a late 19th century settlement (including graveyard) on both sides of the public gravel road on Drie Roode Heuvels (Die Kom) on Maralla West.
- The following recommendations are proposed:
  - No-Go areas must be avoided;
  - If there are any significant changes to the layout of the wind turbines, then a walk down of the proposed facility is recommended as part of the EMPr;

- It is recommended that there is a walk down of all river crossings during the EMP phase of the project, once the final location of the access roads and cable crossings has been finalised of the EMPr, to ensure that no heritage resources are destroyed;
- If any archaeological remains, including human remains, are uncovered during construction, then work must stop in that area and the responsible heritage authorities (SAHRA or Heritage Western Cape) must be notified;
- The potential visual impacts of the proposed facility on the heritage resources of the area (i.e. the results of the VIA), must be integrated with the heritage study. It is assumed that a buffer will be required along the R354, as the road between Matjiesfontein and Sutherland is considered a scenic tourism route.

PALAEONTOLOGY

The Maralla West WEF project area is underlain by fluvial and lacustrine sediments assigned to the lower part of the Abrahamskraal Formation (Lower Beaufort Group, Karoo Supergroup) that are of Middle Permian age. The lower portion of the Abrahamskraal Formation succession in the SW Karoo is characterised by very rare tetrapod remains, vertebrate burrows, vascular plants and other fossils of the Eodicynodon and Tapinocephalus Assemblage Zones. No fossil vertebrates, petrified wood or other scientifically significant fossil material have been recorded in the Abrahamskraal Formation within the present study area. The dense assemblages of reedy plant stem casts (probably horsetails) as well as small invertebrate burrows found here occur widely elsewhere within the region and are therefore not considered to be of special conservation significance. It is concluded that the Middle Permian bedrocks in the Maralla West WEF study area are generally of low palaeontological sensitivity. The same applies to a range of Late Caenozoic superficial sediments (alluvium, colluvium, calcretes, soils, surface gravels etc) overlying the Palaeozoic bedrocks. These may contain reworked blocks of petrified wood in the Klein-Roggeveld region, but no fossils or this or any other sort were recorded within these younger deposits during the two-day field assessment.

The overall impact significance of the construction phase of the proposed wind energy project is assessed as LOW (negative) in terms of palaeontological heritage resources. This is a consequence of (1) the paucity of irreplaceable, unique or rare fossil remains within the study area as well as (2) the extensive superficial sediment cover overlying most potentially-fossiliferous bedrocks here. This assessment applies to the proposed layout for the wind turbines, laydown area, access and internal roads, on-site IPP substation and associated WEF infrastructure within the study area. A comparable low impact significance is inferred for all project infrastructure alternatives and layout options under consideration, including different options for routing of access and internal roads, turbine layouts and siting of the on-site substation and associated Operations and Maintenance Building. Significant further impacts during the operational and de-commissioning phases of the WEF are not anticipated. There are therefore no preferences on palaeontological heritage grounds for any particular layout among the various options under consideration, including alternative sites for the on-site IPP substation. No significant further impacts on fossil heritage are anticipated during the planning, operational and de-commissioning phases of the WEF. The no-go alternative (i.e. no WEF development) will have a low (neutral) impact on palaeontological heritage.

Cumulative impacts on palaeontological heritage resources that are anticipated as a result of the numerous alternative energy developments currently proposed or authorised for the Klein-Roggeveldberge region, including the Maralla West WEF, are predicted to be low (negative), provided that the proposed monitoring and mitigation recommendations made for these various projects are followed through. Unavoidable residual negative impacts may be partially offset by the improved understanding of Karoo palaeontology resulting from appropriate professional mitigation. This is regarded as a positive impact for Karoo palaeontological heritage. Without mitigation, cumulative impacts resulting from the large number of WEF projects in the Klein-Roggeveld region are anticipated to be of medium significance.

There are no fatal flaws in the Maralla West WEF development proposal as far as fossil heritage is concerned. Provided that the recommendations for palaeontological monitoring and mitigation outlined below are followed through, there are no objections on palaeontological heritage grounds to authorisation of the Maralla West WEF project. It is noted that borrow pit sites will only be identified if and when the proposed WEF wins preferred bidder status. In this case, a separate palaeontological assessment of all borrow pit sites will be necessary in the pre-construction phase.

No highly sensitive “no-go” areas within the proposed Maralla West WEF study area have been identified in this study. Pending the potential discovery of substantial new fossil remains during construction, specialist palaeontological mitigation is not recommended for this project. The following general recommendations concerning conservation and management of palaeontological heritage resources apply.

The Environmental Control Officer (ECO) responsible for the WEF development should be made aware of the potential occurrence of scientifically-important fossil remains within the development footprint. During the construction phase all major clearance operations (e.g. for new access roads, turbine placements) and deeper (> 1 m) excavations should be monitored for fossil remains on an on-going basis by the ECO. Should substantial fossil remains - such as vertebrate bones and teeth, or petrified logs of fossil wood - be encountered at surface or exposed during construction, the ECO should safeguard these, preferably in situ. They should then alert the relevant provincial heritage management authority as soon as possible - i.e. SAHRA (Contact details: Dr Ragna Redelstorff, SAHRA, P.O. Box 4637, Cape Town 8000. Tel: 021 202 8651. Email: rredelstorff@sahra.org.za). This is to ensure that appropriate action (i.e. recording, sampling or collection of fossils, recording of relevant geological data) can be taken by a professional palaeontologist at the developer’s expense.

These mitigation recommendations should be incorporated into the Environmental Management Programme (EMPr) for the Maralla West WEF alternative energy project. Please note that:

- All South African fossil heritage is protected by law (South African Heritage Resources Act, 1999) and fossils cannot be collected, damaged or disturbed without a permit from SAHRA or the relevant Provincial Heritage Resources Agency (in this case SAHRA);
- The palaeontologist concerned with potential mitigation work will need a valid fossil collection permit from SAHRA and any material collected would have to be curated in an approved depository (e.g. museum or university collection);
- All palaeontological specialist work should conform to international best practice for palaeontological fieldwork and the study (e.g. data recording fossil collection and curation, final report) should adhere as far as possible to the minimum standards for Phase 2 palaeontological studies developed by Heritage Western Cape (2016) and SAHRA (2013).

VISUAL

The following findings and recommendations are pertinent:

- The proposed facility is situated in a remote karoo landscape of high visual value. The visual absorption capacity is relatively good primarily due to the undulating nature of the topography.
- The area is remote and viewer numbers are low but inhabitants generally have a great affinity for the land and landscape.
- The regular vertical patterns of the turbines are of a scale and size that is not highly congruent with the natural environment and agricultural activities, but generally congruent with existing power facilities in the area.
- The revised layout is preferable to the previous layouts as the number of turbines has been significantly reduced (125 initially to 56 in most recent version). Turbines that will result in the highest impact are those situated at the most elevated positions. The positioning of turbines is constrained by wind farm efficiency which depends, in part, on precise turbine positioning,

based on local topography, the local wind regime, and other technical factors, which in turn influences the feasibility of the project.

- Other buildings and infrastructure associated with the facility will result in a number of lesser visual impacts which can be mitigated.
- The greatest visual concern is the cumulative impact on the landscape. If REDZ and ECI are established, containing the visual impacts within these zones has merit, but will increase the cumulative visual impact on the landscape within these zones.
- If the 16 potential projects within an 80 km radius of the site are considered, there are 65 535 possible scenarios or combinations of renewable energy projects that may be built. It is therefore not possible to accurately estimate the significance of the cumulative impact. However, giving the location of the possible facilities, if constructed, many would result in sequential and / or combined visual impacts when considered with Maralla West. The significance of this impact on the landscape will be higher than the visual impact of Maralla West in isolation.
- The visual impacts can be completely reversed after decommissioning, if all the structures are removed and the land suitably rehabilitated and it is critical that decommissioning and rehabilitation are well controlled and enforced after the life of the facility.
- As with all natural resource evaluations, decisions regarding the project's appropriateness are complex, requiring the balancing of competing interests and values. Although the no-go option is preferred from a visual perspective, the visual impacts can be mitigated to an acceptable degree.

NOISE

This Environmental Acoustic Impact Assessment investigated noise associated with the construction and operation of the proposed Maralla West wind energy facility, located near Sutherland in the Northern Cape province. Baseline acoustic monitoring was performed at three nearby receptor locations (farmhouses) in order to obtain representative ambient noise levels in the vicinity of the Proposed Project. The acoustic impacts of the Proposed Project were evaluated through the use of attenuation-over-distance calculations (construction phase) and the CadnaA acoustic modelling software (operational phase). Changes in noise levels at the receptor locations as a result of the construction and operation of the Proposed Project were then assessed and related community responses evaluated.

CONSTRUCTION PHASE

During the construction phase noise levels in the immediate vicinity of the construction activities were predicted to be high, decreasing as distance from the source increases. The change in noise levels associated with the construction of the proposed wind energy facility will result in "little" estimated community response at two of the three receptor locations (FH 2 and FH 3). Noise levels are anticipated to increase by between 0.3 and 0.6 dB(A) at these farmhouse receptors. Such increases in noise levels are anticipated to be negligible, resulting in sporadic complaints and are deemed to go unnoticed during the noisier day-time hours. At the third receptor (FH 1), the change in current noise levels with the introduction of construction activities will result in "medium" estimated community response, with an increase of 11.5 dB(A) predicted. This receptor is located in close proximity to the wind turbines (500 m).

The South African Noise Control Regulations state that a noise is considered disturbing when noise levels from a new source exceed the ambient sound level by 7 dB(A). Increases in noise levels at all FH 2 and FH 3 are below 7 dB(A) and as such are not considered as disturbing, having little impact on these receptors. At FH 1, however, changes in noise levels exceed 7 dB(A) and as such are considered as disturbing. It must be noted that this represents a worst-case scenario with all construction equipment operational simultaneously, which will not occur in reality.

During a blasting event, noise levels at two of the three receptors (FH 2 and FH 3) were predicted to increase slightly, resulting in “little” community response. Noise levels are anticipated to increase by between 3.1 and 5.0 dB(A) at these farmhouse receptors. According to the Noise Control Regulations, such increases are not considered to be disturbing. At FH 1, however, noise levels during a blasting event are predicted to increase by 22.6 dB(A), resulting in “very strong” community response. Due to the immediate location of this farmhouse to the wind turbines, it is advised that no blasting take place at this location or alternatively new locations for the turbines in the immediate vicinity of this receptor be considered. It must also be noted that in addition to the noise impacts of a blasting event, air over pressure and ground-borne vibration impacts may also be noted. Such impacts were beyond the scope of this Environmental Acoustic Impact Assessment and as such were not assessed here.

Noise associated with construction traffic at the proposed site was calculated based on the South African National Standards (SANS) 10210 methodology. Noise levels in the immediate vicinity of the roads will likely be elevated, with noise levels dropping considerably from 400 m, with predicted noise levels falling below the SANS rural guideline level from 600 m onwards.

OPERATIONAL PHASE

Since noise from wind turbines change with changing wind speeds, three operational phase scenarios were considered, with winds (at 10 m height) blowing at: 6 m/s, 8 m/s and 10 m/s. At all three wind speeds, predicted day-time noise levels at all receiver locations were low with noise associated with the operation of the proposed wind energy facility only perceived at one receiver location. This farmhouse is located 500 m from the nearest wind turbine. The increase in noise at this location is only predicted to increase by between 1.6 and 1.9 dB(A), resulting in “little” impact and community response. Such an increase is also well below the 7 dB(A) threshold for annoyance as per the Noise Control Regulations.

At night, at all three wind speeds, noise levels are expected to increase at one receptor location (FH 1). Such an increase is deemed to have “medium” to “strong” impact on this receptor location with an increase of between 14.8 and 15.7 dB(A) predicted. Such an increase exceeds the 7 dB(A) threshold for annoyance as per the Noise Control Regulations. It must be noted that the night-time scenario represents a worst-case, using the lowest monitored background levels in the area. Should the ambient noise levels be higher than this in reality, the expected increases will diminish. Additionally, it is understood that the farmhouse belongs to one of the landowners who is in support of the Proposed Project and it is deemed that the annoyance created for this receptor would be lower than a normal residential receptor.

The acoustic impacts of the proposed wind energy facility were evaluated using a risk matrix which assessed the nature, significance, extent, duration and probability of potentially significant impacts. Based on this rating system, it was calculated that the acoustic impacts of the Proposed Project on the surrounding receptors during both the construction and operational phases are “medium” with no mitigation in place and “low” with the implementation of mitigation measures.

Cumulatively, considering impacts from all other surrounding proposed wind energy projects in the area, construction phase impacts were deemed to remain as having a “medium” impact on the surrounding receptors. Since construction is temporary and not all sites may be constructed simultaneously, as well as the fact that construction activities can be mitigated to a certain degree, the cumulative construction impacts are not deemed to be significant. During the operational phase, cumulative impacts are envisaged to remain “medium”, dropping to “low”, with implementation of mitigation measures. Additionally, the acoustic impacts are very site specific, with each wind energy project having its own set of sensitive receptors based on locality to the site. Acoustic impacts on receptors at great distances from a source are not considered as noise attenuates over distance with no impacts on receptors located many kilometres away.

Based on the findings of this Environmental Acoustic Impact Assessment, it is advised that the Proposed Project can be authorised. The greatest impact is on the nearest sensitive receptor, namely FH 1 (located 500 m from the nearest turbine). This farmhouse is, however, a landowner's farm who is in support of the Proposed Project and may not be inhabited all of the time. Additionally, due to the remoteness of the site, with very limited sensitive receptors in the vicinity of the Proposed Project and the predominantly "low" impact on receptors during the ± 20-year lifespan of the project; negative, irreversible impacts are not envisaged.

It must also be noted that after completion of the EIA reports for the Biodiversity, Avifauna and Bats specialist studies, the sensitivity maps changed. As a result, the placement of the turbines was revisited and subsequently the number of proposed turbines was reduced from 70 to 56. Such changes will reduce the overall acoustic impacts from the Proposed Project. The turbines located in closest proximity to the FH 1 receptor will be removed, with the closest turbine being located 900 m from this receptor. This relocation will aid in improving the acoustic impacts on this receptor. The acoustic impacts of the operation of the proposed wind energy facility will, however, remain "medium".

TRAFFIC

Based on this study, the following key conclusions and recommendations are relevant:

- The proposed Maralla East Wind Facility will be located south of Sutherland in the Northern and Western Cape Provinces.
- The facility will be located over 3 farms with a total area of 7 634 ha, namely:
  - Remaining Extent of Farm Drie Roodeheuvels 180.
  - Remaining Extent of Farm Annex 3 Roodeheuvels 181.
  - Portion 1 of Farm Wolven Hoek 182.
  - Portion 2 of Farm Wolven Hoek 182.
- The facility will be two 250 MW wind energy facilities, each with 70 turbines up to 120 m high.
- The Scope of the TIA was informed by the Committee of Transport Officials' South African Traffic Impact and Site Traffic Assessment Manual, TMH16, Vol. 1, Version 1, August 2012.
- A single short term (2 year) Construction phase was assumed for analysis purposes.
- There are no known planned road upgrades in the study area.
- There are no known large scale latent developments in the vicinity of the site that may have an impact on the local road network, except for the latent energy developments that were assessed as part of the Cumulative Impact Assessment.
- The site will take access off existing accesses from the R354, a single carriageway 2-way surfaced road (1 lane per direction), with no surfaced shoulders. It is recommended that the existing access roads be utilised for access purposes during construction and the operational phase.
- The R354 is regarded as in "Fair" and "Good" condition in the vicinity of the site, as per the Provincial Government of the Western Cape (PGWC) Department of Transport's 2015 Surfaced Road Condition Assessment.
- Construction and operational phase parking will be accommodated on-site.
- There is no need for public transport services or non-motorised transport infrastructure to serve the site for the construction and operational phase, except for the transport of staff.
- The estimated peak trip generation of both facilities will be 188 veh/hr in the weekday AM and PM peaks during the Construction phase, and will be negligible for the operational phase.
- The expected traffic increase on the local access roads during the construction phase could result in deterioration of the access roads, as they are not designed for abnormal loads and

large traffic volumes. The cost of maintaining and repairing the access roads during the Construction phase of the projects should be borne by the developer.

- The estimated total E80 loading for the duration of the construction period is 0.050 million, and no mitigating measures are deemed necessary on the R354.
- It is not possible to determine the volume of traffic that will be generated during the decommissioning phase. It can however be expected that the volumes will be lower than during the construction phase, and the resultant Transport impact on the local access roads will be lower than during the Construction phase. Any damage to the road caused by the decommissioning phase traffic should be repaired at the cost of the developer.
- The transport route/s between the origin of the turbine components and the facility may be National, Provincial or Local roads; and each authority will be required to provide the necessary permits for the transportation of any oversized or abnormally heavy components.
- It is recommended that an abnormal vehicle route management plan be undertaken when the port/s of entry of the tower components (masts, blades, rotor nacelles, generators, etc.) are known. These plans should include all aspects such as horizontal and vertical requirements along the routes, bridges along the route, speed limits, etc. These plans and the application for the abnormal permits is normally the responsibility of the logistics company that will transport the components to site.
- A capacity analysis of the accesses was not undertaken and is not deemed necessary, however the safety of these intersections should be improved through the provision of additional signage, as follows:
- R354 / Komsberg / Kareedoringkraal access
  - Provide additional warning signs as follows:
    - Side road junction warning sign (W108) on the southern approach of the R354, located approximately 100 m from the intersection.
  - Provide a temporary truck crossing warning sign (TW345) on the same road sign pole as the W108 sign.
  - Staggered side road junctions warning sign (W110) on the northern approach of the R354, located approximately 100 m from the intersection.
  - Provide a temporary truck crossing warning sign (TW344) on the same road sign pole as the W110 sign.
- R354 / Klein Roggeveld access
  - Provide a Stop Sign (R1.1) and solid stop line on the side road approach to the R354.
  - Provide additional warning signs as follows:
  - Side road junction warning sign (W108) on the southern approach of the R354, located approximately 100 m from the intersection.
  - Provide a temporary truck crossing warning sign (TW345) on the same road sign pole as the W108 sign.
  - Side road junction warning sign (W107) on the northern approach of the R354, located approximately 100 m from the intersection.
- Provide a temporary truck crossing warning sign (TW344) on the same road sign pole as the W110 sign.
- The overall significance of each Transport related impact during the Construction Phase of the facilities are Low or Medium. The impacts are limited to the peak construction period only, local in nature, and minor and will not result in an impact on processes or low and will cause a slight impact on processes. Mitigating measures are therefore not recommended for the expected

trip generation of the facilities, except for the provision of additional signage to improve the safety of the intersections.

- Cumulative impact assessment: The maximum traffic generation of the latent sites may occur at an unknown future time period that cannot be determined from the information available. The implementation programme of these sites has also not been determined. It is unlikely that these impacts will occur at the same time, therefore no cumulative Transport impact is foreseen. It should be noted that the Significance of the Transport impact of each of these facilities is expected to be similar to the Maralla facilities, namely Low or Medium.
- The maintenance and repair of the local access roads due to damage by construction vehicles should also be the responsibility of each of the developers of the latent energy facilities.

It is concluded that the proposed Maralla West Wind Facility will have a negligible short-term transport impact on the adjacent road network, and it is recommended that the TIA should be accepted as part of the EIA application.

SOCIAL

The Social Impact Assessment has identified a number of key socio-economic impacts (both positive and negative) associated with the proposed Maralla West Wind 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 Karoo Hoogland 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), and 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 for within the Karoo Hoogland 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 Maralla West Wind Facility be authorised. The mitigation and management measures are to be included in the EMPr prepared in support of the EA application.

11.4 IMPACT SUMMARY

A summary of the identified impacts and corresponding (initial and residual) significance ratings for Maralla West WEF is provided in Error! Reference source not found..

Table 11-3: Impact Significance Summary – Maralla East WEF

REF.	RECEIVING ENVIRONMENT	IMPACT DESCRIPTION	PHASE	STATUS	SIGNIFICANCE (PRE-MITIGATION)	RESIDUAL SIGNIFICANCE (POST-MITIGATION)
SLC1	Soils and Land Capability	Loss of land (including wetlands) previously used for sheep and antelope grazing will be occupied by the wind facility and associated infrastructure.	Construction	Negative	**Medium**	**Low**
SLC2		Construction activities will entail vegetation clearance, soil disturbance and high traffic movement on site, resulting in a higher potential for soil erosion		Negative	**Low**	**Low**
SLC3		Potential spillage of hazardous substances such as oils, fuel, grease from construction vehicles, and sewage from on-site sanitation systems.		Negative	**Low**	**Low**
SLC4		Loss of land (including wetlands) previously used for sheep and antelope grazing will be occupied by the wind facility and associated infrastructure.	Operation	Negative	**Medium**	**Low**
SLC5		Vegetation clearance for wind turbines and roads, soil disturbance and stockpiles, and increased traffic movement on site, resulting in a higher potential for soil erosion		Negative	**Low**	**Low**
SLC6		Potential land contamination from hazardous substances. This includes spillage of oils, fuel, grease (from site operational and maintenance vehicles) and permanent onsite sewage systems Potential spillage of hazardous substances such as oils, fuel, grease from maintenance vehicles, and sewage from on-site sanitation systems.		Negative	**Low**	**Low**
SLC7		Increased potential of soil erosion due to removal of wind infrastructure (i.e. turbines), soil disturbance and a high traffic movement on site.	De-commissioning	Negative	**Low**	**Low**
SLC8		Potential spillage of hazardous substances such as oils, fuel, grease from maintenance vehicles, and sewage from on-site sanitation systems.		Negative	**Low**	**Low**

REF.	RECEIVING ENVIRONMENT	IMPACT DESCRIPTION	PHASE	STATUS	SIGNIFICANCE (PRE-MITIGATION)	RESIDUAL SIGNIFICANCE (POST-MITIGATION)
BIO1	Natural Vegetation and Animal Life	Impacts on vegetation and protected plant species	Construction	Negative	**Medium**	**Medium**
BIO2		Faunal impacts due to construction activities		Negative	**Medium**	**Medium**
BIO3		Increased Soil Erosion risk during construction		Negative	**Medium**	**Low**
BIO4		Faunal impacts due to operational activities of the wind farm such as noise, and human presence during maintenance activities	Operation	Negative	**Medium**	**Medium**
BIO5		Erosion		Negative	**Medium**	**Low**
BIO6		Alien Plant Invasion		Negative	**Low**	**Low**
BIO7		Faunal impacts due to decommissioning of the wind farm such as noise, and operation of heavy machinery on-site	De-commissioning	Negative	**Medium**	**Low**
BIO8		Erosion		Negative	**Medium**	**Low**
BIO9		Alien Plant Invasion		Negative	**Medium**	**Low**
AV1	Avifauna	Displacement of priority species due to disturbance during construction operations	Construction	Negative	**Medium**	**Medium**
AV2		Priority species mortality due to collision with the turbines	Operation	Negative	**High**	**Medium**
AV3		Displacement of priority species due to habitat transformation		Negative	**Medium**	**Low**
AV4		Priority species mortality due to collision with the on-site powerlines		Negative	**High**	**Medium**
AV5		Priority species mortality due to electrocution on the on-site powerlines		Negative	**Medium**	**Low**
AV6		Displacement of priority species due to disturbance during decommissioning operations	De-commissioning	Negative	**Low**	**Low**

REF.	RECEIVING ENVIRONMENT	IMPACT DESCRIPTION	PHASE	STATUS	SIGNIFICANCE (PRE-MITIGATION)	RESIDUAL SIGNIFICANCE (POST-MITIGATION)
BAT1	Bats	Destruction of bat roosts due to earthworks and blasting -	Construction	Negative	**Medium**	**Low**
BAT2		Loss of foraging habitat.		Negative	**Medium**	**Low**
BAT3		Bat mortalities due to direct blade impact or barotrauma during foraging activities (not migration).	Operation	Negative	**High**	**Medium**
BAT4		Artificial Lighting		Negative	**Medium**	**Low**
BAT5		Loss of foraging habitat.	De-commissioning	Negative	**Medium**	**Low**
SW1	Surface Water	Alterations of flow regimes of watercourses, in close proximity to the site, or that is proposed to be traversed by roads.	Construction	Negative	**Medium**	**Low**
SW2		Increased potential of soil erosion due to vegetation clearance, soil disturbance and a high traffic movement on site. Subsequent potential sedimentation of watercourses.		Negative	**Low**	**Low**
SW3		Potential land contamination from hazardous substances. This includes spillage of concrete onto soil surface, as well as oils, fuel, grease (from construction vehicles) and sewage from temporary on-site ablution facilities.		Negative	**Low**	**Low**
SW4		Temporary potential degradation of wetland habitat due to the proposed positioning of road access		Negative	**Medium**	**Low**
SW5		Alterations of flow regimes of watercourses, in close proximity to the site, or that is proposed to be traversed.	Operation	Negative	**Medium**	**Low**
SW6		Increased potential of soil erosion due to vegetation clearance, and more run-off from harden surfaces (i.e. roads). Subsequent potential sedimentation of watercourses.		Negative	**Low**	**Low**
SW7		Potential land contamination from hazardous substances. This includes spillage of oils, fuel, grease (from site operational and maintenance vehicles) and permanent onsite sewage systems		Negative	**Low**	**Low**

Ref.	Receiving Environment	Impact Description	Phase	Status	Significance (Pre-Mitigation)	Residual Significance (Post-Mitigation)
SW8		Alterations of flow regimes of watercourses, in close proximity to the site, or that is proposed to be traversed by roads.	De-commissioning	Negative	**Medium**	**Low**
SW9		Increased potential of soil erosion due to removal of wind turbine infrastructure, soil disturbance and a high traffic movement on site.		Negative	**Low**	**Low**
SW10		Potential land contamination from hazardous substances. This includes spillage of oils, fuel, grease (from construction vehicles) and sewage from on-site systems		Negative	**Low**	**Low**
H1	Heritage	Impacts to a ruined settlement (Road Settlement) and graveyard on public access road through De Kom		Negative	**Medium**	**Low**
H2		Impacts to Late Stone Age sites along river bed (River Settlement)		Negative	**Medium**	**Low**
H3		Impacts to the farm house of Wolvenhoek		Negative	**Medium**	**Low**
P1	Palaeontology	Disturbance, damage or destruction of fossils (direct, negative impacts) preserved at or beneath the ground surface within the development footprint during the construction phase, mainly due to surface clearance or excavation activities	Construction	Negative	**Low**	**Low**
V1	Visual	Visual impact during construction due to dust, vehicles and equipment	Construction	Negative	**Medium**	**Low**
V2		Visual impact during construction due to vegetation clearing		Negative	**Medium**	**Low**
V3		Visual impact during construction on landforms		Negative	**Medium**	**Low**
V4		Intrusion on sense of place and rural landscape	Operation	Negative	**Medium**	**Medium**
V5		Visual impact of wind turbines		Negative	**High**	**Medium**
V6		Visual impact of substation and other buildings and infrastructure		Negative	**Medium**	**Medium**

Ref.	Receiving Environment	Impact Description	Phase	Status	Significance (Pre-Mitigation)	Residual Significance (Post-Mitigation)
V7		Visual impact of shadow flicker		Negative	**Low**	**Low**
V8		Visual impact of lighting from facility		Negative	**Medium**	**Medium**
V9		Visual impact of additional roads and road widening		Negative	**Low**	**Low**
V10		Visual impact during decommissioning due to dust, vehicles and equipment	De-commissioning	Negative	**Medium**	**Low**
N1	Noise	Acoustic impact on residential receptors	Construction	Negative	**Medium**	**Low**
N2		Acoustic impact on residential receptors	Operation	Negative	**Medium**	**Low**
N3		Acoustic impact on residential receptors	De-commissioning	Negative	**Medium**	**Low**
T1	Traffic	Noise, dust and exhaust pollution due to vehicle trips on-site	Construction	Negative	**Medium**	**Low**
T2		Noise, dust and exhaust pollution due to additional trips on the access roads		Negative	**Medium**	**Medium**
T3		Noise and exhaust pollution due to additional vehicle trips on the R354		Negative	**Low**	**Low**
SE1	Social	Increase in Employment Opportunities	Construction	Positive	**Medium**	**High**
SE2		Increased Economic Development Opportunities		Positive	**Medium**	**High**
SE3		Disruption due to influx of job seekers		Negative	**Medium**	**Medium**
SE4		Increase in communicable diseases and reduced public health		Negative	**Medium**	**Medium**
SE5		Change in sense of place		Negative	**Medium**	**Low**
SE6		Nuisance from noise, dust and traffic disturbances		Negative	**Medium**	**Low**
SE7		Increased risk to neighbouring land users		Negative	**Low**	**Low**

Ref.	Receiving Environment	Impact Description	Phase	Status	Significance (Pre-Mitigation)	Residual Significance (Post-Mitigation)
SE8		Increased risk of veld fires		Negative	**Medium**	**Low**
SE9		Increased employment opportunities	Operation	Positive	**Medium**	**High**
SE10		Increased economic development opportunities		Positive	**Medium**	**Medium**
SE11		Change in sense of place		Negative	**Medium**	**Medium**
SE12		Loss of permanent employment	De-commissioning	Negative	**Medium**	**Low**
SE13		Gain of short term employment		Positive	**Low**	**Medium**
SE14		Nuisance from dust, noise and traffic		Negative	**Low**	**Low**
SE15		Increased risk to neighbouring land users		Negative	**Low**	**Low**
SE16		Increased risk of veld fires		Negative	**Medium**	**Low**

11.5 ALTERNATIVES ASSESSMENT

Table 11-4 outlines the preferred alternatives identified through the EIA and relevant specialist studies.

Table 11-4: Preferred Alternatives

ALTERNATIVE	PREFERRED	COMMENT
Site	Maralla West WEF development area → Farm Drie Roode Heuvels 180, Remainder → Farm Annex Drie Roode Heuvels 181, Remainder → Farm Wolven Hoek 182, Portion 1 → Farm Wolven Hoek 182, Portion 2	No site alternative was assessed. Maralla West WEF was subjected to a high level site selection process already described in Chapter 7, Section 7.4. The Maralla West WEF is also situated within the Komsberg REDZ.
Technology	Wind	Wind technology has been identified as the preferred technology and most feasible option for the Maralla West WEF.
Layout and Design	Proposed Maralla West WEF Layout (56 turbines)	The environmental sensitivity information was utilised to inform the layout and design of the Maralla West WEF project. The initial 125 turbine layout was revised after the completion of the scoping studies to a 70 turbine layout. Since the completion of the EIA studies and the compilation of an updated sensitivity map the layout was revisited and further reduced to a 56 turbine layout.
Access Roads	Proposed Maralla West WEF Layout	The environmental sensitivity information was utilised to inform the layout and design of the Maralla West WEF project. The layout includes the internal access roads.
Internal 132kV Powerlines	- Alternative 1 - Steel / concrete monopole single circuit structure - Alternative 2 - Steel / concrete monopole double circuit structure - Alternative 3 - H-pole structure (usually wooden poles)	There is no preferred alternative with regards to the tower structure utilised for the internal 132kV powerlines due to the fact that none of the proposed structures pose an electrocution risk to the priority avifauna species in the surrounding areas.
IPP Substation	- Substation 1	IPP Substation 1 is considered the preferred alternative.

11.6 IMPACT STATEMENT

The overall objective of the EIA is to provide sufficient information to enable informed decision-making by the authorities. This was undertaken through consideration of the proposed project components, identification of the aspects and sources of potential impacts and subsequent provision of mitigation measures.

It is the opinion of WSP | Parsons Brinckerhoff that the information contained in this document (read in conjunction the final scoping report) is sufficient for the DEA to make an informed decision for the environmental authorisation being applied for in respect of this project.

Mitigation measures have been developed where applicable for the above aspects and are presented within the EMPr (**Appendix W**). It is imperative that all impact mitigation recommendations contained in the EMPr, of which the environmental impact assessment took cognisance, are legally enforced.

12 CONCLUSION

BioTherm has proposed the development of three up to 250 MW Wind Energy Projects within the Western Cape and a portion of the Northern Cape, namely Maralla East, Maralla West and Esizayo Wind Energy Projects. **This report is specific to the Maralla West WEF**.

It must be stressed that the fact that there are several approved EA surrounding the site does not equate to actual ‘development’. The surrounding projects, except for the Preferred Bidders, are still subject to the REIPPPP bidding process like the Maralla West project. Depending on the next bid window Maralla West due to its competitive nature may actually be selected as the next Preferred Bidder and commence with construction prior to other facilities with existing EA approvals. Some of the other proposed Wind Energy facilities received their EA several years ago, but have not secured Preferred Bidder status

The anticipated environmental impacts associated with the Proposed Project have been evaluated according to their significance, which is determined as a result of their extent, magnitude, probability and duration. All impacts were assessed with and without management measures in place. Where the overall environmental impact significance was determined to be low-medium and higher, these impacts were assessed in more detail with the relevant management measures recommended.

This Draft EIR has been structured to comply with the requirements of the Appendix 3 of GNR 982. The report provides a description of the proposed project and details the aspects associated with the construction, operation and decommissioning. The report also includes the methodology followed to undertake the S&EIR process. A detailed description on the existing environment (bio-physical as well as socio-economic) is provided based on findings from the specialist surveys. Stakeholder engagement was undertaken from the onset of the project in a transparent and comprehensive manner. Outcomes of all meetings and comments received from the public review periods were recorded and responded to in the EIR. Based on the environmental description, specialist surveys as well as the stakeholder engagement a detailed EIA rating has been undertaken and where relevant the necessary management measures have been recommended.

In summary, the S&EIR process assessed both biophysical and socio-economic environments and identified appropriate management and mitigation measures. The biophysical impact assessment revealed that there are no environmental fatal flaws and no significant negative impacts associated with the proposed project should mitigation and management measures be implemented. In addition, it should be noted that the overall socio-economic impacts associated with the project are positive and include the creation of job opportunities and contributions to the local, regional and national economies.

WSP is of the opinion that should the identified mitigation and management measures be implemented.

The Draft EIR has been made available for public review from the **2 February 2017** to **2 March 2017**. All issues and comments submitted to WSP **|** Parsons Brinckerhoff, to date, have been incorporated in the Comment and Reponses Report and have been included in **Appendix H**.

The Draft EIR has been submitted to the delegated competent authorities responsible for authorising this project.

If you have any further enquiries, please feel free to contact:

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Appendix A

CURRICULUM VITAE

Appendix B

EAP DECLARATION OF INTEREST AND UNDERTAKING

Appendix C

SPECIALIST DECLARATIONS

Appendix D

DEA COMMENTS ON FINAL SCOPING REPORT

Appendix E

DEA ACCEPTANCE OF APPLICATION

Appendix F

DEA PRE-APPLICATION MEETING MINUTES

Appendix G

DEA COMMENTS ON DRAFT SCOPING REPORT

Appendix H

COMMENT AND RESPONSE REPORT

Appendix I

TRAFFIC PEER REVIEW

Appendix J

PEER REVIEWER – CURRICULUM VITAE

Appendix K

LAND CAPABILITY SPECIALIST STUDY

Appendix L

BIODIVERSITY SPECIALIST STUDY

Appendix M

AVIFAUNA SPECIALIST STUDY

Appendix N

BATS SPECIALIST STUDY

Appendix O

TRANSPORT SPECIALIST STUDY

Appendix P

STAKEHOLDER DATABASE

Appendix Q

SURFACE WATER SPECIALIST STUDY

Appendix R

HERITAGE SPECIALIST STUDY

Appendix S

PALAEONTOLOGY SPECIALIST STUDY

Appendix T

VISUAL SPECIALIST STUDY

Appendix U

NOISE SPECIALIST STUDY

Appendix V

SOCIAL SPECIALIST STUDY

Appendix W

ENVIRONMENTAL MANAGEMENT PROGRAMME

Appendix X

DEA A3 MAPS

Appendix Y

LAWYERS LETTER