REPORT NO 01

PROPOSED MARALLA EAST WIND ENERGY FACILITY NEAR SUTHERLAND, NORTHERN AND WESTERN CAPE

DRAFT ENVIRONMENTAL SCOPING REPORT

PUBLIC

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WSP | PARSONS BRINCKERHOFF

PROPOSED MARALLA EAST WIND ENERGY FACILITY NEAR SUTHERLAND, NORTHERN AND WESTERN CAPE

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BioTherm Energy (Pty) Ltd

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1 INTRODUCTION

1.1 PURPOSE OF THIS REPORT

This Scoping Report documents the process and findings of the scoping phase of the Scoping and Environmental Impact Reporting (S&EIR) process for the proposed establishment of the Maralla East Wind Energy project (hereafter referred to as 'Maralla East') which forms part of the establishment of a wind energy development, located approximately 34km south of Sutherland in both the Northern Cape within the Karoo Hoogland Local Municipality under the jurisdiction of the Namakwa District Municipality and the Western Cape within the Laingsburg Local Municipality under the jurisdiction of the Central Karoo District Municipality.

This Scoping Report provides stakeholders and authorities with information that is necessary for a proper understanding of the scoping process; for informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process undertaken through the environmental impact assessment process.

1.2 BACKGROUND INFORMATION

BioTherm Energy (Pty.) Ltd. (BioTherm) is the proponent and applicant for the Environmental Authorisation (EA) for the Maralla East 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 250MW (**Figure 1-1**). The infrastructure associated with each of the Wind Energy Projects has been outlined within **Table 1-1**.

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 East project. Depending on the next bid window Maralla East 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.

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 Wind	Western Cape	Wind

Figure 1-1: The proposed Wind Energy Development

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

1.3 SCOPING TERMS OF REFERENCE

The EIA Regulations (GNR 982 of 2014) identify Maralla East 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 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 EIA Regulations, 2014.

As defined in Appendix 2 of GNR 982 of 2014, the objective of the scoping process is to, through a consultative process:

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

Public participation is a requirement of scoping; 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 STRUCTURE OF THIS REPORT

Table 1-2 cross-references the relevant sections within the Scoping Report that respond to the legislated requirements as defined within Appendix 2 of GNR 982 of 2014.

Table 1-2: Legislation Requirements as detailed in GNR 982

APPENDIX 2	LEGISLATED REQUIREMENTS AS PER THE NEMA GNR 982	RELEVANT REPORT SECTION
(a)	Details of:	
	the EAP who compiled the report; and	Section 1.2 and Appendix A
	the expertise of the EAP, including a Curriculum Vitae	Appendix A
(b)	The location of the activity, including-	
	The 21 digit Surveyor code for each cadastral land parcel;	Section 5.1
	Where available, the physical address and farm name	Section 5.1
	Where the required information in terms of (i) and (ii) is not available, the coordinates of the boundary of the property.	Section 5.1
(c)	A plan which locates the proposed activities applied for at an appropriate scale, or, if it is-	
	A linear activity, a description of the corridor in which the proposed activity or activities is to be undertaken; or	N/A
	On land where the property has not been defined, the coordinates within which the activity is to be undertaken.	Section 5.1 (Figure 5.1)
(d)	A description of the proposed activity, including-	
	All listed and specified activities triggered;	Section 2.2
	A description of the activities to be undertaken, including associated structures and infrastructure;	Section 5
(e)	A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning	Section 2

APPENDIX 2	LEGISLATED REQUIREMENTS AS PER THE NEMA GNR 982	RELEVANT REPORT SECTION
	frameworks and instruments that are applicable to this activity and are to be considered in the assessment process;	
(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 4
(g)	A full description of the process followed to reach the proposed preferred activity, site and location within the site, including-	
	Details of all the alternatives considered;	Section 5.5
	Details of the public participation undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Section 3.4
	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;	To be included in Final Scoping report
	the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 6
	the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	Section 7
	the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	Section 3.3
	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 7
	the possible mitigation measures that could be applied and level of residual risk;	Section 7
	the outcome of the site selection matrix;	Section 7 and Section 8
	if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and	Section 5.5
	a concluding statement indicating the preferred alternatives, including preferred location of the activity;	Section 8
(h)	A plan of study for undertaking the environmental impact assessment process to be undertaken, including-	
	a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity;	Section 9.2

APPENDIX 2	LEGISLATED REQUIREMENTS AS PER THE NEMA GNR 982	RELEVANT REPORT SECTION
	a description of the aspects to be assessed as part of the environmental impact assessment process;	Section 9.3
	aspects to be assessed by specialists;	Section 9.5
	a description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists;	Section 9.6
	a description of the proposed method of assessing duration and significance;	Section 9.6
	an indication of the stages at which the competent authority will be consulted;	Section 9.8
	particulars of the public participation process that be conducted during the environmental impact assessment process; and	Section 9.8
	a description of the tasks that will be undertaken as part of the environmental impact assessment process;	Section 9.7
	identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.	Section 9.6
(i)	An undertaking under oath or affirmation by the EAP in relation to-	
	the correctness of the information provided in the report;	Appendix B
	the inclusion of comments and inputs from stakeholders and interested and affected parties; and	Appendix B
	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
(j)	An undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and interested and affected parties on the plan of study for undertaking the environmental impact assessment;	Appendix B
(k)	Where applicable, any specific information required by the competent authority; and	N/A
(l)	Any other matter required in terms of section 24(4)(a) and (b) of the Act.	N/A

1.5 ASSUMPTIONS AND LIMITATIONS

The following assumptions have been made during the Scoping Study and in the compilation of this document:

- 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 Draft Scoping Report (DSR) provides a good description of the issues associated with the project, and a reasonable plan of study for the environmental impact assessment (EIA) phase.

2 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.

2.1 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);
- Western Cape Department of Environmental Affairs and Development Planning (DEADP);
- Department of Water and Sanitation (DWS). The Department of Water and Sanitation Northern Cape Region will act as a commenting authority for this application and will provide input with regards to water use license requirements. The project falls within the Gouritz Water Management Area and Olifants-Doring Water Management Area;
- South African Heritage Resources Agency;
- Laingsburg Local Municipality;
- Central Karoo District Municipality;
- Karoo Hoogland Local Municipality; and
- Namakwa District Municipality.

2.2 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 8 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 2-1, Table 2-2 and **Table 2-3** outline the listed activities that are triggered by the proposed project under GNR 983, 984 and 985 respectively.

Table 2-1: Determination of Applicable 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 East 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;	Potentially Applicable	The construction of Maralla East 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 East 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.	Potentially Applicable	Internal access roads will be required for access to Maralla East 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.	Potentially 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 East 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 East 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.	Potentially Applicable	The main access road that connects Maralla East to the main road may require widening.

Table 2-2: 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 East 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 East is proposed to be developed outside an urban area and the proposed development footprint will be greater than 20ha

Table 2-3: Determination of Applicable 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 Western Cape - (i) Areas outside urban areas containing indigenous vegetation.	Applicable	Maralla East 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 And in the Western Cape - (i) Areas outside urban areas containing indigenous vegetation.	Applicable	Maralla East 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
(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 Western Cape - (i) Within critical biodiversity areas identified in bioregional plans.	Applicable	Maralla East is located within a Critical Biodiversity Area and will entail the clearance of over 300m^2 of vegetation.
(14) Activity 14: The development of – (xii) infrastructure or structures with a physical footprint of 10 square meters or more In the Western Cape, outside urban areas, where- (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 East is located within a Critical Biodiversity Area.

LISTED ACTIVITY AS DESCRIBED IN GNR 985	APPLICABLE (Y/N)	APPLICABILITY & LICENCE REQUIREMENT
(18) The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. (f) in the Western Cape: (i) all areas outside urban areas (aa) Areas containing indigenous vegetation	Applicable	Maralla East 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 (g) in the western Cape: (i) Outside an urban area (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.	Potentially Applicable	Maralla East 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 all Listing Notices are applicable, the more rigorous process is to be followed, therefore a S&EIR process will be undertaken in order to obtain the required EA.

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 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.

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 East 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.

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 (SACAA) as an agency of the Department of Transport (DoT). The SACAA 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 SACAA 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 SACAA 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, 2007 (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.

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

The National Occupational Health and Safety Act (No. 85 of 1993) 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 Occupational Health and Safety (OHS) Act and its relevant Regulations, is essential.

2.3 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.

WESTERN CAPE PROVINCIAL SPATIAL DEVELOPMENT FRAMEWORK

The Western Cape Provincial Spatial Development Framework (PSDF) is a long term spatial framework from which various plans will be implemented. It is informed by the NDP and related spatial policies, and takes its strategic direction from the Western Cape's development strategy and related policy frameworks. The national and provincial policy informants to the PSDF are:

- The National Development Plan (2012)
- ONECAPE 2040
- Western Cape Infrastructure Framework (2013)
- Western Cape Provincial Land Transport Framework (2013)
- Western Cape Green Economy Strategic Framework (2013)

In taking these agendas forward, the PSDF applies the following spatial Principals:

- Spatial Justice
- Sustainability and Resilience
- Spatial Efficiency
- Accessibility
- Quality and Liveability

The PSDF outlines in Policy R4- Recycle and recover waste, deliver clean resources of energy to urban consumers, shift from private to public transport, and adapt to and mitigate against climate change;

- Pursue energy diversification and energy efficiency in order for the Western Cape to transition to a low carbon, sustainable energy future, and delink economic growth from energy use.
- Support emergent Independent Power Producers (IPPs) and sustainable energy producers (wind, solar, biomass and waste conservation initiatives) in sustainable rural locations (as per recommendations of the strategic Environmental Assessment for wind energy.

2.4 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.

CENTRAL KAROO DISTRICT MUNICIPALITY 3RD GENERATION INTEGRATED DEVELOPMENT PLAN

The Central Karoo District Municipality 3rd Generation Integrated Development Plan (IDP) 2012-2017 aims to create a platform to inform decision making; create an environment for robust economic development; building social cohesion and further ensuring that the Central Karoo's vision of working together in development and growth is realised. The IDP highlights the following strategic objectives:

1. To improve and maintain our roads and promote effective and save transport for all;
2. To deliver sound administrative and financial services, to ensure good governance and viability;
3. To effectively plan to minimise the impact of disasters on the community, visitors, infrastructure and environment;
4. To promote a safe, healthy environment and social viability of residents through the delivery of a responsible environmental health service;
5. To establish an inclusive tourism industry through sustainable development and marketing which is public sector led, private sector driven and community based;
6. To ensure a united integrated development path in a safe and sustainable environment;
7. To pursue economic growth opportunities that will create descent work; and
8. To facilitate effective stakeholder participation.

In terms of Strategic Objective 6 '*to ensure a united integrated development path in a safe and sustainable environment*' the priority has been placed on green energy. The proposal to construct wind energy facilities is in line with the Municipalities goal to achieve the required outcome of enhanced service delivery, decrease in crime statistics and increase in job opportunities.

The Central Karoo Growth and Development Strategy (GDS) 2007-2022 was conducted in 2007 after the Summit on the 9th March 2007. It reflected sixteen major catalytic projects as the outcomes for economic growth in the region (**Figure 2-1**). These have been mapped spatially in order to align with the SDF Review and include wind generation farms.

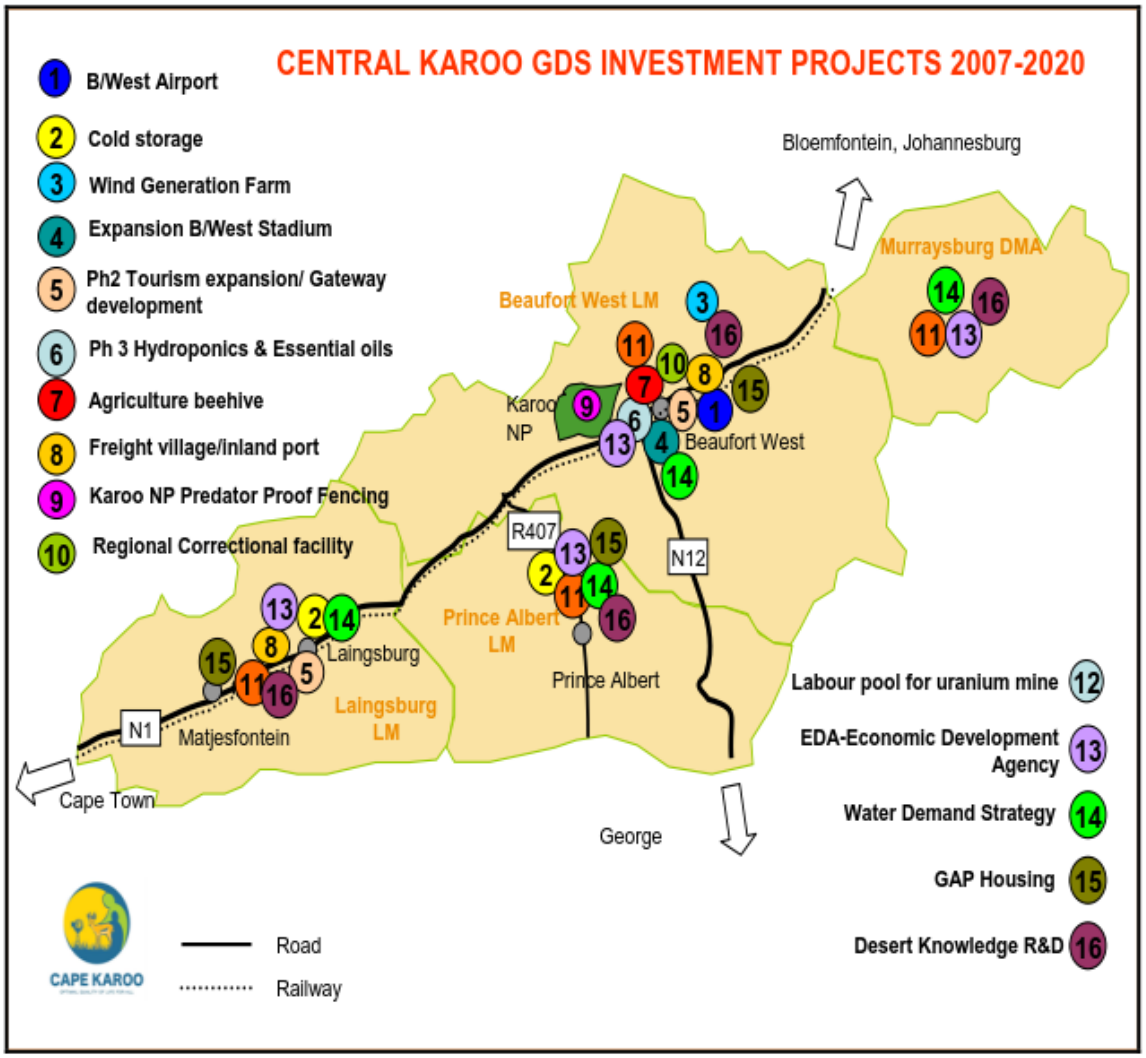


Figure 2-1: The GDS Development Projects (source Central Karoo IDP)

LAINGSBURG LOCAL MUNICIPALITY INTEGRATED DEVELOPMENT PLAN

The Laingsburg Integrated Development Plan (IDP) provides policies and guidelines to assist in the Municipalities vision to "*improve as a desirable place, invest and visit based on its potential as the Oasis Gateway to the Great Karoo, Moordenaars Karoo and Klein Swartberg, so that all of its residents may enjoy a sustainable way of life*" (IDP 2014/15). The goals of the Municipality include:

- To improve the quality and knowledge of the tourism attractions in the municipality;
- To integrate the municipality's settlements through appropriate rural and urban development;
- To conserve and extend the municipality's agricultural resources and promote wider access to them;
- To strengthen Laingsburg Town's role as a transport support, refreshment and emergency service centre straddling on the National Capet Town transport corridor;
- To deliver sustainable affordable services;
- Create an environment conducive to economic growth; and
- To illuminate social illness in the municipal area.

The main focus of the IDP is on job creation and economic development. The construction and operation of the wind energy facility within this region aids in job creation and the promotion of the local economy.

2.5 STRATEGIC ENERGY PLANNING CONTEXT

THE NATIONAL ENERGY ACT (NO. 34 OF 2008)

The National Energy Act was promulgated in 2008 (Act No. 34 of 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.

THE ELECTRICITY REGULATION ACT, 2006 (ACT NO. 4 OF 2006), AS AMENDED

In 2011, the electricity regulation on new generation capacity was published under Section 35(4) of the Electricity Regulation Act, (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 East 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 East project will fall within the Komsberg Wind REDZ, located within the Laingsburg area of the Western Cape (**Figure 2-2**).

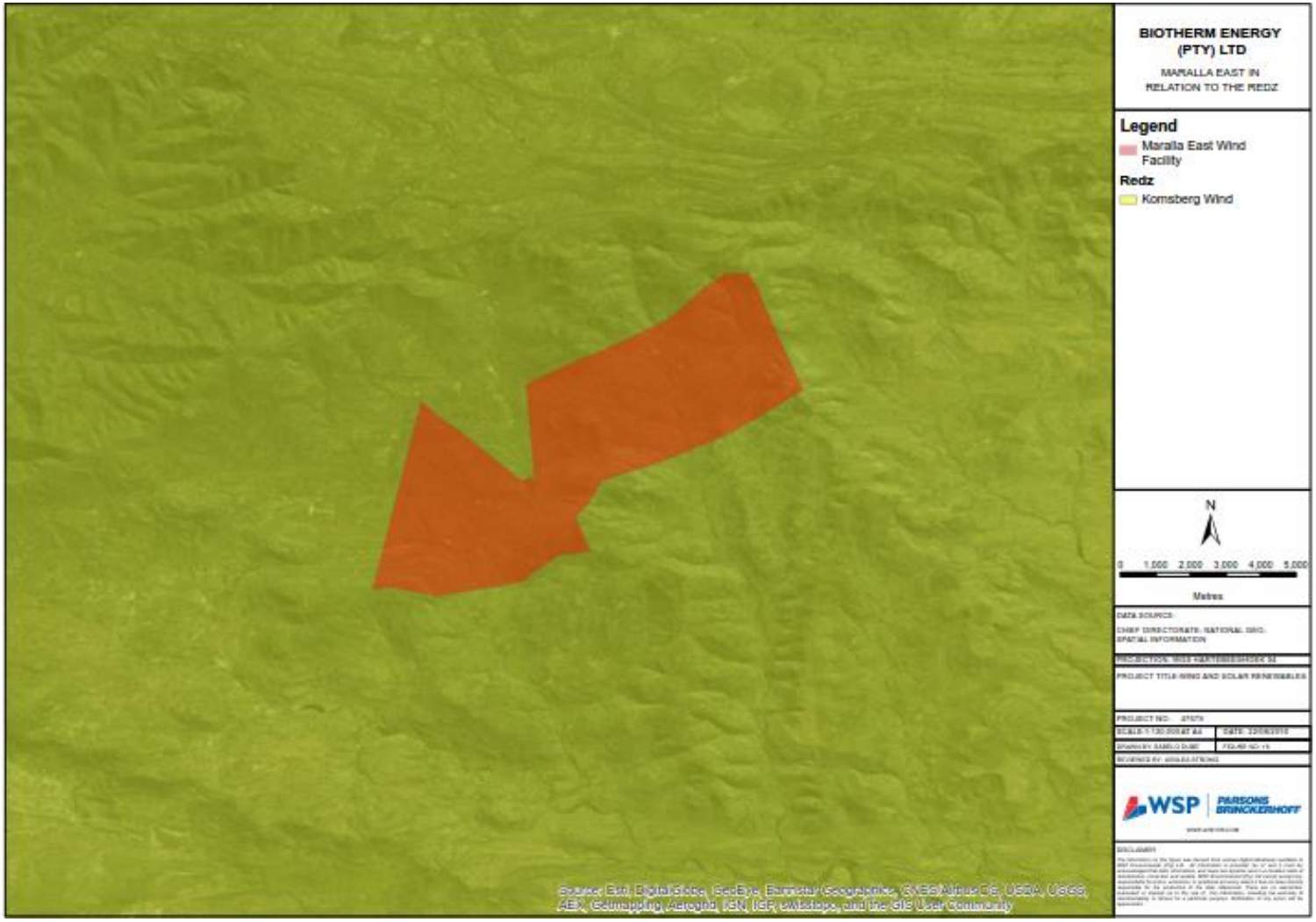


Figure 2-2: The location of the Maralla East Project within the Komsberg REDZ

DEPARTMENT OF ENERGY PROCESS FOR INDEPENDENT POWER PRODUCERS

The Renewable Energy Independent Power Producer Procurement Programme (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.

2.6 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.

2.7 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.

Together, the eight Performance Standards establish standards that the client is to meet throughout the life of an investment by IFC:

- Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts;
- Performance Standard 2: Labour and Working Conditions;
- Performance Standard 3: Resource Efficiency and Pollution Prevention;

- Performance Standard 4: Community Health, Safety, and Security;
- Performance Standard 5: Land Acquisition and Involuntary Resettlement;
- Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources;
- Performance Standard 7: Indigenous Peoples; and
- Performance Standard 8: Cultural Heritage.

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

3 SCOPING METHODOLOGY

The scoping process was initiated in accordance with Appendix 2 of GNR 982 pertaining to applications subject to an S&EIR process.

3.1 APPLICATION

The application phase consisted of the completion of the appropriate application form by the EAP and the Proponent as well as the subsequent submission and registration of the application for EA with the DEA. The application form was submitted to DEA on **15 September 2016**.

A DEA reference number will be allocated to this application and will appear in the final Scoping Report and all subsequent official S&EIA related correspondence with the authorities and the public.

The Final Scoping Report (FSR) must be submitted to the DEA within 44 days of receipt of the application by the DEA.

3.2 BASELINE ENVIRONMENTAL ASSESSMENT

The description of the baseline environment was compiled through a combination of desktop reviews and site investigations. Desktop reviews made use of available information including existing reports, aerial imagery and mapping. Site investigations were undertaken by the specialist team between November 2015 and March 2016 to verify the desktop review information.

3.3 IDENTIFICATION AND EVALUATION OF POTENTIALLY SIGNIFICANT IMPACTS

The main issues and potential impacts associated with the proposed project were determined as both a desktop level based on existing information as well as field work and specialist input. The following methodology was used:

- Identify potential sensitive environments and receptors that may be impacted on by the proposed project;
- Identify the type of impacts that are most likely to occur (including cumulative impacts);
- Determine the nature and extent of the potential impacts during the various developmental phases, including, construction, operation and decommissioning;
- Identify potential No-Go areas (if applicable); and
- Summarise the potential impacts that will be considered further in the EIA phase through detailed specialist studies.

Appendix 2 of GNR 982 requires the identification of the significance of potential impacts during scoping. To this end an impact screening tool has been used in the Scoping Report (**Table 3-1**). The screening tool allows impacts of very low significance to be excluded from the detailed studies in the EIR phase. The screening tool is based on two criteria, namely probability; and, consequence, where the latter is based on general consideration to the intensity, extent, and duration.

The scales and descriptors used for scoring probability and consequence are detailed in **Table 3-2** and **Table 3-3** respectively.

Table 3-1: Significance Screening Tool

	CONSEQUENCE SCALE				
PROBABILITY SCALE		1	2	3	4
	1	Very Low	Very Low	Low	Medium
	2	Very Low	Low	Medium	Medium
	3	Low	Medium	Medium	High
	4	Medium	Medium	High	High

Table 3-2: Probability Scores and Descriptors

SCORE	DESCRIPTOR
4	Definite: The impact will occur regardless of any prevention measures
3	Highly Probable: It is most likely that the impact will occur
2	Probable: There is a good possibility that the impact will occur
1	Improbable: The possibility of the impact occurring is very low

Table 3-3: Consequence Scores and Descriptors

SCORE	NEGATIVE	POSITIVE
4	Very severe: An irreversible and permanent change to the affected system(s) or party(ies) which cannot be mitigated.	Very beneficial: A permanent and very substantial benefit to the affected system(s) or party(ies), with no real alternative to achieving this benefit.
3	Severe: A long term impacts on the affected system(s) or party(ies) that could be mitigated. However, this mitigation would be difficult, expensive or time consuming or some combination of these.	Beneficial: A long term impact and substantial benefit to the affected system(s) or party(ies). Alternative ways of achieving this benefit would be difficult, expensive or time consuming, or some combination of these.
2	Moderately severe: A medium to long term impacts on the affected system(s) or party (ies) that could be mitigated.	Moderately beneficial: A medium to long term impact of real benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are equally difficult, expensive and time consuming (or some combination of these), as achieving them in this way.
1	Negligible: A short to medium term impacts on the affected system(s) or party(ies). Mitigation is very easy, cheap, less time consuming or not necessary.	Negligible: A short to medium term impact and negligible benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are easier, cheaper and quicker, or some combination of these.

3.4 STAKEHOLDER ENGAGEMENT

AUTHORITY NOTIFICATION

A pre-application meeting was held on 25 August 2016 with the DEA in order to discuss the proposed project. The minutes of this meeting are included in **Appendix D**.

The application form was submitted to DEA on **15 September 2016**. In addition, WSP | Parsons Brinckerhoff notified the NC DENC, WC DEADP, Laingsburg and Karoo Hoogland Local Municipalities, the Central Karoo and Namakwa District Municipalities as well as the DWS of the Proposed Project via a notification letter.

STAKEHOLDER IDENTIFICATION

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;
- Placement of community notices;
- Completed comment sheets; and
- Attendance registers at meetings.

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

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

REPRESENTATIVE SECTOR	FURTHER EXPLANATION	NO. OF STAKEHOLDERS
Government departments	All tiers of government, namely, national, provincial, and local government. Also inclusive of parastatal organisations such as Transnet and Eskom	23
Business and consultants	Local and neighbouring businesses in the area. Representatives of consulting organisations that provide services in the area	2
Non-governmental organisations (NGOs) and community based organisations	Agricultural unions, churches, and environmental NGOs	6
General public	Local communities, farmers, and other such individuals who may have an interest in the project	15

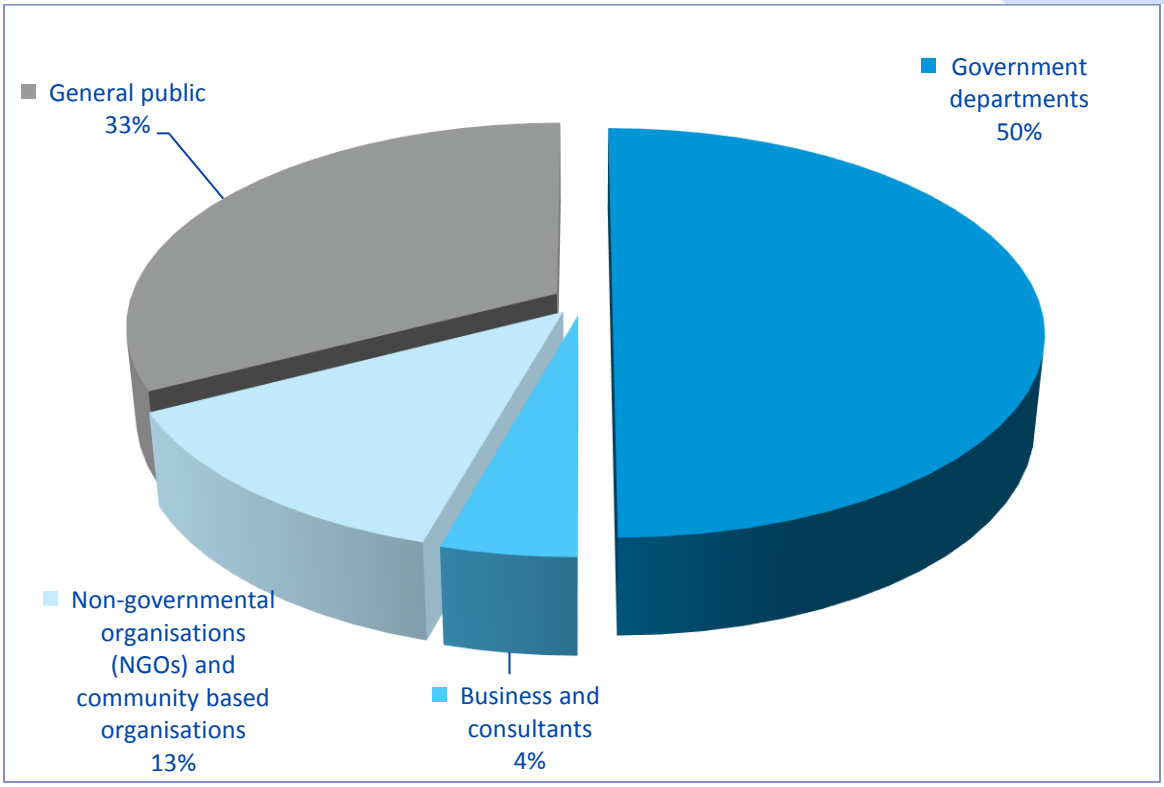


Figure 3-1: Pie chart showing the Breakdown of the Stakeholders currently Registered on the Database per representative sector

STAKEHOLDER NOTIFICATION

NEWSPAPER ADVERTISEMENTS

In accordance with the requirements of GNR 982, the proposed project was advertised in a local and regional newspaper. The purpose of the advertisement was to notify the public about the proposed project and to invite them to register as stakeholders (**Appendix F**). The relevant advertisement dates undertaken during scoping are listed in **Table 3-5**.

Table 3-5: Dates on which the Adverts were published

NEWSPAPER	PUBLICATION DATE
The Courier	9 September 2016
Die Noordwester	8 September 2016

SITE NOTICES

The official site notices will be erected as per GNR 982 on the boundary fence of the proposed site. In addition, general project notices, announcing the Proposed Project and inviting stakeholders to register, will be placed in and around the project area. Proof of these notices will be included in the FSR.

PUBLIC REVIEW OF THE DRAFT SCOPING REPORT

The DSR will be placed on public review for a period of 30 days from **15 September 2016** to **15 October 2016**, at the following venues:

→ Sutherland Library

- Laingsburg Library
- WSP | Parsons Brinckerhoff Website

All registered stakeholders and authorising/commenting state departments were notified of the public review period as well as the locations of the DSR via email, post, sms, hand-outs and the stakeholder meetings.

The abovementioned plan, for notification and provision of reports, will also be utilised for the review of the EIR once the EIR phase has commenced.

STAKEHOLDER MEETINGS

FOCUS MEETINGS

Informal one-on-one stakeholder meetings will be held, as required, in order to present the proposed project 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 DSR review period (30 days). WSP | Parsons Brinckerhoff will facilitate the meetings and will be accompanied by the applicant during all meetings.

PUBLIC MEETINGS

Table 3-6 outlines the meetings that will be held during the DSR review period. The meetings will outline the details of the proposed project and provide opportunities for stakeholders to raise issues, concerns and queries. The meetings will also establish lines of communication between stakeholders and the project team. The meetings will be facilitated by WSP | Parsons Brinckerhoff's EIA team and will be attended by BioTherm representatives. Invitations to the meetings were sent out in the form of faxes, telephone calls, emails and site notices. The minutes of the meetings will be included in the FSR.

Table 3-6: Meetings to be held during the Draft Scoping Report Review Period

DATE	TIME	VENUE
29 September 2016	18:00 to 20:00	JJ Ellis Hall
30 September 2016	09:00 to 11:00	NG Church Hall

STAKEHOLDER REVIEW PRIOR TO DSR SUBMISSION

The DSR was made available to all stakeholders and authorities on **15 September 2016**, for a 30-day review period. The comments received from stakeholders will be recorded and incorporated into the FSR which will be submitted to the DEA as well as any other relevant commenting authorities including the NC DENC and DEADP.

COMMENT AND RESPONSE REPORT

All concerns, comments, viewpoints and questions (collectively referred to as 'issues') will be documented and responded to adequately in a Comment and Response Report to be included in the FSR. 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.

SUBMISSION AND DECISION-MAKING

The delegated DEA will be allocated 43 days to review the FSR. The FSR will be placed on stakeholder review for a reasonable time period during the DEA's final review and decision-making process. The delegated competent authorities must within this specified timeframe issue a decision on whether to proceed onto the next phase, the EIR phase.

WAY FORWARD

FINAL SCOPING REPORT SUBMISSION

All issues raised during the scoping phase of the proposed project will be incorporated into the FSR and will be addressed during the EIR Phase. Once a decision has been reached, the stakeholders will be informed of the next phase of the public participation process.

ONGOING CONSULTATION AND ENGAGEMENT

In addition to the public documents distributed to stakeholders, there will be ongoing communication between the proponent, the WSP | Parsons Brinckerhoff and stakeholders throughout the S&EIR process. These interactions include the following:

- In addition to the project announcement letters, a letter will be sent out to all registered stakeholders providing them with an update of the proposed project once the FSR has been approved;
- Interactions with stakeholders will take place in English and Afrikaans;
- Feedback to stakeholders, individually and collectively;
- Written responses (email, faxes or letters) will be provided to stakeholders acknowledging issues and providing information requested (dependent on availability); and
- 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.

4 NEED AND JUSTIFICATION

4.1 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.

4.2 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.

4.3 REGIONAL AND SITE SUITABILITY

The proposed project is to be developed approximately 34 km South of Sutherland in the Northern and Western Cape and will comprise of a single site located on the Remainder of Farm Drie Roode Heuwels 180, the Remainder of Farm Welgemoed 268 and the Remainder of Farm Schalkwykskraal 204. 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 and Western Cape regions, 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 East 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 up to 250MW 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 5.5** (Alternatives).

4.4 LOCAL NEED

The proposed site falls within the Karoo Hoogland and Laingsburg Local Municipalities, which are located within the Namakwa and Central Karoo District Municipalities respectively.

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 unemployment levels within the Laingsburg Local Municipality are fairly high, with 28.3% of the potential labour force being unemployed, compared to South African national unemployment rate of 25.4% (Statistics South Africa, 2012 and 2016). There are a number of constraints to Local Economic Development (LED), including low education levels, and a lack of services and infrastructure.

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.

ONECAPE 2040 is a vision and strategy drafted by the Western Cape Government, which sets out an agenda for joint action on economic development. One of the goals set out within the ONECAPE 2040 is 'The western Cape is a recognised leader and innovator in the Green Economy.' The idea of a Green Cape is phased with the following outcomes:

- 2013-2019: Renewable and natural gas energy investments including linking with off shore gas;
- 2020-2026: Bring gas into the Western Cape domestic market;
- 2027-2033: 40% of Western Cape energy from renewable sources; and
- 2034-2040: Sustainable, low carbon, zero waste region where the environment is one of the cornerstones of the economy.

The proposed wind energy facility will contribute towards the overall move towards renewable energy sources in both provinces.

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.

According to the REIPPPP Focus on Western Cape, Provincial Report 2016, the Western Cape has a lower unemployment rate relative to the overall official unemployment rate of South Africa. However, the provincial unemployment rate has been steadily rising each year from the 18.8% y/y recorded in 2007. Nonetheless, approximately 4 out of 5 people in the province's economically active population are employed. The Western Cape has attracted 10% of the IPPPP projects to date. The electrical energy that will become available from the investments in Bidding Window 1,

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

2, 3, 3.5, 4 and 1S2 will equate to roughly 7.8% of the Western Cape's own energy needs. The Western Cape has attracted 14% of the total wind capacity procured in BW1 to BW4 and 1S2 under the REIPPPP in South Africa, contributing 467 MW of the national total 3 366 MW wind power. Of the 14 renewable energy IPPs in the province, wind has the dominant share with 8 IPPs or 77% of total provincial capacity

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 Laingsburg Local Municipality has a total population of 8 889 people, with a unemployment rate of 17.9 %. Currently there are no REIPPP projects under construction or operational within the area and therefore no data is available. However, based on the data received on the Northern Cape the positive socio-economic impacts on the local community are anticipated to assist in economic growth within the Municipality.

The development of the proposed wind facility 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.

5 PROJECT DESCRIPTION

5.1 LOCATION OF THE PROPOSED PROJECT

The proposed project is to be developed proximity 34km South of Sutherland in the Northern Cape and will comprise of a single site located on the farms outlined in **Table 5-1**.

Table 5-1: Farms included in the Maralla East Site

FARM NAME & NUMBER	21 DIGIT SG CODE	PROVINCE	FARM SIZE (HA)
Farm Welgemoed 268, Remainder	C04300000000026800000	Western Cape	2 649ha
Farm Schalkwykskraal 204, Remainder	C07200000000020400000	Northern Cape	1 056ha
Farm Drie Roode Heuvels 180, Rremainder	C07200000000018000000	Northern Cape	3 929ha

The Maralla East Wind Energy Facility falls within the Karoo Hoogland and Laingsburg Local Municipalities, which are located within the Namakwa and Central Karoo District Municipalities respectively (**Figure 5-1**).

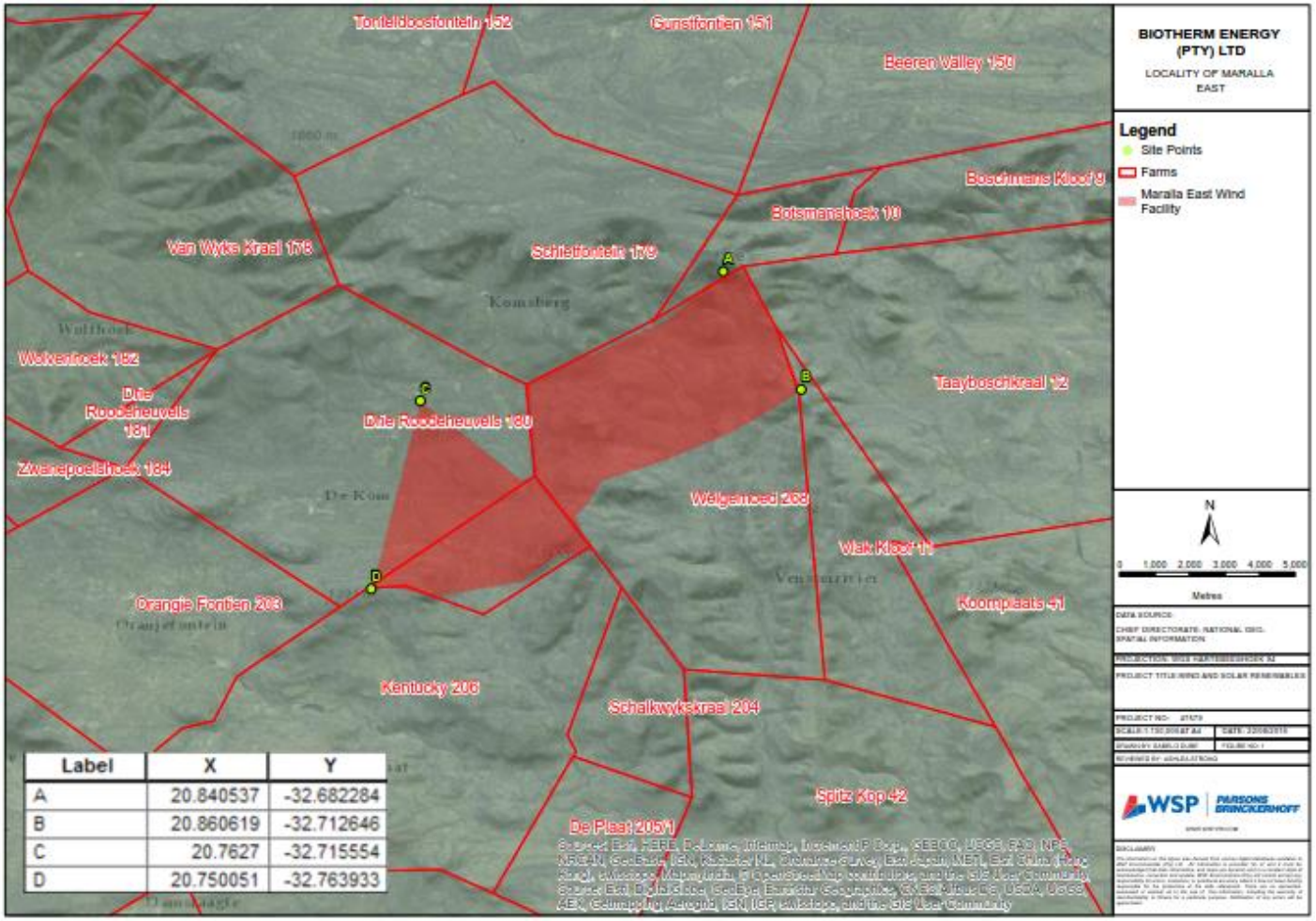
The site is considered highly suitable for a wind energy project due to the following:

- Climatic Conditions;
- Relief and aspect;
- Land availability; and
- Access to the National Grid through Eskom's Komsburg Substation located approximately 10km from the site.

There are a number of Environmental Authorisation (EA) (either issued or in process) in the area surrounding the proposed project site. 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 East project. Depending on the next bid window Maralla East 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. These EAs are illustrated in **Figure 5-2** and detailed in **Table 5-2**. 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.

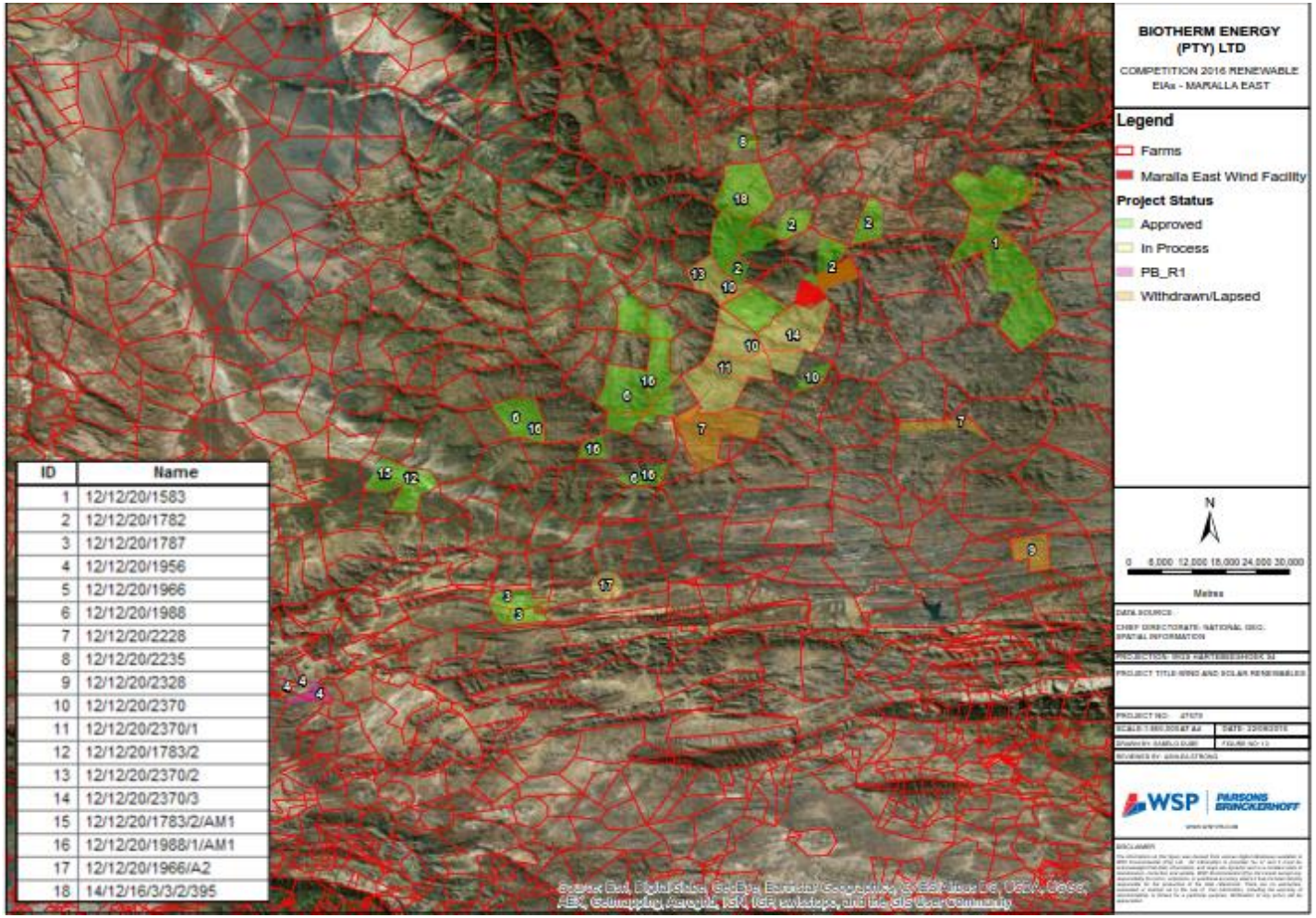
In addition to the above, the proposed project also forms part of a larger project plan proposed by the Applicant. BioTherm propose to develop two additional renewable wind energy projects in this area. The proposed three projects include:

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



Label	X	Y
A	20.840537	-32.682284
B	20.860619	-32.712646
C	20.7627	-32.715554
D	20.750051	-32.763933

Figure 5-1: Location of the Maralla East Wind Energy Facility



ID	Name
1	12/12/20/1583
2	12/12/20/1782
3	12/12/20/1787
4	12/12/20/1956
5	12/12/20/1966
6	12/12/20/1988
7	12/12/20/2228
8	12/12/20/2235
9	12/12/20/2328
10	12/12/20/2370
11	12/12/20/2370/1
12	12/12/20/1783/2
13	12/12/20/2370/2
14	12/12/20/2370/3
15	12/12/20/1783/2/AM1
16	12/12/20/1988/1/AM1
17	12/12/20/1966/A2
18	14/12/16/3/3/2/395

Figure 5-2: The location of the Existing Environmental Authorisations in the study area surrounding the proposed site

Table 5-2: Existing Environmental Authorisations study area surrounding the Maralla East 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	PB_R1

5.2 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 5-3 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.

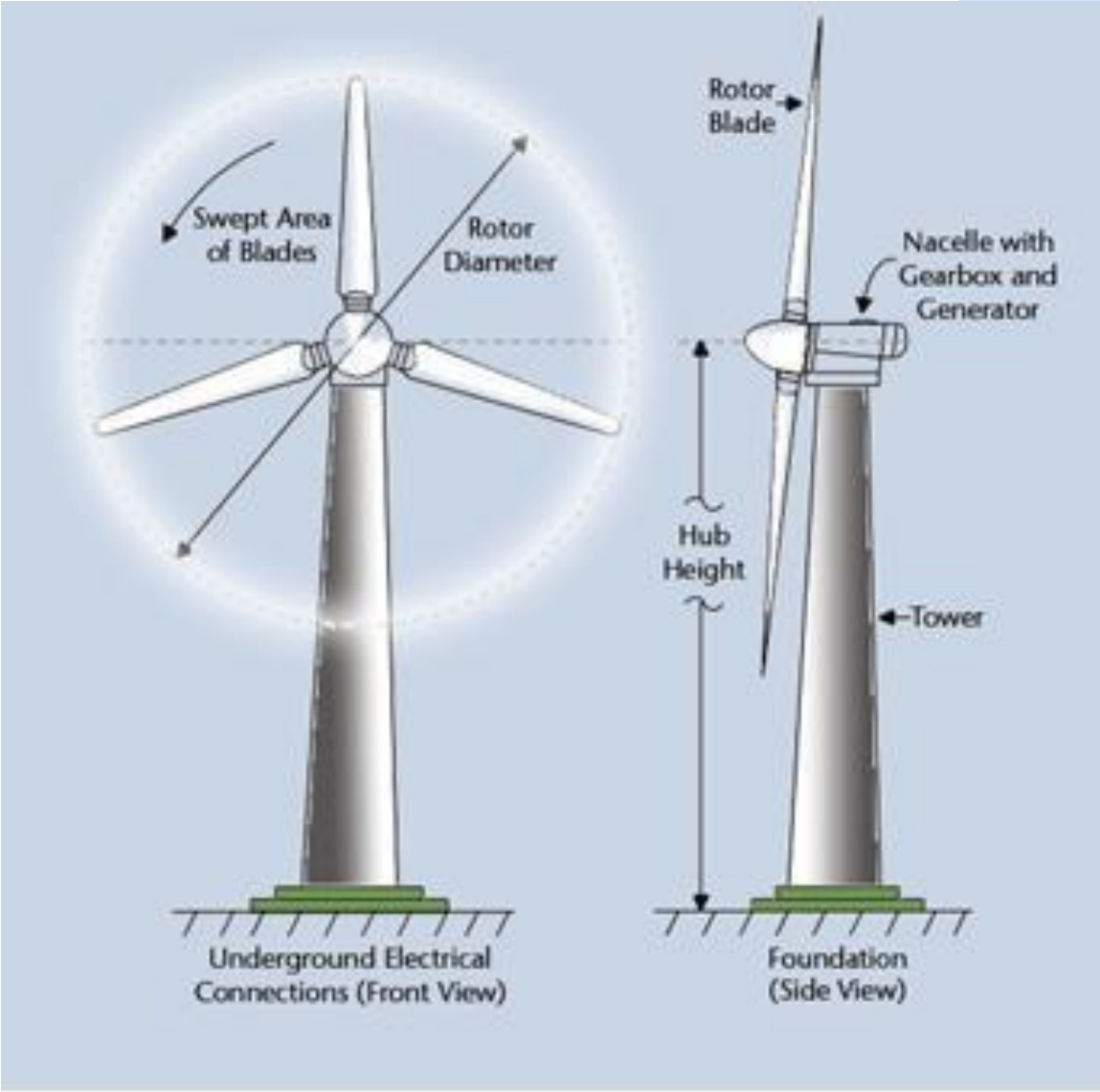


Figure 5-3: Illustration of the main components of a wind turbine

5.3 PROJECT INFRASTRUCTURE

The proposed project is for the construction and operation of a up to 250MW wind energy facility. A technical summary of the facility and its associated infrastructure is included in **Table 5-3**

Table 5-3: Details of the proposed wind energy facility and associated infrastructure

TECHNICAL DETAILS OF THE PROPOSED FACILITY	
Generation Capacity	up to 250MW
Number of turbines	up to 125
Area of buildable area	Approximately 200 ha
Area occupied by each turbine	0.5 ha (85m x 60m)
Turbine hub height	up to 120m

TECHNICAL DETAILS OF THE PROPOSED FACILITY	
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 portable 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.

5.4 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 40 000m^2 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.
- **Construct 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 cabling (where possible). 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.

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).

5.5 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.

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 5-4.**

Figure 5-4: Site Selection Process Flow Diagram

ENVIRONMENT

Environmental 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 the 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 Northern 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 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.

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 10 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, though speaking with local land owners identified parcels of land suitable for development.

STRATEGIC PLANNING CONSIDERATIONS

The project development area, including the Maralla East facility, falls within the Komsberg REDZ (**Figure 5-5**). 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.

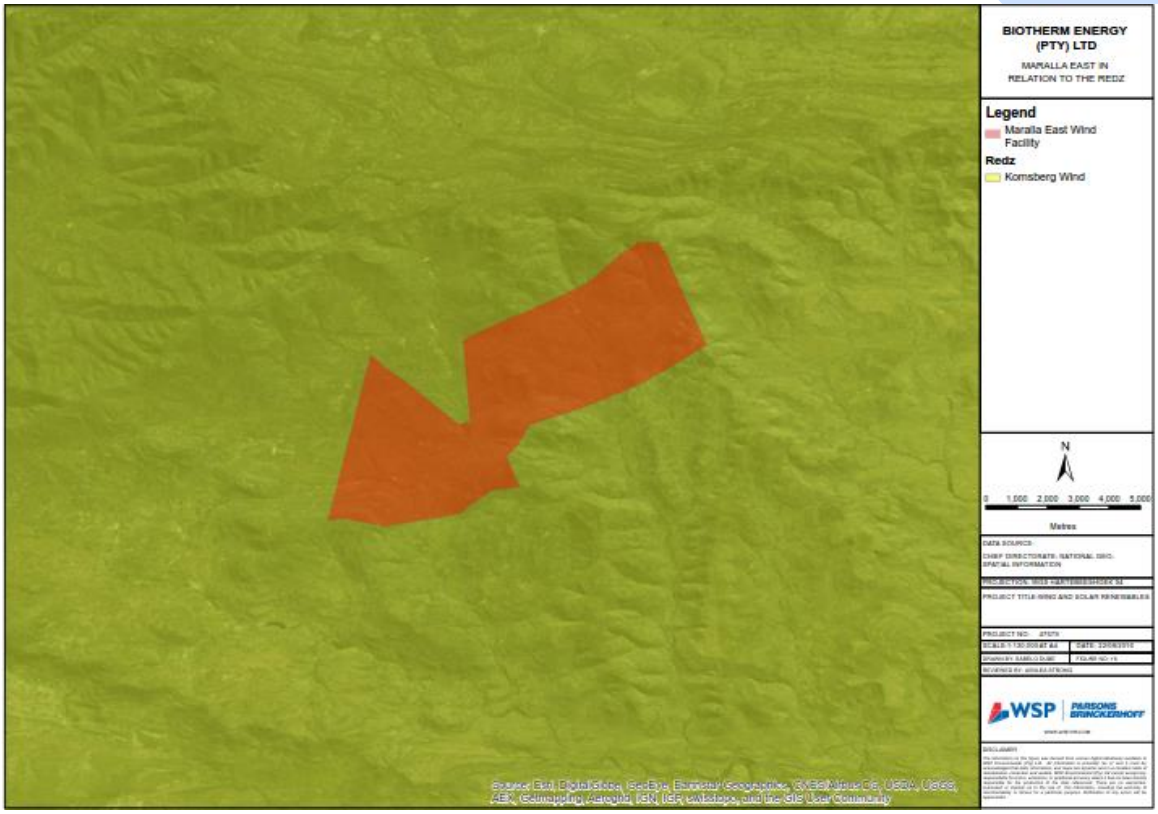
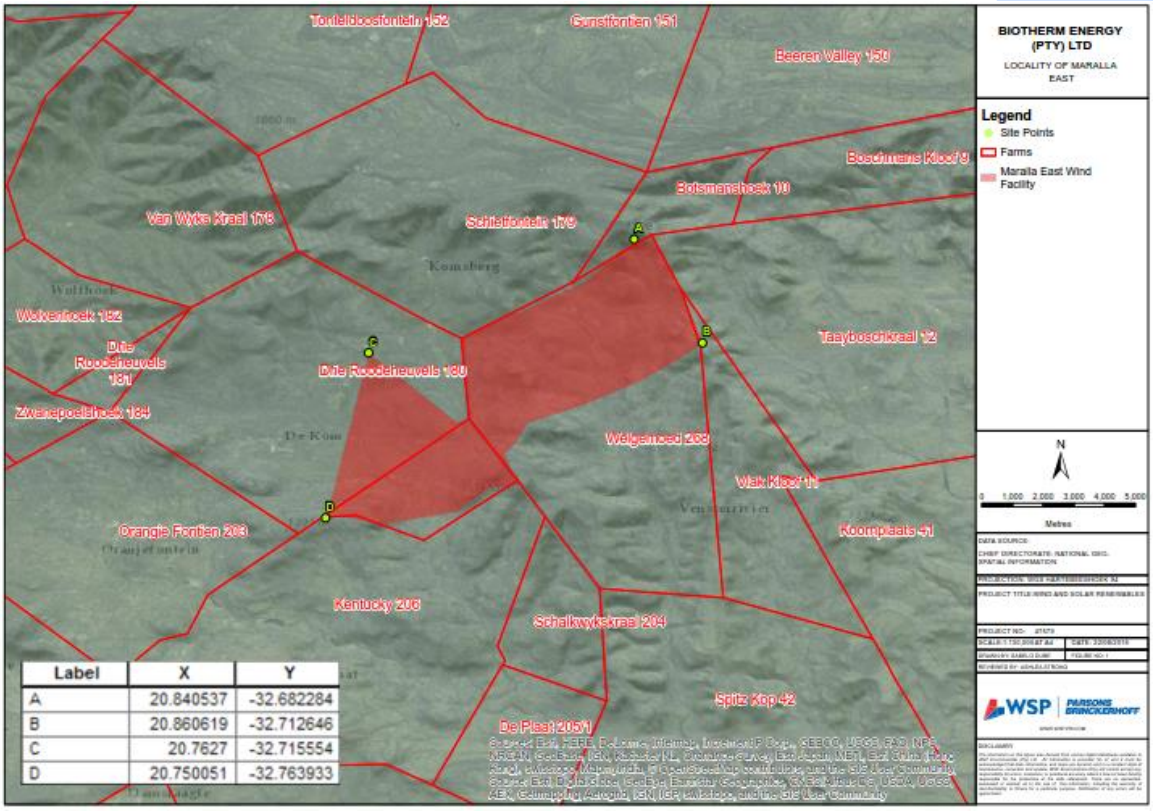


Figure 5-5: Location of the proposed site in relation to the Komsberg REDZ

SITE SELECTION

Maralla East 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.



Label	X	Y
A	20.840537	-32.682284
B	20.860619	-32.712646
C	20.7627	-32.715554
D	20.750051	-32.763933

Figure 5-6: Location of the Proposed Maralla East Project

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.

LAYOUT AND DESIGN ALTERNATIVES

An initial layout alternative was proposed for assessment during the scoping phase (**Figure 5-7**). The layout included the positions of 125 turbines within the Maralla East site. The area of the site is 4 300 ha in extent; this can adequately accommodate the up to 250MW design capacity of Maralla East. 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 scoping phase aims to identify potentially environmentally sensitive areas within the site which should be avoided by the proposed development. This information will be used to inform the final layout and design alternative for the proposed project.

During the EIA further detailed studies will be undertaken on the areas affected by the proposed layout and design alternatives in order to identify any further areas of sensitivity thereby allowing for further refinement of the final layout and design.

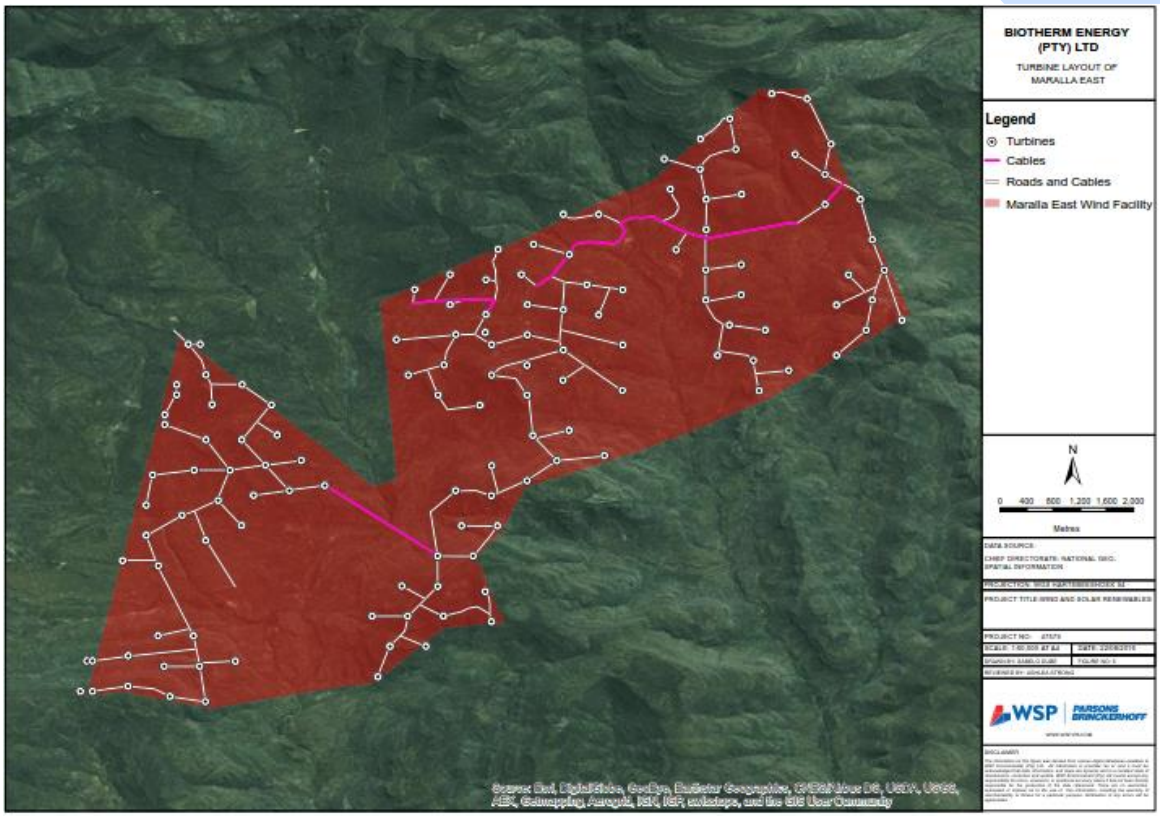


Figure 5-7: Initial layout plan for the Maralla East Turbines

ACCESS ROAD ALTERNATIVES

No alternative access routes have been identified at this stage. These will be identified in conjunction with the final layout and design alternatives.

INTERNAL POWER LINE ALTERNATIVES

The power generated by the turbines will be evacuated to the national grid via the new 132kV powerlines. These external high voltage (132kV) powerlines will be identified concurrently with the layout and design alternatives. The following 132kV tower structure alternatives are available for the internal powerlines, these will be assessed during the EIA phase:

- Steel / concrete monopole single circuit structure (**Figure 5-8**);
- Steel / concrete monopole double circuit structure (**Figure 5-9**); and
- H-pole structure (usually wooden poles) (**Figure 5-10**).

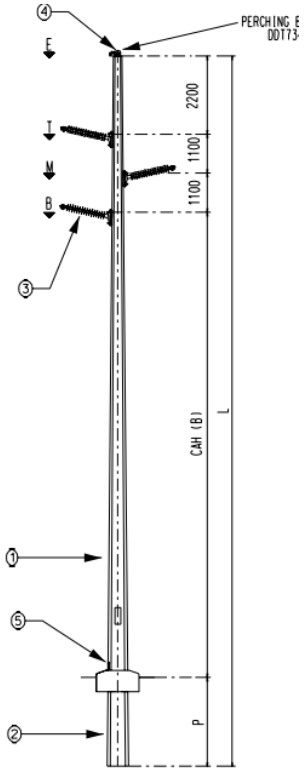


Figure 5-8: Steel / Concrete Monopole Single Circuit Structure

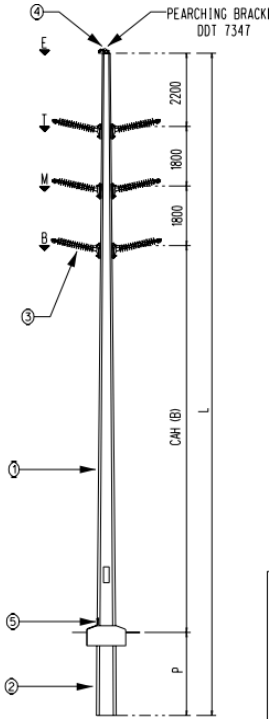


Figure 5-9: Steel / Concrete Monopole Double Circuit Structure

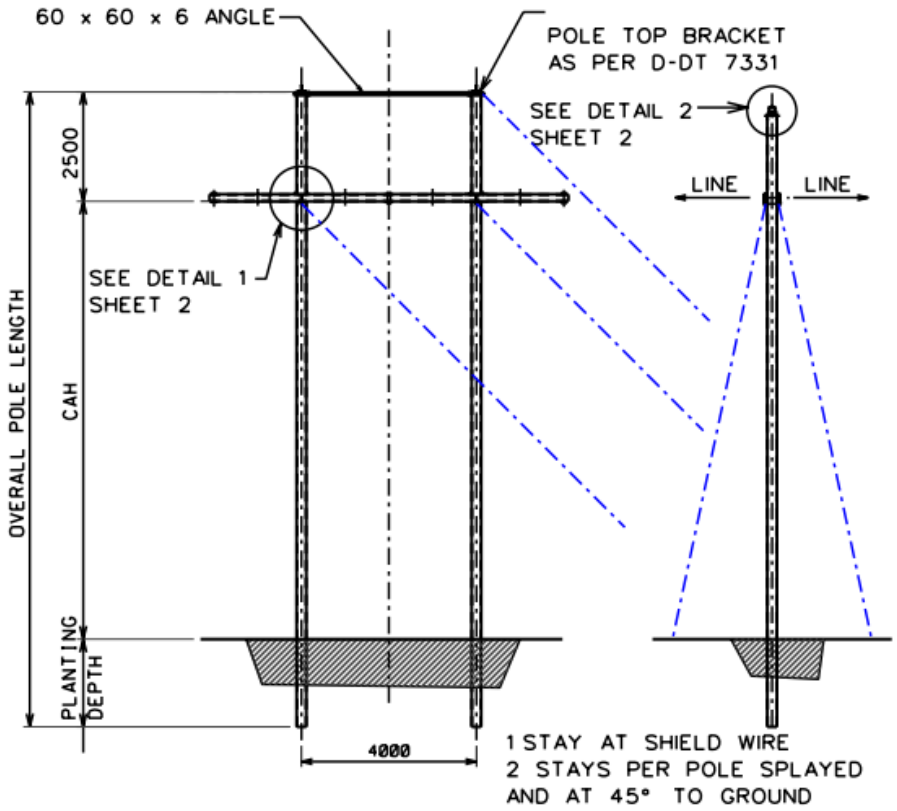


Figure 5-10: H-pole Structure (usually wooden poles)

At the on-site substation, voltage will again be stepped up before being fed to Eskom's Komsberg Substation. Power will be evacuated by one 132kV powerline. Alternative powerline corridors have been identified however; they are being assessed in a separated Basic Assessment process and will therefore not be included in the scope of this assessment.

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 4). Accordingly, the no-go option is not the preferred option.

6 DESCRIPTION OF THE BASELINE ENVIRONMENT

6.1 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 East site ranges from 984 m to 1379 m and 1098 m to 1614 m, respectively (**Figure 6-1**). There are several natural gullies and watercourses, which drain the site in the direction of the slope (**Figure 6-1**), however these are ephemeral in nature, and seldom have water present in the channels.

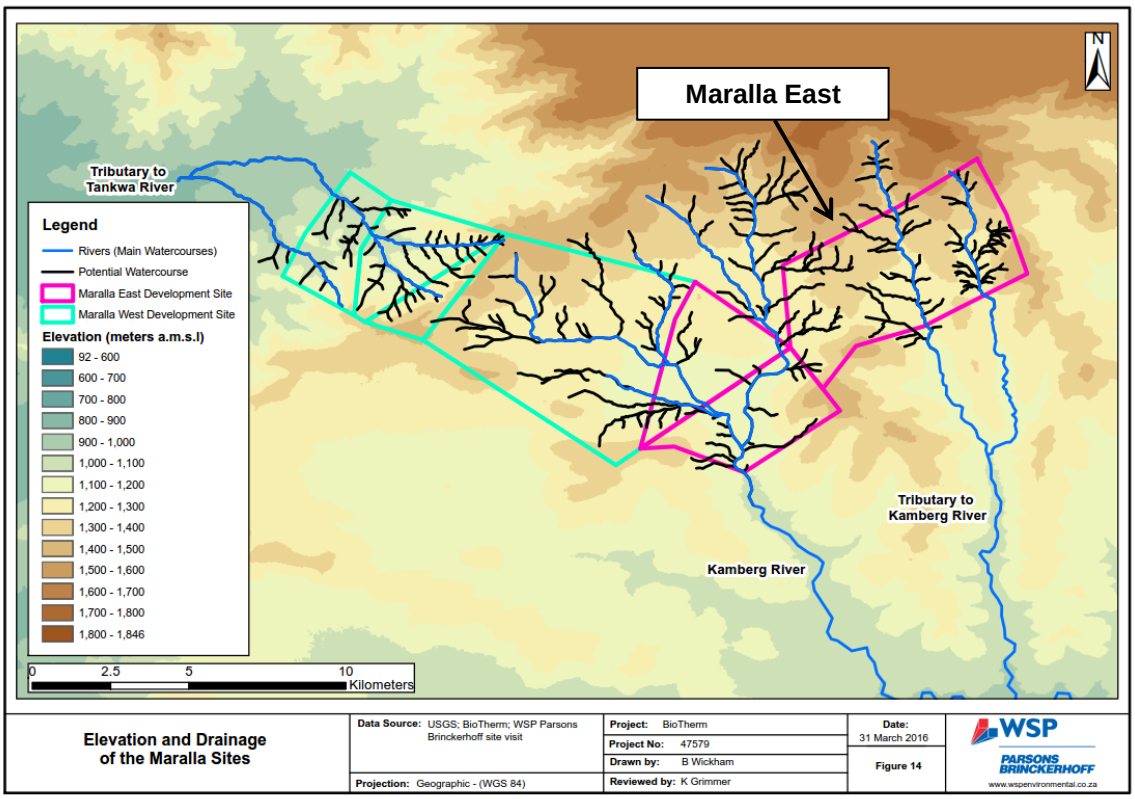


Figure 6-1: Elevation and Drainage for the Maralla East site

6.2 GEOLOGY

The Maralla East site is nested in the Roggeveld Mountains range, in the Larger Cape Fold belt system. Maralla East is located on the Beaufort Series which forms part of the Karoo system (**Figure 6-2**). 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.

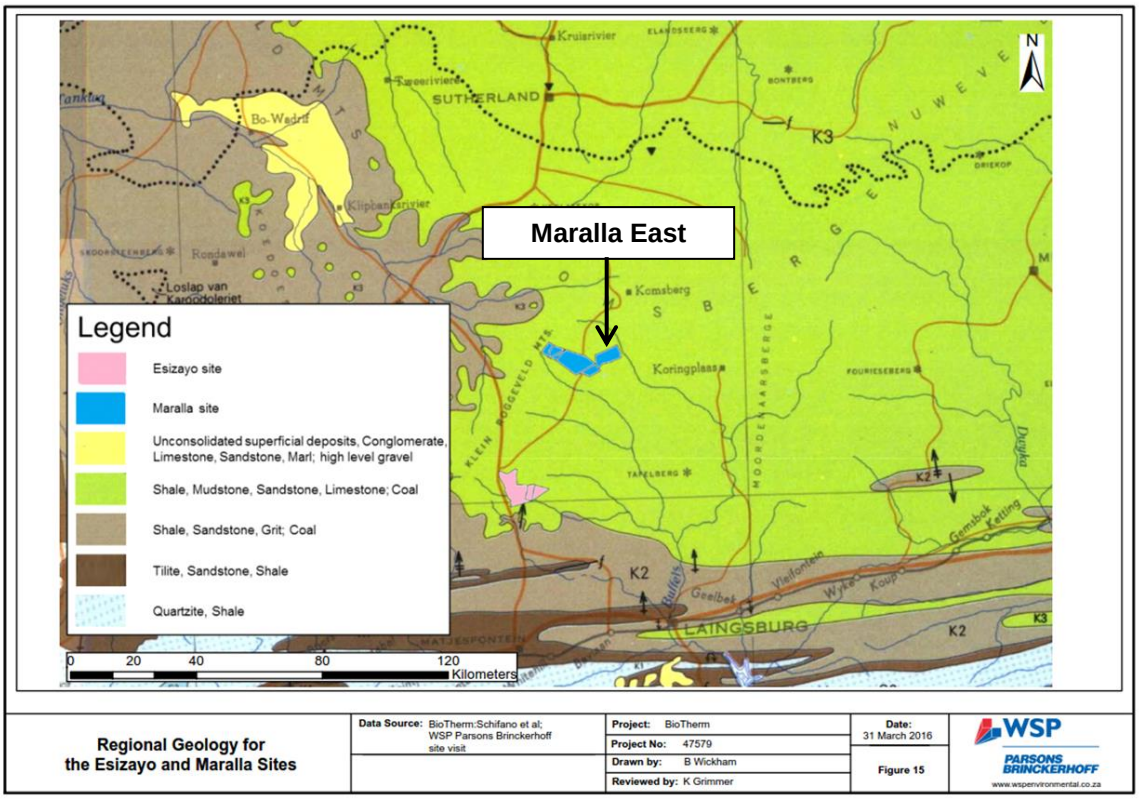


Figure 6-2: Regional Geology for the Maralla East Site

6.3 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 6-3** 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 6-4** 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 6-5** shows the number of days within one month the wind can be expected to reach certain speeds. **Figure 6-6** represents the wind rose for the Laingsburg area.

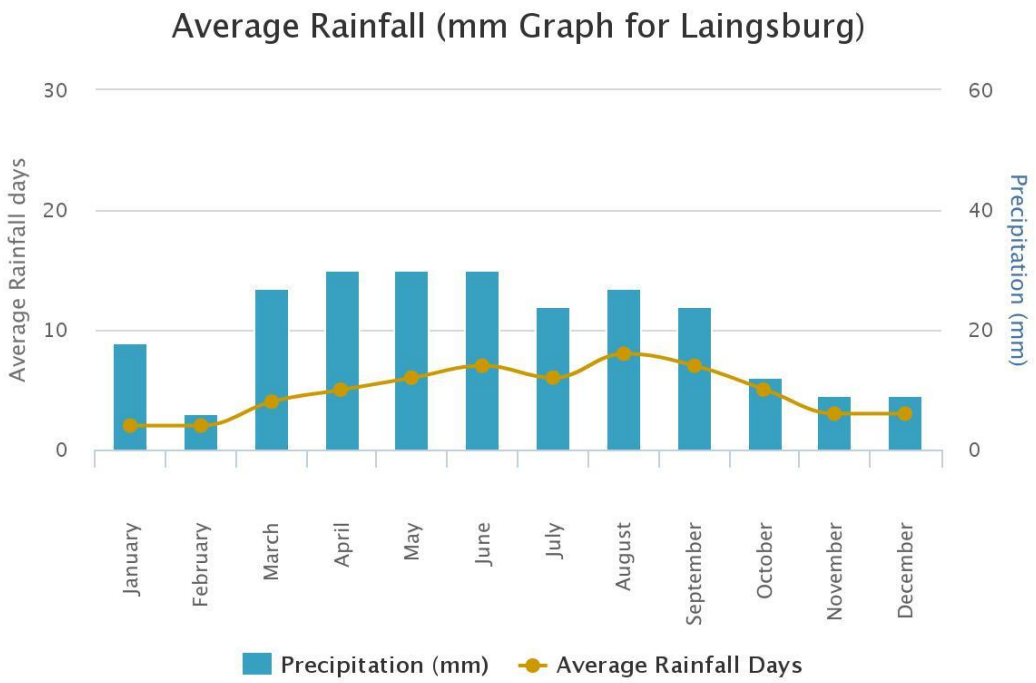


Figure 6-3: Average Annual Rainfall (mm) for Laingsburg

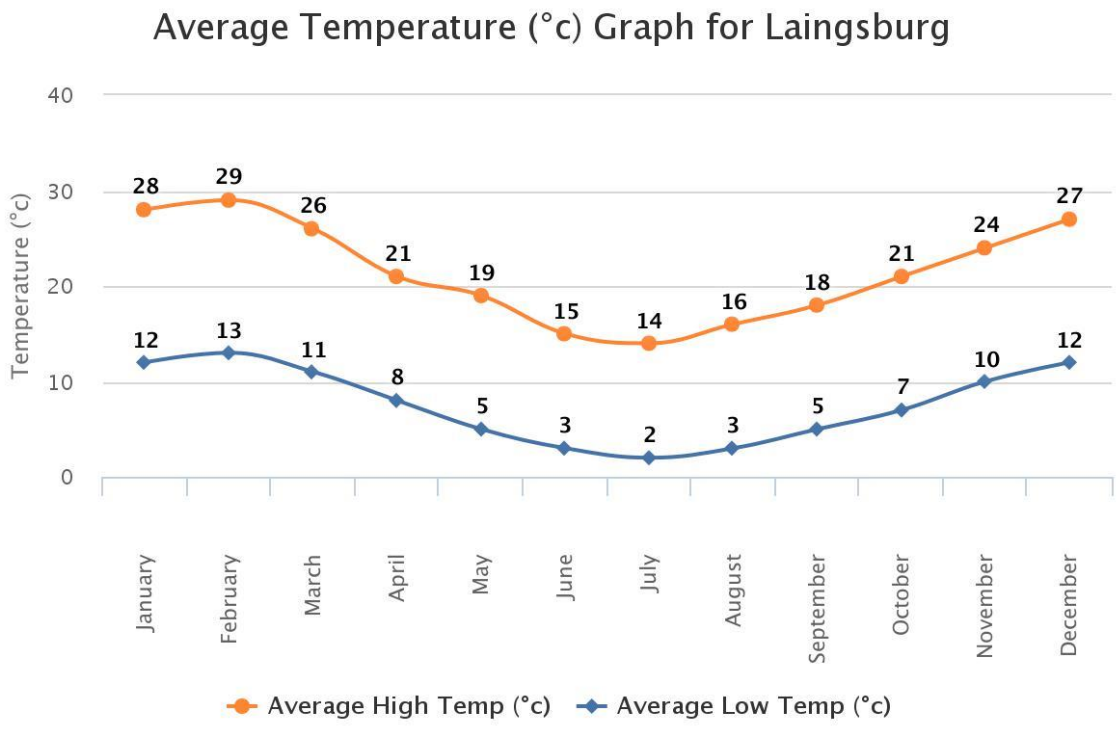


Figure 6-4: Average Annual Temperature (°C) for Laingsburg

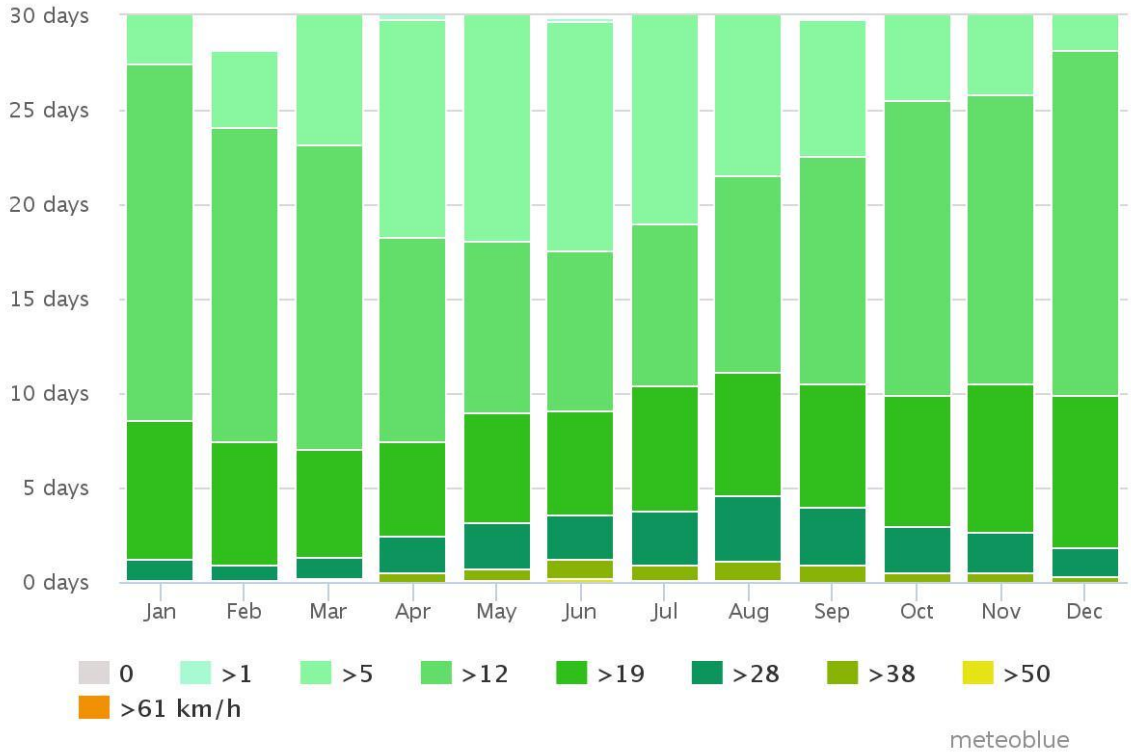


Figure 6-5: Annual Wind Speed (km/h) for Laingsburg

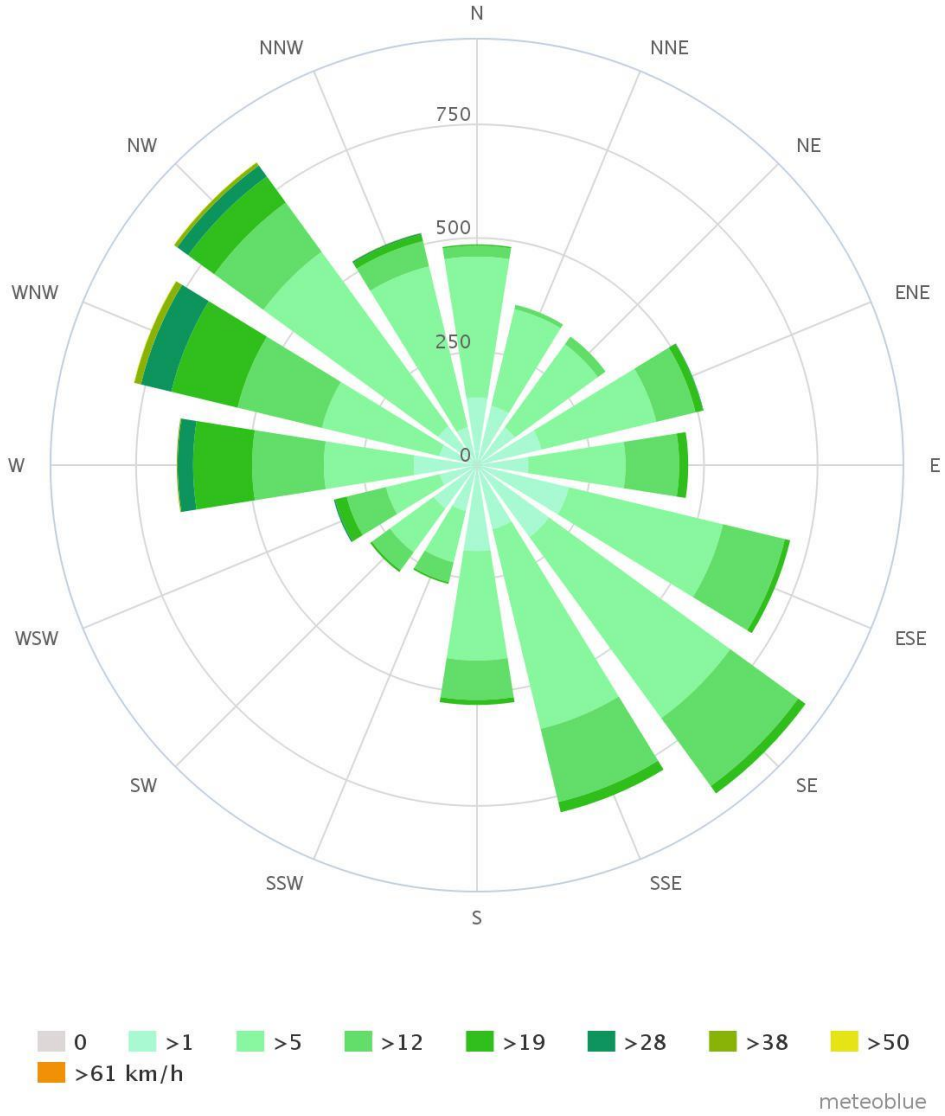


Figure 6-6: Wind Rose for Laingsburg

6.4 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 East are shown in **Figure 6-7.**

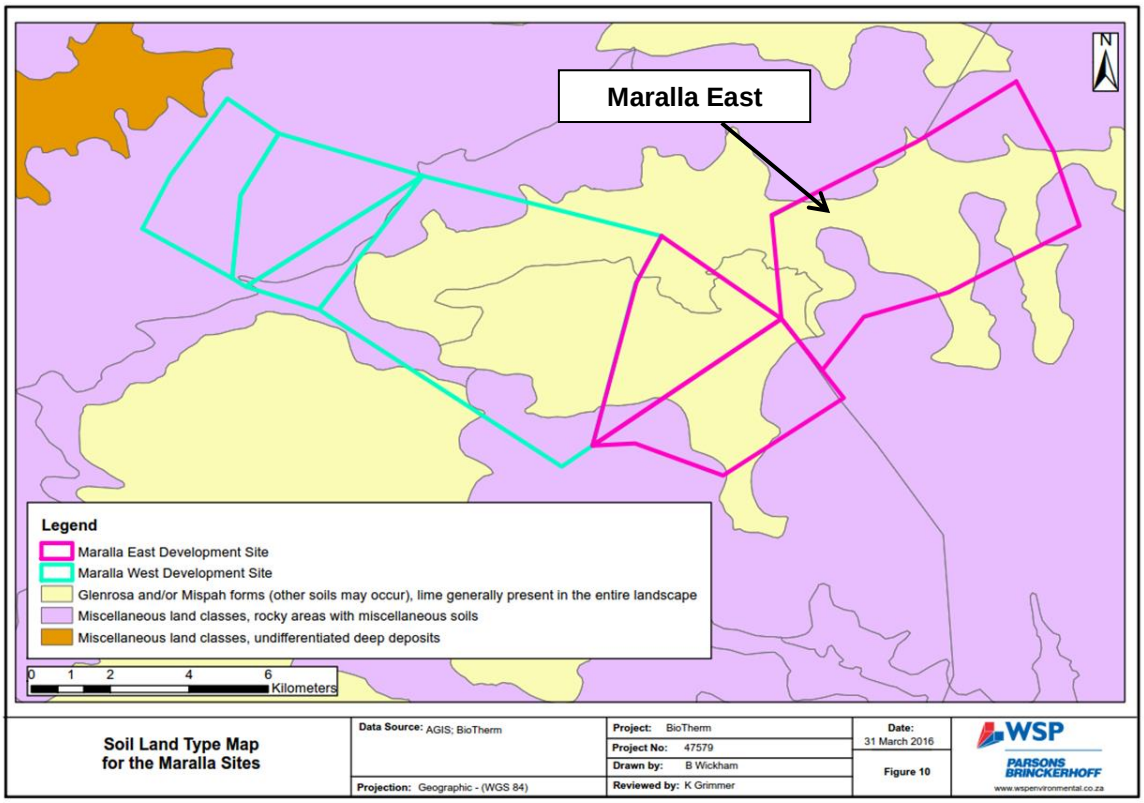


Figure 6-7: Soil Land Types for Maralla East

During the site visit, a total of 16 soil samples were taken at various locations throughout the Maralla East (**Figure 6-8**). 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 wetland flats were identified as Prieska form.

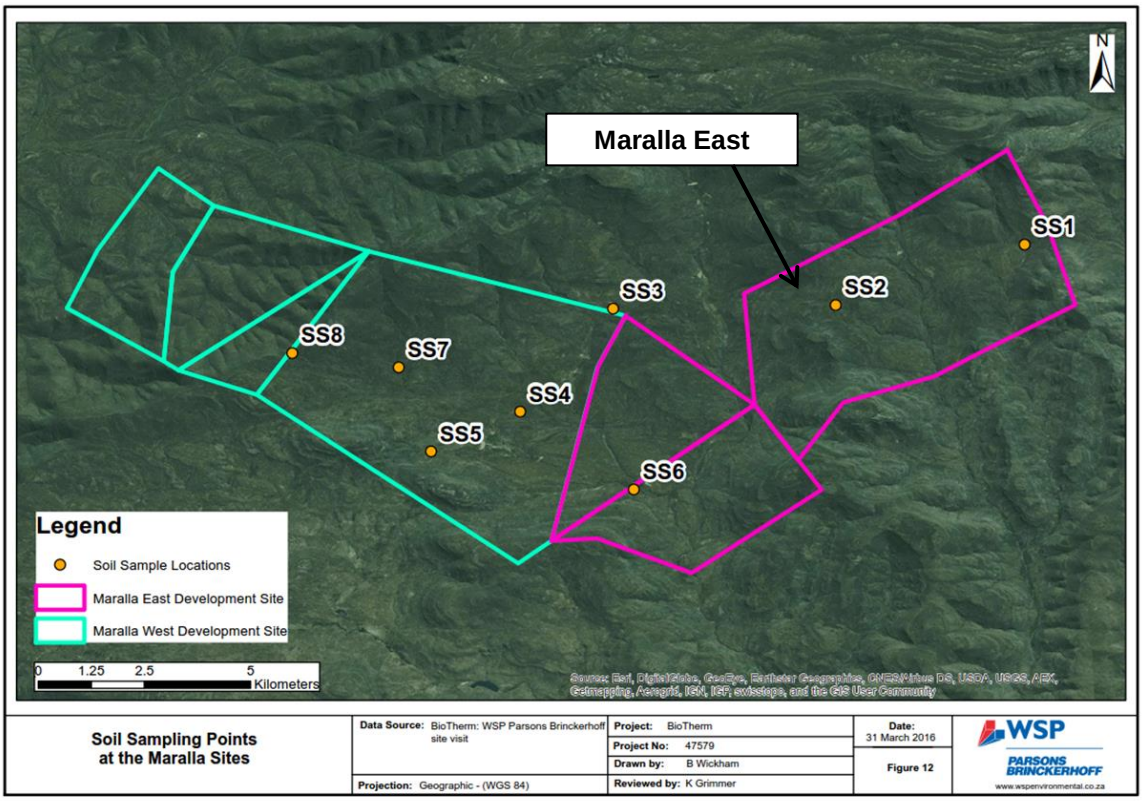


Figure 6-8: Soil Sampling Locations

NATIONAL LAND COVER AND LAND USE

The Department of Agriculture, Forestry and Fisheries (DAFF) define the land cover within the Maralla East 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 6-9**. There are three wetlands marked within the 500 m buffer around the site (**Figure 6-9**). 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.

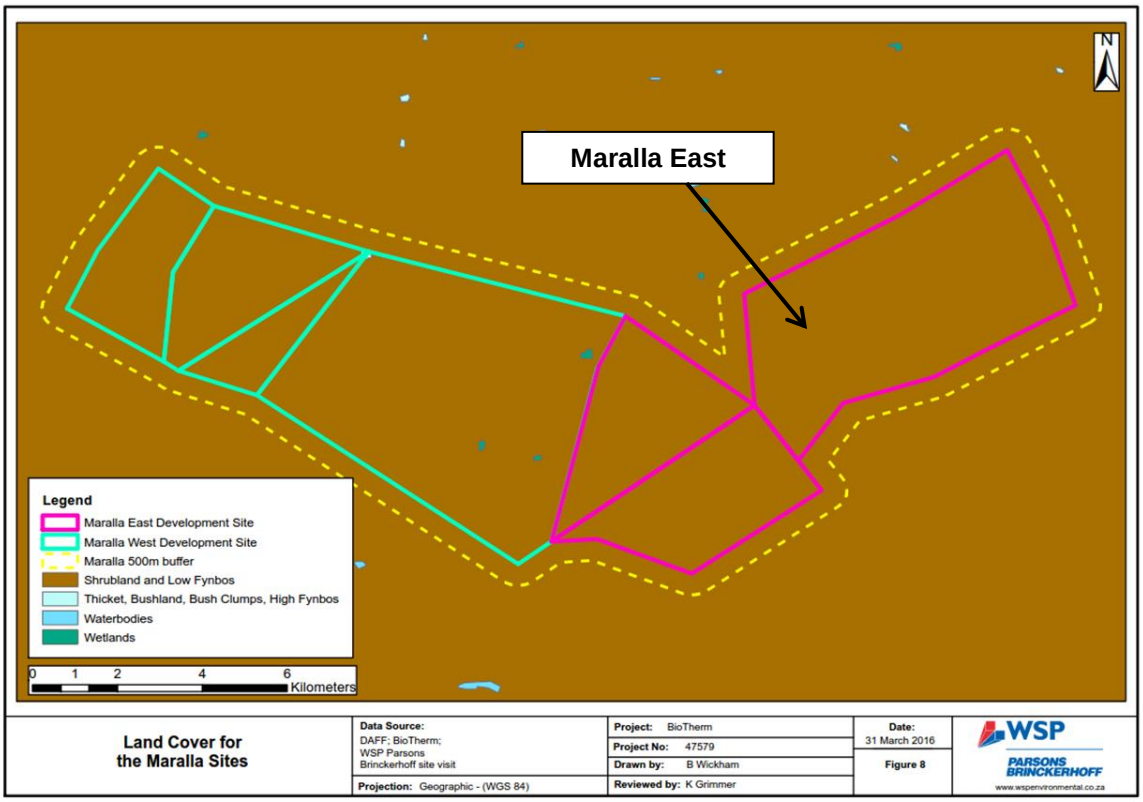


Figure 6-9: National Land Cover for Maralla East Site

6.5 NATURAL VEGETATION AND ANIMAL LIFE

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

BROAD-SCALE VEGETATION PATTERNS

According to the national vegetation map, two vegetation types occur within the study area (**Figure 6-10**). The majority of the site falls within the Central Mountain Shale Renosterveld vegetation type and a very small extent of Roggeveld Shale Renosterveld along the north-eastern border of the site.

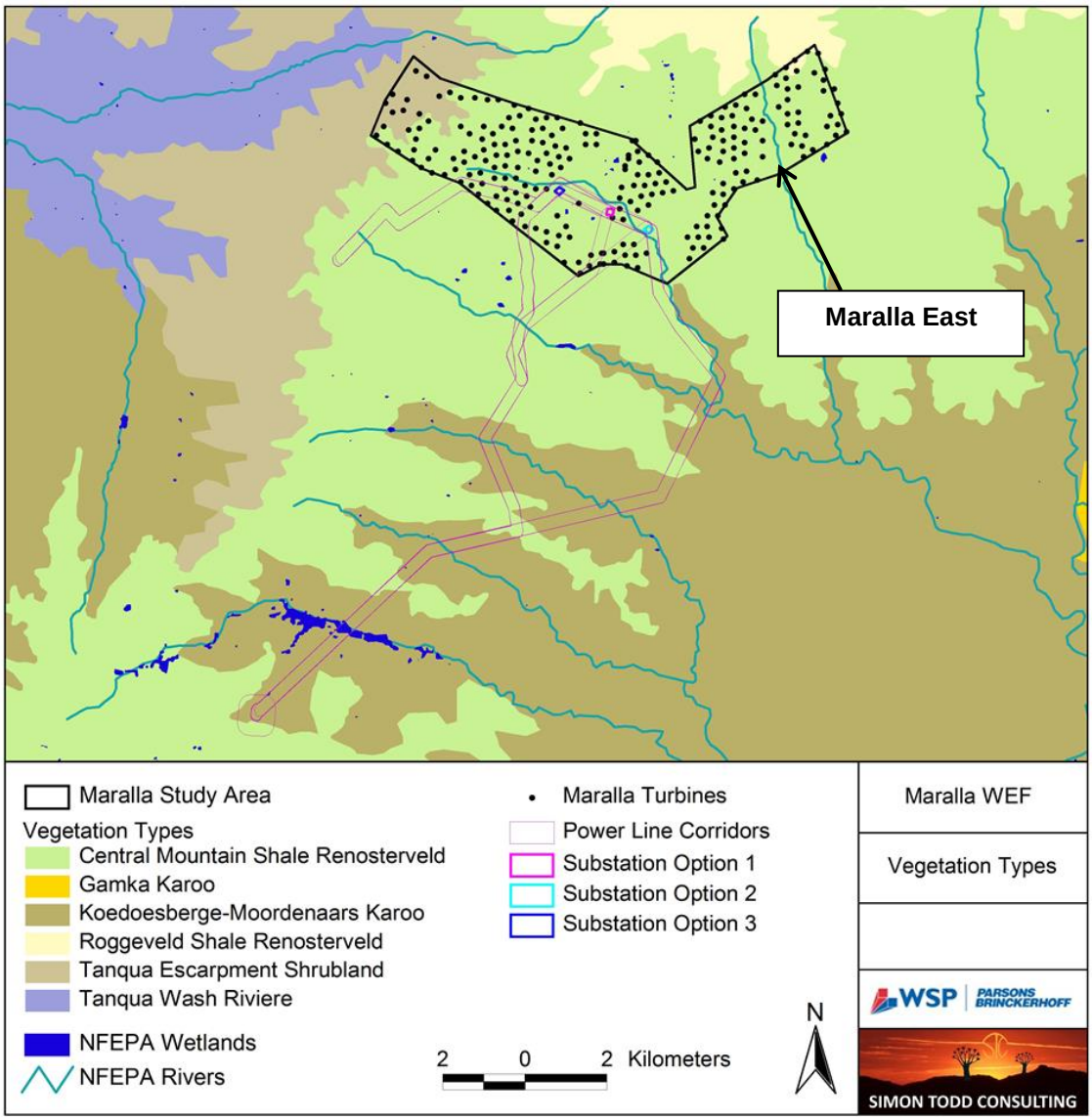


Figure 6-10: Broad-scale overview of the vegetation in and around the proposed site

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 lb and Fc. Although this vegetation type is classified as Least Threatened, it has a very limited extent of 1236km2 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. Experience from this and other projects in the area indicate that this should be considered to be a relatively sensitive vegetation type with a relatively high abundance of species of conservation concern. The Komsberg area is also 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 (Clark et al. 2011).

Roggeveld Shale Renosterveld occurs in the Northern and Western Cape and occupies the majority of the Roggeveld from the edge of the Western edge of the Great Escarpment mostly above the Tanqua Basin, reaching as far east as the higher-lying areas of the Teekloof Pass south of Fraserburg along the northwest summit plateaus of the Nuweveldberge (Mucina & Rutherford 2006). It occupies undulating, slightly sloping plateau landscapes, with low hills and broad shallow valleys supporting mainly moderately tall shrublands dominated by renosterbos with a rich geophytic flora in the wetter and rocky habitats. It occurs mostly on mudrocks and sandstones of the Adelaide Subgroup. The land types present are mostly Fc and Da. Mucina & Rutherford (2006) list 12 endemic species for this vegetation type, which is a large number given that the total extent of the vegetation type is only 2917 km^2.

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 6-1**). 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) *Drimia altissima* (Declining). 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 low abundance of such species

Table 6-1: 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

The site lies along the boundary of two fine-scale conservation plans, with the Namakwa District Biodiversity Sector Plan (Desmet & Marsh 2008) in the Northern Cape (Maralla West) and the Biodiversity Assessment of the Central Karoo District Municipality (Skowno et al. 2009) covering those parts of the site (Maralla East) within the Western Cape. These district-wide biodiversity assessments were commissioned to inform Spatial Development Frameworks (SDFs), Biodiversity Sector plans, Environmental Management Frameworks (EMFs), Strategic Environmental Assessments (SEAs) and the Environmental Impact Assessment (EIA) process. The Biodiversity Assessments identify 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 6-11**. The majority of the Maralla East development is within a CBA, while there are some small scattered CBAs within Maralla West associated with south-facing slopes that are considered important for climate change resilience.

Given that the objective of CBAs is to identify biodiversity priority areas which should be maintained in a natural to near natural state, development within CBAs is not encouraged and may not be compatible with the objectives of the CBA if there are significant impacts on areas of high biodiversity or species not found elsewhere. The likely implications and impacts of development within the CBAs and their immediate environment is a potential concern for the development that needs to be carefully addressed through avoidance of sensitive areas identified in the EIA as well as thereafter through the implementation of a robust and effective environmental management plan that reduces construction and persistent operational phase impacts. Pertinent issues in this regard include establishing the underlying reasons that an area has been identified as a CBA and if there are any mitigation measures that can be implemented that can significantly reduce or avoid impacts on the CBAs or those receptors which were identified as being significant.

According to the map of DEA-registered projects as at April 2016, there are a large number of renewable energy project applications in the area (**Figure 6-12**). These are concentrated along the escarpment as well as on the Elandsberge south of the escarpment. In terms of cumulative impact it is important to consider the vegetation types and habitats that would bear the brunt of development in the area.

The broad area is quite diverse in terms of the different vegetation types present in the area, with the result that each development tends to impact different vegetation types. Cumulative impacts on Central Mountains Shale Renosterveld however appear to be a particular concern as this vegetation type has a relatively limited extent and a significant proportion, especially in the west is within renewable energy development application areas. The current development potentially consists of several phases and possibly a large number of turbines, with the result that the potential contribution to cumulative impact from the development is high. As the impact results from transformation as well as the presence of the facility, this impact cannot be avoided, although reducing the footprint will also reduce the impact to some degree.

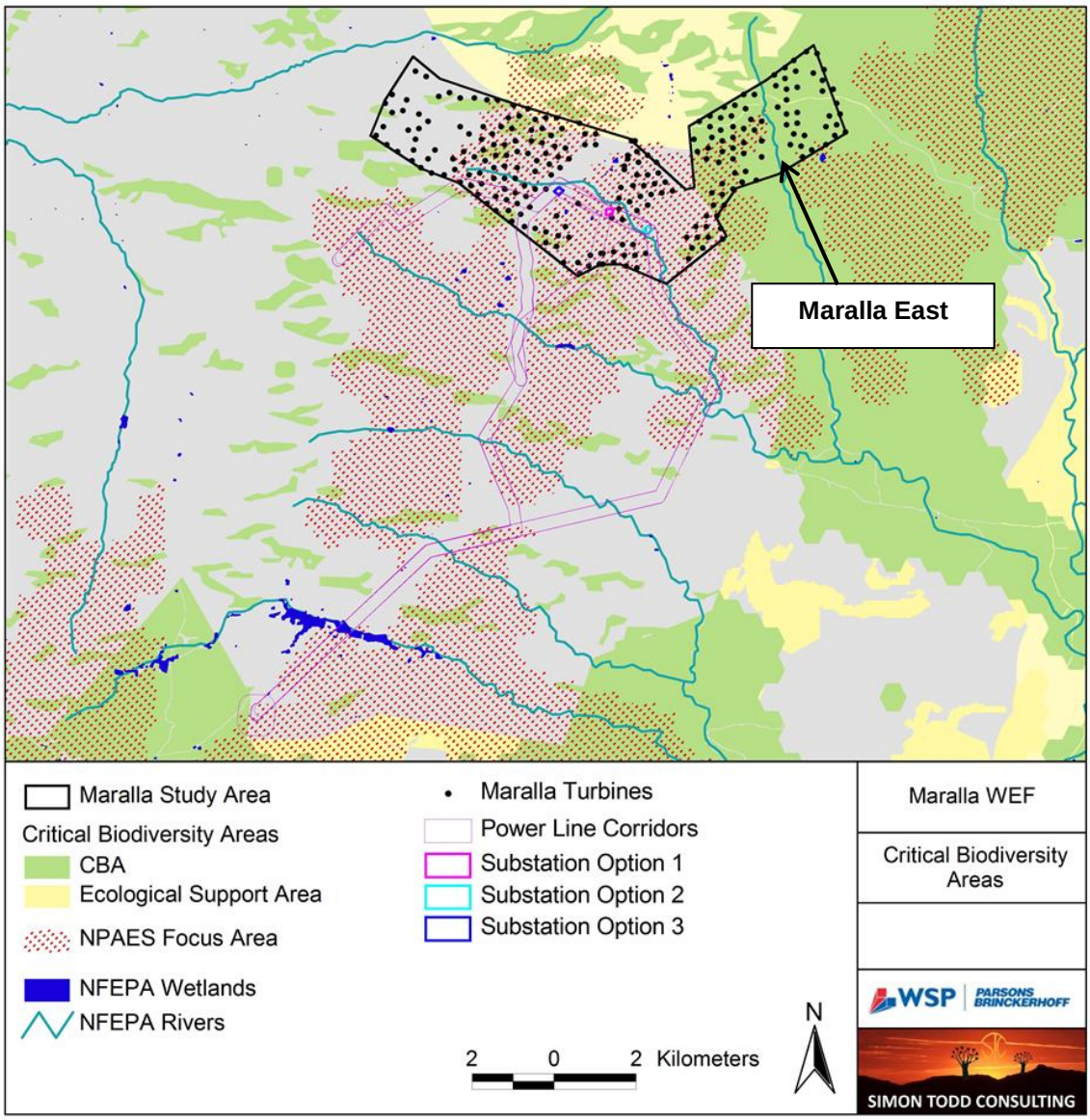


Figure 6-11: Critical Biodiversity Areas map of the area around the Proposed Site

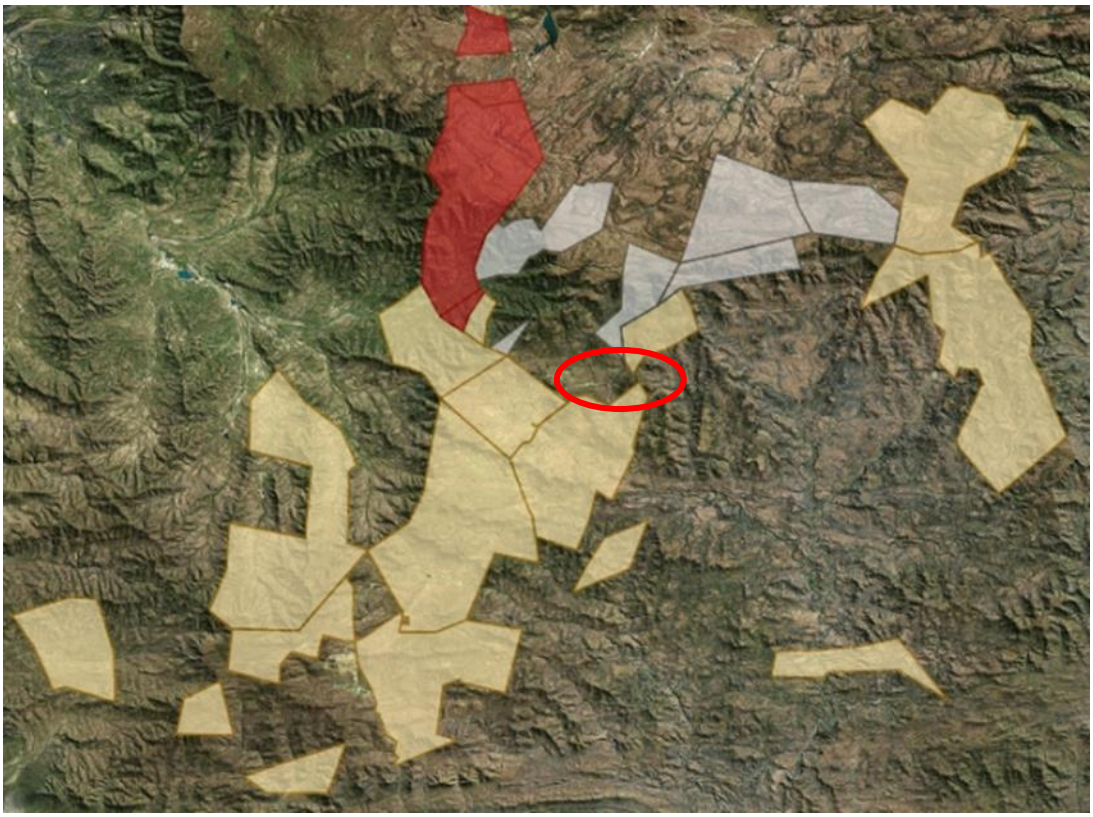


Figure 6-12: Map of DEA registered renewable energy applications as of April 2016 (Maralla East is indicated by the red circle)

FAUNAL COMMUNITIES

MAMMALS

At least 50 mammal species potentially occur at the site (Appendix 2). 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. The mammalian community is therefore relatively rich and due to the remote and inaccessible nature of large parts of the area probably has not been highly impacted by human activities aside from livestock grazing, which is largely compatible with most biodiversity processes.

Despite trapping and hunting by the local landowners, medium sized carnivores such as jackal and caracal appear to be relatively common in 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*. The lowlands are likely to contain an abundance of species associated with lowland habitats such as deeper soils and floodplain habitats, which includes Brants's Whistling Rat *Parotomys brantsii*, the Bush Vlei Rat *Otomys unisulcatus*, Hairy-footed Gerbil *Gerbillurus paeba* and Common Duiker *Sylvicapra grimmia*.

A number of antelope are common in the affected area and would potentially be impacted by the development. Both Duiker and Steenbok *Raphicerus campestris* are 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. Grey Rhebok *Pelea capreolus* are common at

the site and although this species may become habituated to the presence of the facility, they may avoid the vicinity of the turbines and experience some habitat loss as a result.

The Riverine Rabbit *Bunolagus monticularis* which is listed as Critically Endangered and is regarded as the most threatened mammal in South Africa is known to occur in the broader area. This species is usually associated with alluvial terraces and floodplains of ephemeral rivers of the Karoo. As there does not appear to be any suitable habitat within the site, it is not likely that this species would be impacted by the development.

REPTILES

There is a wide range of habitats for reptiles present at the site, including rocky uplands and cliffs, open flat and lowlands and densely vegetated riparian areas. As a result the site is likely to have a relatively rich reptile fauna which is potentially composed of 7 tortoise species, 20 snakes, 17 lizards and skinks, two chameleons and 10 geckos. The area has however been very poorly sampled as illustrated by the fact that there are only 18 records representing 9 species for the 4 quarter degree squares around the site, within the ReptileMap database of the ADU. Consequently, the estimate of potential richness is based on broad-scale distribution maps in the literature and not the ADU database. Some little-known species which have previously been listed but have been recently downgraded to Least Concern may occur in the area, this includes Fisk's House Snake *Lamprophis fiskii* and the Namaqua Plated Lizard *Gerrhosaurus typicus*. 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 area include Karoo Tent Tortoise *Psammobates tentorius tentorius*, Angulate Tortoise *Chersina angulata*, Puff Adder *Bitis arietans*, Karoo Girdled Lizard *Cordylus polyzonus*, Southern Rock Agama *Agama atra*, Namaqua Plated Lizard *Gerrhosaurus typicus*, Cape Skink *Mabuya capensis*, Namaqua Sand Lizard *Pedioplanis namaquensis* and Cape Cobra *Naja nivea*. Although there are a variety of different habitats present, the generally intact nature of the area means that most habitats have associated reptiles.

In general, the predominant potential 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

Although there are no perennial rivers within the site, many of the larger drainage lines contain pools which have water on a near-perennial basis. Cape River Frogs were observed using these pools and other species are likely to be breeding in them as well. In addition, there are a number of pans and irrigation dams at the site which would also represent important breeding sites for water-dependent species. The amphibian diversity at the site is however likely to be relatively low as the site lies within the distribution range of only eight frog and toad species. The only species observed during the site visit was the Cape River Frog *Amietia fuscigula* which is present in farm dams and pools in the rivers of the site. 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.

In general, the most important areas for amphibians at the site are the riparian areas, seeps and wetlands and the man-made earth dams which occur in the area. As these are widely recognized as sensitive habitats, impacts to these areas are avoided largely at the design phase of the development and a minimum amount of infrastructure has been located in the vicinity of these features. Consequently, 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.

6.6 AVIFAUNA

The Avifauna Assessment was undertaken by Chris van Rooyen Consulting and is included in **Appendix I**.

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).

A total of 161 species could potentially occur in the study area. Of these, 19 are classified as priority species. **Table 6-2** 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 6-2: Priority Species that could potentially occur at the Maralla East 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	6.25	✓ 10.42	X	X		X	
Buzzard, Jackal	*Buteo rufofucus*	X			Near Endemic	Endemic	53.13	✓ 22.22	X		X		
Buzzard, Steppe	*Buteo vulpinus*	X					15.63	✓ 17.65	X		X		
Eagle, Booted	*Aquila pennatus*	X					3.13	✓ 10.71	X		X		
Eagle, Martial	*Polemaetus bellicosus*	X	VU	EN			21.88	✓ 10.42	X		X		
Eagle, Verreaux's	*Aquila verreauxii*	X	LC	VU			6.25	✓ 16.67	X		X		
Eagle-Owl, Spotted	*Buba africanus*	X					28.13	✓ 5.88			X		
Francolin, Grey-winged	*Scleroptila*	X			Endemic (SA, Lesotho, Swaziland)	Endemic	40.63	✓ 8.33	X			X	X
Goshawk, Southern Pale Chanting	*Melierax canorus*	X				Near endemic	34.38	✓ 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	0	✓ 12.00	X		X		
Kestrel, Lesser	*Falco naumanni*	X					3.13	× 0.00			X		
Kite, Black-Shouldered	*Elanus caeruleus*	X					0	✓ 29.41			X		
Korhaan, Karoo	*Eupodotis vigorsii*	X	LC	NT		Endemic	15.63	✓ 15.00	X	X		X	X
Korhaan, Southern Black	*Afrotis afra*	X	VU	VU	Endemic	Endemic	25	✓ 16.00		X	X	X	X
Snake-Eagle, Black-chested	*Circaetus pectoralis*	X					3.13	✓ 16.67	X		X		
Sparrowhawk, Rufous-chested	*Accipiter rufiventris*	X					9.38	× 0.00	X		X		
Stork, Black	Ciconia nigra	X	LC	VU			0	✓ 5.88	X		X		
Falcon, Lanner	Falco biarmicus	X	LC	VU			0	0	X		X		

6.7 BATS

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

"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 6-3** 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 6-3: Table of Species that may be roosting or foraging on Maralla East

SPECIES	COMMON NAME	PROBABILITY OF OCCURRENCE	CONSERVATION STATUS	POSSIBLE ROOSTING HABITAT ON SITE	POSSIBLE ROOSTING HABITAT UTILIZED ON SITE	LIKELIHOOD OF RISK OF FATALITY (SOWLER AND STOFFBERG 2014)
Rhinolophus clivosus	Geoffroy's horseshoe bat	20-30	Least Concern	Culverts, rock hollows and any other suitable hollow. Usually roosts in caves and mine adits	Clutter forager, may be found near dwellings and in denser vegetative valleys.	Low
Nycteris thebaica	Egyptian slit-faced bat	20-30	Least Concern	Hollows and culverts under roads.	Clutter forager, may be found near dwellings and in denser vegetative valleys.	Low
Tadarida aegyptiaca	Egyptian free-tailed bat	90-100	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	90-100	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	80-90	Least Concern	Roosts in rock crevices	Clutter-edge forager	Medium - High
Myotis tricolor	Temmink'smyotis	40-50	Least Concern	Usually roosts gregariously in caves, and sometimes culverts or other hollows. No known caves or mine adits close to site.	Clutter-edge forager	Medium - High
Neoromicia capensis	Cape serotine	90-100	Least Concern	Roosts under the bark of trees and under roofs of houses.	Clutter-edge forager	Medium - High

6.8 WATER RESOURCES

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 East Site falls within the Gouritz Water Management Area 16 (WMA 16) and Olifants-Doring Water Management Area 17 (WMA 17). The Maralla East Site is located within the quaternary catchments J11A and E23A. **Table 6-4** 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 East site.

Table 6-4: Hydrological characteristics of the quaternary catchments (Source: WR2012, WRC/DWS, 2012)

QUATERNARY	WMA	MAP (MM/A)	MAE (MM/A)	MAR (MILLION M3/A)
Maralla East				
J11A	Gouritz (WMA 16)	295	1965	5.86
E23A	Olifants-Doring (WMA 17)	254	1895	3.25

6.9 HERITAGE

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

ARCHAEOLOGICAL BACKGROUND

PRE- COLONIAL ARCHAEOLOGY

There are very few Early or Middle Stone Age sites in the study area. Halkett & Webley (2011) observed Middle Stone Age (MSA) artefacts including scatters of polished/patinated stone chunks, flakes and cores, with occasional denticulation noted.

Lloyd Evans et al. (1985) excavated a small rock shelter on the grounds of the South African Astronomical Observatory in Sutherland. It contained a Later Stone Age. They comment (1985: 108) that the presence of the shell beads points to cultural ties with people along the Cape coast while the small scrapers can be assigned to the Wilton industry. Hart (2005) reported finding a dense artefact scatter associated with a shallow rock shelter while doing a survey for a golf course to the south of Sutherlands. The study indicated that archaeological sites may be found in areas that were sheltered from the wind.

Halkett & Webley (2011) and the present study, recorded only a handful of well-defined LSA sites, some associated with indigenous ceramics, generally located in proximity to water sources (springs and river banks). The LSA stone artefact assemblages included thumbnail scrapers, and the raw material included a grey chert. Large flakes on indurated shale or hornfels is also common. The Halkett & Webley (2011) study identified the presence of “open Khoekhoen encampments” along the dry river beds in the bottom of valleys and this study supports these conclusions.

One of the most common type of pre-colonial site found in the Roggeveld area, are stone kraals or stone structures (Halkett & Webley 2011; this study). They typically consist of dry stone piled wall enclosures in a roughly circular configuration, sometimes interlocking but not more than half a metre high, and ranging from 3 – 4 meters in diameter. It is believed that many of these stone structures

represent the “kraals” for small stock such as fat-tailed sheep and goats. While large kraal complexes, consisting of interlocking enclosures have been recorded elsewhere on adjoining properties, none were found in the study area.

ROCK ART

At least four small shelters with rock paintings have been recorded (Halkett & Webley 2011; and this study) in and around the study area. These included sites with indistinct human figures and some faded finger daubs. A further rock art site was reported to us by Mr Hanekom from the farm Saailands. There is a small possibility that more caves or rock shelters with rock art will be found in the study area.

HISTORICAL BACKGROUND

Schoeman (1986) has described the early settlement of the Roggeveld and Sutherland area which commenced around 1750. The first recorded loan farms in the Roggeveld date to 1743, and by 1750 there were 31 registrations (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. Each Trekboer usually had in addition to a loan farm on the plateaux, a farm in the Karoo known as a legplaats (outpost). Initially, the population of the area remained small, because many of the early loan farms were merely “stock posts” and the owners lived elsewhere. Drought, poor grazing and attacks by the San caused many farms to be abandoned. According to Penn (2005), in the 18th century there were numerous independent Khoekhoen kraals located amongst the Trekboer farms in the Roggeveld.

Resistance to the Trekboers in the Roggeveld came initially from the San who resisted fiercely throughout the great Karoo, at times beating back the vanguard of *Trekboer* farmers. In 1754, attacks from the Khoisan are reported to have increased and flocks of sheep and herds of cattle belonging to the Trekboers were driven out of the area. This increased to the extent that it is described by Schoeman as a type of guerrilla warfare. Livestock was stolen, Khoisan herders and slaves killed, and Trekboer farms attacked. The colonists fought back by establishing the *Kommando* system. There was apparently a massacre of 186 San in the Roggeveld in 1765. Both Penn (2005) and Schoeman (1986) refer to another mass grave on the farm Gunsfontein (to the west of Schietfontein (Scholtzenhof) - and now part of a private nature reserve), possibly dating to the rebellion of the 1770’s.

The Khoisan were gradually driven from the Roggeveld northward to the extent that by 1809 there is reported to have been only one settled “Bushmen” kraal left in the area. Schoeman (1986) notes that during the early years of settlement in the Roggeveld, many of the Trekboers lived in grass huts or *Matjieshuise (*mat covered houses), and in tents and some travellers found farmers living in *Matjieshuise* as late as 1839. Attempts at constructing more permanent structures were inhibited by the lack of suitable wood for roofs.

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;
- **Schalkwykskraal 204:** Surveyed and granted in 1838 to SJ Botma and JA Victor. It then passed through the hands of Meiring, Paulsen, Esterhuysen, Roussouw, Moller and de Vos. At one stage it was also owned by Abraham le Roux (of Wolvenhoek and Schietfontein);
- **Welgemoed 268:** It was surveyed in 1834 and granted to Stephanus Botma, and was retained in the family until 1905 when it is listed as part of the deceased estate of Johannes Botma. Schoeman (1986) describes how a Jan Fourie of Welgemoed joined the commando of Manie Maritz in 1901 and became active during the South African War.

The colonial heritage of the area is characterised by farmhouses (come 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, unplastered, with a reed roof. However, very few of these structures have been preserved. 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.

SOUTH AFRICAN WAR

During the South African War, the threat of Boer incursions led British forces to build fortifications at a number of strategic passes through the Roggeveld. With Manie Maritz active in the district, many young men from the Roggeveld joined the Boer cause. A stone redoubt was built at the top of the Brandkloof and Maleishoek passes. Orton & Halkett (2011) reported finding stone-walled structures relating to the South African War on the farm Jakhalsvalley 99, outside Sutherland. They related that stone-walled defensive enclosures were made by both Boer and British and it is difficult to distinguish between them, even when they are associated with historic tin cans, glass and ceramics. This study as identified stone walled enclosures and associated historic midden material, probably from the South African War, on the farm Aurora 285/Aanstoot 72.

This review has identified at least three possible types of stone walled enclosures:

- Pre-colonial kraals;
- Colonial era stockposts;
- Fortifications relating to the South African War.

CEMETERIES AND GRAVES/CAIRNS

A large number of farm cemeteries and graves have been recorded in the area by various consultants. The cemeteries are generally associated with farm settlements. However, on at least two occasions, the farm cemetery has been separated from the homestead by a road.

LANDSCAPE AND SCENIC ROUTES

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.

6.10 PALAEONTOLOGY

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

The Great Karoo is world-famous for its rich record of terrestrial vertebrates and other fossils from the Permian, Triassic and Early Jurassic Periods in Gondwana (MacRae 1999, McCarthy & Rubidge 2005). The fossil record of the Klein-Roggeveld region is very poorly known by Karoo standards but our knowledge has been in recent years through several palaeontological impact assessments in the area (e.g. Almond 2015a, 2015b, 2015c, 2015d). The Lower Beaufort beds in the study area belong to the middle part of the very thick (c. 2.5 km) Abrahamskraal Formation succession – predominantly the Koornplaats Member. A range of fossil tetrapod (i.e, four-limbed vertebrate) remains have been discovered from this stratigraphic level in the Klein-Roggeveldberge and adjacent Mordenaarskaroo regions (Loock et al. 1995, Almond 2015d and refs. therein). These earliest diverse terrestrial vertebrate faunas of the Main Karoo Basin are assigned to the late Middle Permian Tapinocephalus Assemblage Zone (Smith & Keyser 1995, Day & Rubidge 2010, Smith et al. 2012). They are characterised by a range of therapsid (“mammal-like reptile”) subgroups such as dicynodonts and dinocephalians as well as large-bodied pareiasaur reptiles (Fig. 3). Other

important fossil groups include large temnospondyl amphibians, bony fish, freshwater bivalves, various invertebrate and vertebrate trace fossils (e.g. tetrapod trackways and burrows, lungfish aestivation burrows) as well as sparse vascular plants of the Glossopteris Flora. The wide spectrum of Late Caenozoic superficial sediments overlying the Palaeozoic and Mesozoic bedrocks in the study area are generally fossil-poor. Important 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.

6.11 VISUAL

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

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 6-13**).

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 6-13: 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.

6.12 TRAFFIC

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 will bisect 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 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.

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 totals 173 AADT (Annual Average Daily Traffic). The counts were undertaken on the link between the DR2243 Aprilkraal and MR318 intersections.

6.13 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 East project (**Figure 6-14**).

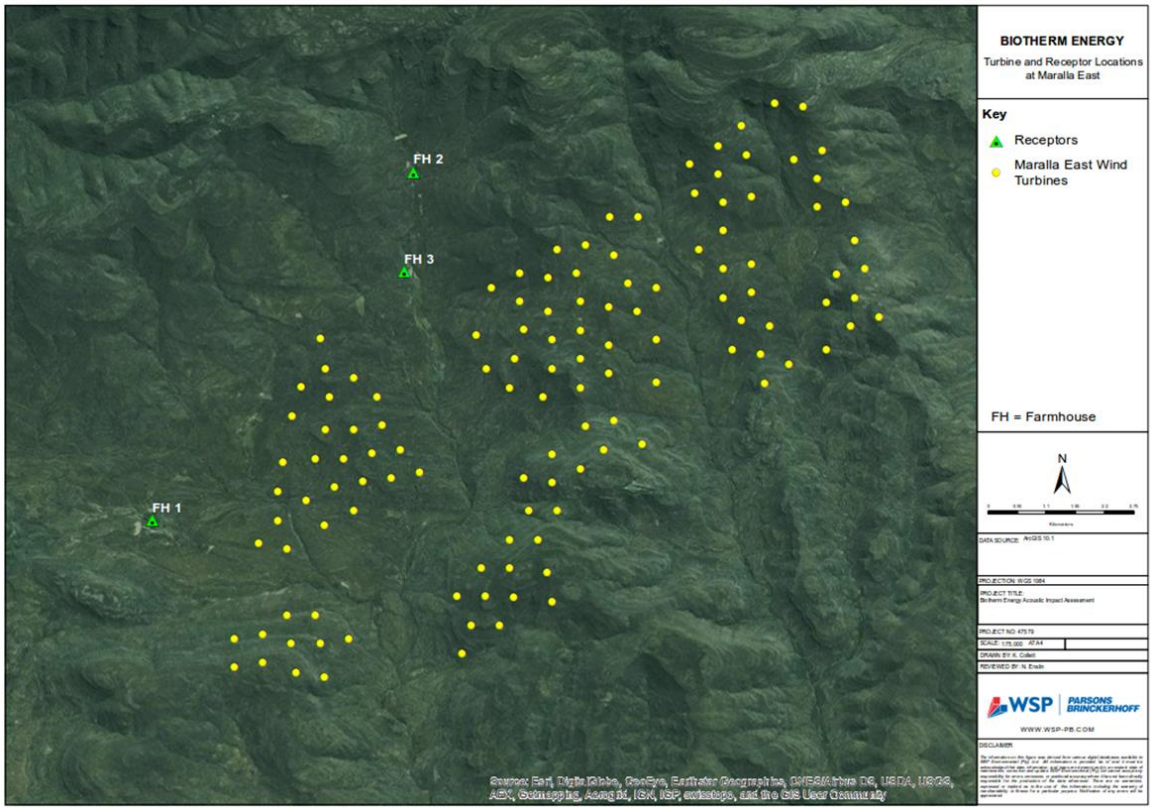


Figure 6-14: Farmhouse Receptors around Maralla East

The South African National Standards (SANS) 10328:2008 (*Methods for environmental noise impact assessments*) presently inform environmental acoustic impact assessment in South Africa. As per SANS 10103:2008 (*The measurement and rating of environmental noise with respect to annoyance and to speech communication)*, typical rating levels with regard to noise are applicable in different districts, as presented in **Table 6-5**. In order to assess the existing noise climate in the region, the "rural" SANS classification (Classification A) will apply to areas surrounding the proposed wind projects. Monitored noise levels will be assessed against these standards (45 dB(A) during the day and 35 dB(A) at night). Current noise levels are not anticipated to exceed such standards, but will be confirmed with the assessment of the baseline monitoring results, which will be presented in the final EIA report.

Table 6-5: Typical Rating Levels for Noise in Districts (adapted from SANS 10103:2008)

Type of District	Classification	Equivalent Continuous Rating level for Noise ($L_{REQ,T}$) (dB(A))	
		Outdoors	
		Day-time ($L_{Req,d}$)	**Night-time ($L_{Req,n}$)**
Rural	A	45	35
Suburban (with little road traffic)	B	50	40
Urban	C	55	45
Urban (with one or more of the following: workshops, business premises and main roads)	D	60	50
Central Business Districts	E	65	55

Type of District	Classification	Equivalent Continuous Rating level for Noise ($L_{REQ,T}$) (dB(A))	
		Outdoors	
		Day-time ($L_{Req,d}$)	**Night-time ($L_{Req,n}$)**
Industrial District	F	70	60
Guidelines in red are applicable to this noise impact assessment			

6.14 SOCIAL ENVIRONMENT

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

SOCIO-ECONOMIC CONTEXT

The proposed Maralla East Wind Facility site is located within the Northern and Western Cape Provinces (**Figure 6-15**).

Figure 6-15: The regional location of the Maralla East site

NORTHERN CAPE PROVINCE

The Northern Cape is the largest province within South Africa, and has the country's smallest population, with a population density of approximately 1 person per square kilometre (Statistics South Africa, 2016). The climate of the province is predominantly arid, with the Orange River (located in the north) providing the most significant water source for the province.

Key economic activities within the province include agriculture and mining. The climatic conditions lend itself towards extensive sheep, goat, and cattle rearing, which is the main farming activity in the province. 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 is, however, the leading contributor to the province's economy, which includes diamond, iron, manganese, titanium, zinc, lead, and copper mines in various areas of the province. The Northern Cape mining industry makes up nearly 7% of South Africa's total mining value and contributes 23.4% to the provinces total economy.

There are a number of small economic contributors, which are nonetheless important to the local economy. These include tourism (Kgalagadi Transfronteir Park, Namaqua National Park, and Richtersveld world Heritage Site) and technology (the Square Kilometre Array and South African Astronomical Observatory and the Southern African Large Telescope (SALT)).

The Namakwa District Municipality is one of five districts of the Northern Cape Province and comprises six local municipalities. The municipality is extensive, covering approximately a third of the province, extending from the Namibian border in the north, Atlantic Ocean to the west, and through to the central region of the Karoo dessert in the south. The district is the least populated in the province with just over 100 000 people, with a population density of 0.91 people per square kilometre (Statistics South Africa, 2016).

The main contributor to the local economy of the Namakwa District Municipality is the mining sector (52% to GDP), which includes including iron, manganese, and zinc extraction (Namakwa District Municipality, 2012). Other economic activities include mariculture, agriculture and community services (Namakwa District Municipality, 2012). The mining sector is the largest employer within the municipality, although recent trends show the sector to be in decline. A decline in employment opportunities in the mining sector emphasises the need to prioritise alternative sectors (Namakwa District Municipality, 2012).

WESTERN CAPE PROVINCE

The Western Cape is situated within the southernmost region of the country, and has a diverse topography with a mountainous coastline and a Karoo plateau to the North West.

The Western Cape has a population of approximately 5.8 million (Statistics South Africa, 2012). The provinces' economy contributes to approximately 14% to South Africa's Gross Domestic Product (GDP) (Statistics South Africa, 2012). The key economic activities include:

- Primary – Fishing and agriculture (wine, fruit, forestry, wheat, livestock)
- Secondary – Manufacturing including clothing and textiles, metals and engineering, oil and gas
- Tertiary – Services, including finance, insurance, real estate, call centres, business process outsourcing, information and communication technology, and tourism.

Source: Wyngaard, 2006

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 of the population is, however, concentrated in urban areas of the municipality.

The key economic sectors within the district are agriculture; community, social and personal services, and wholesale and retail trade (Central Karoo, 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 East Wind Facility is located within the Karoo Hoogland and Laingsburg Local Municipalities, which form part of the Namaqua and Central Karoo District Municipalities respectively.

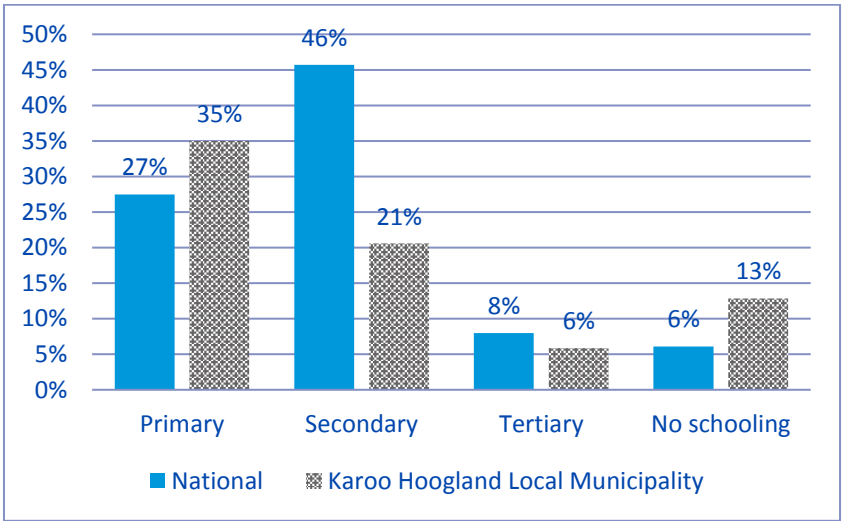
KAROO HOOGLAND LOCAL MUNICIPALITY

The three main towns in the Karoo Hoogland Local Municipality are Williston, Fraserburg and Sutherland (Karoo Hoogland IDP, 2015).

The human settlement within the Karoo Hoogland Local Municipality is concentrated within urban area, with farming communities and settlements being 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 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 6-16**. 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.



Data sourced from: Stats South Africa, 2012

Figure 6-16: Education levels – Karoo Hoogland Local Municipality

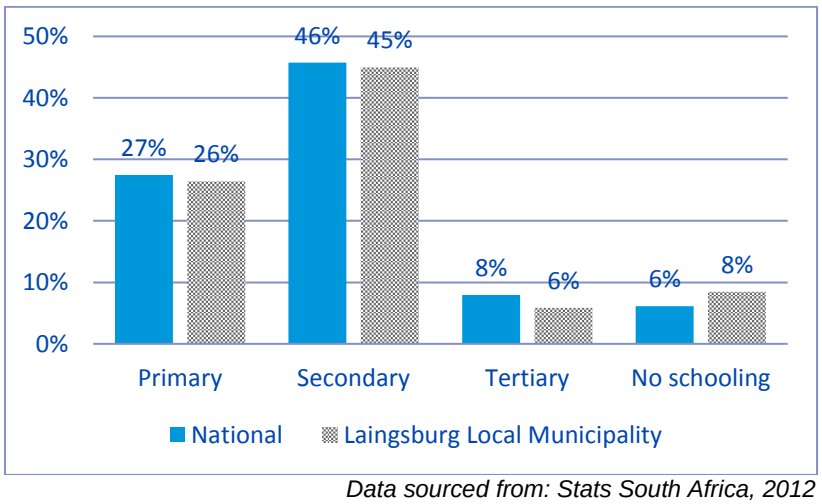
The income levels of the municipality's population are low, with 42.5% earning less than R1600 per month. The unemployment levels are 6.5% higher than national levels, with 33.2% of the potential labour force being unemployed in comparison to the national unemployment levels of 26.7% (as of the first quarter 2016) (Statistics South Africa, 2012 and 2016).

The 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).

LAINGSBURG LOCAL MUNICIPALITY

The three main urban areas within the Laingsburg Local Municipality are the towns of Laingsburg, Matjiesfontein, and Vleiland, with the rural areas comprising approximately 250 farms (Laingsburg Local Municipality, 2012).

The Laingsburg Local Municipality has a population of approximately 8 289 people with a population density of one person per km^2. The dominant population group within the local municipality is Coloured (79%) followed by White (13.3%). The majority of the population resides within an urban settlement with 79.3% of households having access to electricity for lighting, 73.5% for cooking and 65 % for heating. Sixty five percent of households have their refuse removed by the local authority, which indicates a moderate level of service. Sanitation levels are moderate with 68.2% having flush toilets connected to a sewer system and 14.6% using flush toilet with septic tanks (Statistics South Africa, 2012). Education levels are fair to good compared to the national average, as indicated in **Figure 6-17**.



Data sourced from: Stats South Africa, 2012

Figure 6-17: Education levels – Laingsburg Local Municipality

The unemployment levels within the Laingsburg Local Municipality are fairly high, with 28.3 % of the potential labour force being unemployed, compared to South African national unemployment rate of 25.4% (Statistics South Africa, 2012 and 2016). There are a number of constraints to Local Economic Development (LED), including low education levels, and a lack of services and infrastructure.

The income levels in the region are low, with 29.6% of the population having no income and 31.9% earning less than R1600 per month. Within the Laingsburg Local Municipality 31.4% of the labour force is employed in the formal sector (Statistics South Africa, 2012), indicating that a large

percentage are employed through the informal sector (which is likely to include seasonal work on farms).

LOCAL ECONOMIC ACTIVITIES

AGRICULTURE

LAINGSBURG LOCAL MUNICIPALITY

The single dominant agricultural (and economic) activity within the Laingsburg area is sheep farming. Other agricultural activities include intensive crop agriculture, specifically fruit and vegetables cultivation, and game farming.

KAROO HOOGLAND LOCAL MUNICIPALITY

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

LAINGSBURG LOCAL MUNICIPALITY

Tourism is an important constituent of the local economy for the Laingsburg region. The R354 regional route is a link for tourists travelling from Cape Town to Sutherland. The small neighbouring towns have a number of tourist attractions. Examples include the Rietfontein Private Nature Reserve near Matjiesfontein; and the Flood Museum at Laingsburg.

KAROO HOOGLAND LOCAL MUNICIPALITY

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.

RENEWABLES

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 East project site

LOCAL COMMUNITIES

The proposed Maralla East project site lies 35 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 East 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 6-6** and illustrated in **Figure 6-18**.

Table 6-6: Description of local settlements and towns – Maralla East site

RELEVANCE TO THE SITE	SETTLEMENT NAME	DISTANCE AND DIRECTION FROM SITE	DESCRIPTION
Adjacent to site boundary	Aurora Farm	1 600 m west	Comprised of several buildings (currently unused), and planted pastures.
	Welgemoed	800 m north	These farming settlements includes of several buildings and planted pastures.
	Komsberg	600 m north	
Within 10 km of site boundary	Surrounding farm settlements	2 km north 5.9 km southeast 5.7 km southeast 4.6 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[2].
Closet 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[3].

[2] Cape Farm Mapper - Crop Census 2013
[3] Statistics South Africa, 2012

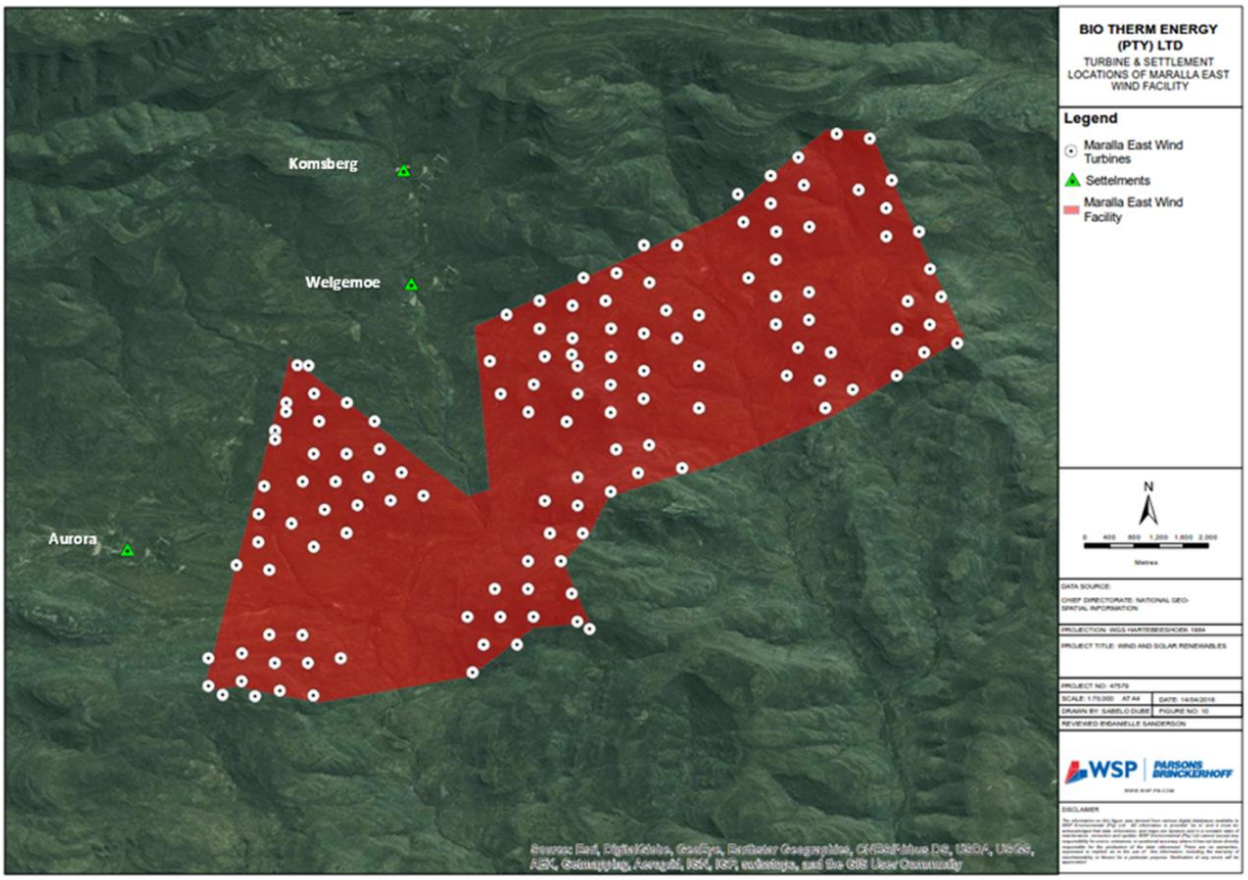


Figure 6-18: Location of Settlements at the Maralla East Site

7 IDENTIFICATION OF POTENTIAL IMPACTS

7.1 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.

- Decommissioning:

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

7.2 ACTIVITIES MATRIX

The impacts below have been assessed according to environmental categories. **Table 7-1** provides an indication of how these environments are linked to the various NEMA listed activities outlined in **Chapter 4**.

Table 7-1: 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. And in the Western Cape - (i) Areas outside urban areas containing indigenous vegetation.	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 And in the Western Cape - (i) Areas outside urban areas containing indigenous vegetation.	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
(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 and Western Cape - (i) Within critical biodiversity areas identified in bioregional plans.	-	-	-	C	C	C	C	C	C	C	C	-	-
(14) Activity 14: The development of – (xii) infrastructure or structures with a physical footprint of 10 square meters or more In the Western Cape, outside urban areas, where- (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. (f) in the Western Cape: (i) all areas outside urban areas (aa) Areas containing indigenous vegetation	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 (g) in the western Cape: (i) Outside an urban area (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

7.3 TOPOGRAPHY

SENSITIVE AREAS

No sensitive topographical areas were identified in the study area. The region as seen as supporting a homogenous topography with very little variation in the topographical character across the site and its surroundings.

IMPACT IDENTIFICATION

→ **Change in the site micro-topography**

The development of infrastructure such as turbines, internal access roads, fencing, etc. will result in the need for site clearance, top soil removal and earthmoving activities associated with road and infrastructure construction. These activities will result in a minor change in the topographical profile of the site.

→ **Change in study area macro-topography**

The combined Esizayo and Maralla projects will not result in any changes to the vertical ground profile within the study area; however, the height of the turbines add a secondary visual dimension to the study area which can visually change the topography of the area.

SIGNIFICANCE SCREENING

The significance screening of the above mentioned impacts is outlined in **Table 7-2**.

Table 7-2: Impact Significance Screening for Potential Topography Impacts

IMPACT	PHASE	CHARACTER	PROBABILITY	CONSEQUENCE	SIGNIFICANCE
Change in the site micro-topography	C, O	Negative	2	1	**Very Low**
Change in study area macro-topography	C, O	Negative	1	1	**Very Low**

POTENTIAL MITIGATION MEASURES

Due to the low impact significance, mitigation measures are not considered to be necessary.

FURTHER STUDIES RECOMMENDED IN THE EIA PHASE

No further studies are recommended.

7.4 GEOLOGY

SENSITIVE AREAS

No sensitive geological areas were identified in the study area.

IMPACT IDENTIFICATION

→ **Disturbance to underlying geology**

During the construction phase site preparation will be required in terms of vegetation clearance and bulk earthworks. In addition, concrete foundations will be required for the supporting of the wind towers. The excavation activities will be approximately 3m deep and have a footprint of

approximately 500- 600 m^2. Therefore the impact on the underlying geology is considered to be negligible.

SIGNIFICANCE SCREENING

The significance screening of the above mentioned impacts is outlined in **Table 7-3**.

Table 7-3: Impact Significance Screening for Potential Geological Impacts

IMPACT	PHASE	CHARACTER	PROBABILITY	CONSEQUENCE	SIGNIFICANCE
Disturbance to underlying geology	C	Negative	2	2	**Very Low**

POTENTIAL MITIGATION MEASURES

Due to the low impact significance, mitigation measures are not considered to be necessary.

FURTHER STUDIES RECOMMENDED IN THE EIA PHASE

No further studies are recommended.

7.5 CLIMATE

SENSITIVE AREAS

No sensitive climatic issues were identified in the study area.

IMPACT IDENTIFICATION

→ **Climatic impacts such as greenhouse effect and perceived global warming, as well as the phenomenon of acid rain**

The manufacturing of the materials associated with the project, and associated transportation to site will result in indirect GHG emissions. There will be no GHG emissions directly associated with power generation from the facility in the operational phase due to the nature of the technology.

→ **Contribution of cleaner energy to the National Grid**

The project may be regarded as having a positive impact in terms of GHG emissions associated with the development of power generation capacity in South Africa i.e. less GHG emissions per unit of power contributed when compared to conventional fossil fuel derived power.

SIGNIFICANCE SCREENING

The significance screening of the above mentioned impacts is outlined in **Table 7-4**.

Table 7-4: Impact Significance Screening for Potential Climate Impacts

IMPACT	PHASE	CHARACTER	PROBABILITY	CONSEQUENCE	SIGNIFICANCE
Climatic impacts such as greenhouse effect and perceived global warming, as well as the phenomenon of acid rain.	C / O	Negative	2	1	**Very Low**

IMPACT	PHASE	CHARACTER	PROBABILITY	CONSEQUENCE	SIGNIFICANCE
Contribution of cleaner energy to the National Grid	O	Positive	4	3	**High**

POTENTIAL MITIGATION MEASURES

Due to the fact that the proposed development will have no impact on climate, mitigation measures are not deemed necessary.

The implementation of the project can be regarded as having a mitigatory effect in terms of contributing to the curbing of South African's CO_2 emission increases.

FURTHER STUDIES RECOMMENDED IN THE EIA PHASE

No further studies are recommended.

7.6 SOILS AND LAND CAPABILITY

SENSITIVE AREAS

The nature of the local and regional landscape is a sparsely populated with little infrastructure. For the larger part, the natural landscape is generally homogeneous (i.e. undulating areas and mountainous rocky slopes, Mountain Shale Renosterveld, with pale yellow-brown "Mispha" soils). The land use is dominated by sheep grazing, with smaller portions of land under cultivation (irrigated and dryland) with farm dams. Furthermore, there were several small wetland flats located on the Maralla East site.

IMPACT IDENTIFICATION

The following impacts on land capacity have been identified:

- **Reduction in land available for grazing animals**

  During the construction and operational phases of the projects there will be a reduction in overall land available for grazing animals due to the occupation of the project and its associated infrastructure**.**

- **Soil Erosion resulting in degradation of soil structure**

  During the construction and operational phases there will be an increased likelihood of soil erosion, due to vegetation clearance, soil disturbance and increased vehicle traffic within the footprint of the development. Secondary impacts associated with soil erosion relate to potential suspended solids and turbidity impacts on nearby surface water features – see separate impact description.

- **Degradation of soil due to contamination**

  During the construction and operational phases there is potential for soil contamination associated with potential releases of environmental contaminants and hazardous substances (typically sewage / portable toilet chemicals, cement, oil, grease, and fuel). Secondary impacts relate to potential chemical contamination of nearby surface water features due to the transport of contamination during rainfall events.

SIGNIFICANCE SCREENING

The significance screening of the above mentioned impacts is outlined in **Table 7-5**.

Table 7-5: Impact Significance Screening for Potential Soil and Land Capability Impacts

IMPACT	PHASE	CHARACTER	PROBABILITY	CONSEQUENCE	SIGNIFICANCE
Reduction in grazing land available for grazing animals	C	Negative	4	2	**Medium**
	O	Negative	4	1	**Medium**
Soil erosion resulting in degradation of soil structure	C / D	Negative	1	1	**Very Low**
Degradation of soil due to contamination	C / O	Negative	1	1	**Very Low**

POTENTIAL MITIGATION MEASURES

The following potential mitigation measures have been identified:

- Areas of construction should be (practically) limited in extent, and activities outside of the project area should be kept to a minimum.
- 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).
- Due to the potential for wind erosion, wind-breaks may be required in areas where wind erosion occurs.
- Impacts that are expected to lead to long term degradation of soil quality (i.e. soil contamination) need to be limited through appropriate on-site management measures. This includes the proper handling and storage of hazardous materials, the use of hardstanding in areas where spillages are possible, the use of bunding around storage of hazardous materials and proper upkeep of machinery and vehicles.
- Vegetation removal should be kept to a minimum and limited to the area of development.

FURTHER STUDIES RECOMMENDED IN THE EIA PHASE

The land capacity of the site comprises a combination of non-arable, low potential grazing land and wilderness areas; hence, the EIA Phase investigation will be limited to a desktop study with subsequent targeted ground-truthing to confirm specific findings. Refer to detailed plan of study (**Chapter 9**).

7.7 NATURAL VEGETATION AND ANIMAL LIFE

SENSITIVE AREAS

The ecological sensitivity map of the site is depicted in **Figure 7-1**. 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.

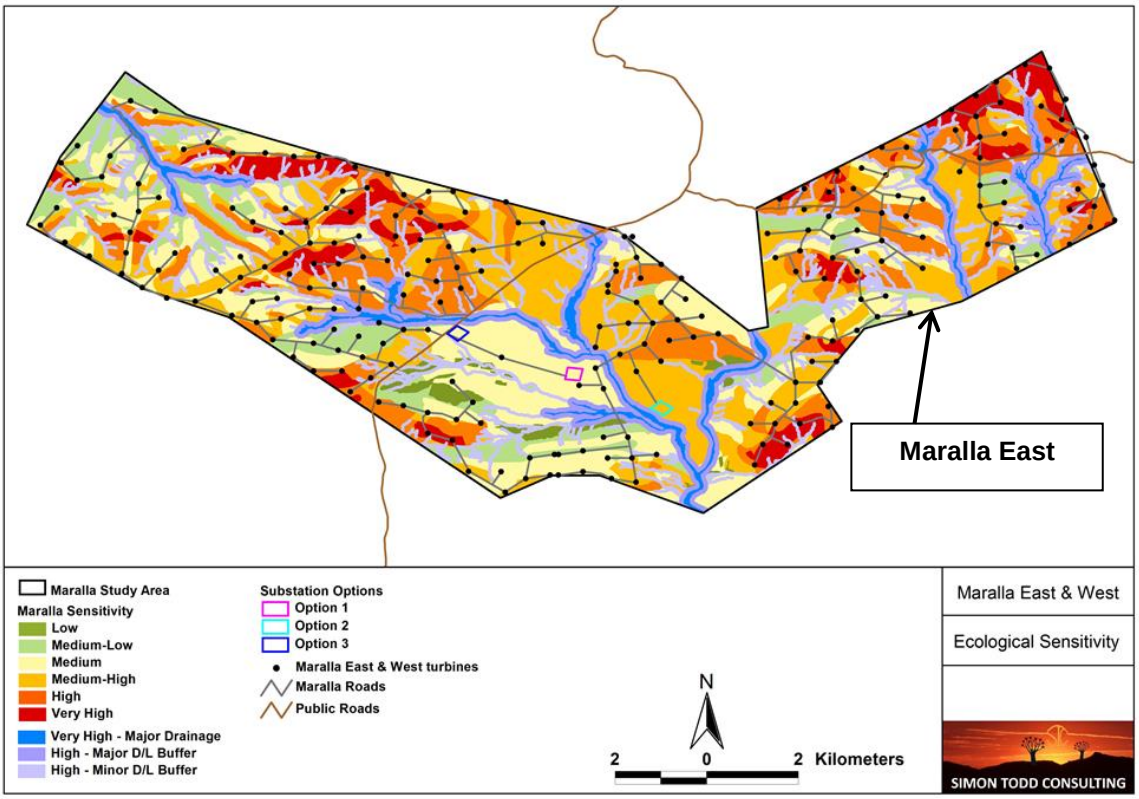


Figure 7-1: Biodiversity Sensitivity Areas in relation to the Maralla East site

IMPACT IDENTIFICATION

The following impacts have been identified:

→ **Disturbance, loss and transformation of vegetation and listed or protected plant species**

The development would require vegetation clearing for turbines, roads and other hard infrastructure. Apart from the direct loss of vegetation within the development footprint, listed and protected species are also highly likely to be impacted. These impacts are likely to occur during the construction phase of the development, with additional vegetation impacts during operation likely to be relatively low.

- **Impacts on Fauna**

  Increased levels of noise, pollution, disturbance and human presence during construction will be detrimental to fauna. Sensitive and shy fauna are likely to move away from the area during the construction phase as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the construction activities and might be killed if proper management and monitoring is not in place. Traffic at the site during all phases of the project would pose a risk of collisions with fauna. Slower types such as tortoises, snakes and amphibians would be most susceptible and the impact would be largely concentrated to the construction phase when vehicle activity was high. Some mammals and reptiles would be vulnerable to illegal collection or poaching during the construction phase as a result of the large number of construction personnel that are likely to be present. During the operational phase, noise generated by the operation of the turbines is likely to negatively affect at least some fauna.

- **Increased Risk of Erosion**

  The large amount of disturbance created during construction would leave the site vulnerable to soil erosion, especially as many parts of the site are steep. The soil disturbance associated with the development will render the impacted areas highly vulnerable to erosion and measures to limit erosion will need to be a key element of mitigation measures at the site. Furthermore, if the eroded material were to enter streams and rivers at the site it could have significant impact on these systems through siltation of pools and changes in the chemistry and turbidity of the water.

- **Proliferation of alien invasive plant species**

  The disturbance associated with the construction phase of the project will render the disturbed areas vulnerable to alien plant invasion. Some alien plant invasion is inevitable and regular alien plant clearing activities would be required to limit the extent of this problem. Once the natural vegetation has returned to the disturbed areas, the site will be less vulnerable to alien plant invasion, however, the roadsides and turbine service areas are likely to remain the focus of alien plant invasion for years. This impact would manifest during the operational phase, although some of the required measures to reduce this impact are required during construction.

- **Impacts on Critical Biodiversity Areas and broad-scale ecological processes**

  Large parts of the site are within Critical Biodiversity Areas (CBAs) and a significant amount of habitat loss may be generated within these areas. While CBAs are not necessarily no-go areas, development within CBAs is not encouraged as such development may compromise the ecological functioning of the CBA or result in direct biodiversity loss within the CBA if not approached carefully and managed effectively. This impact can result from the presence of the facility as well as habitat loss within the CBAs. In addition, the presence of the wind turbines and daily operational activities at the site may deter certain species from the area, resulting in a loss in broad-scale landscape connectivity. In this regard it is important to note that while the development footprint is low in comparison with the total extent of the site, this impact should be considered in the context of the impact on the affected ridges and their specific habitats which may be much more restricted, as well as the presence of the other similar developments in the area.

- **Effect on South Africa's commitment to conservation**

  The development will contribute to cumulative habitat loss within the NPAES Focus Area and along with the other developments in the area, this may impact on future conservation options in the area. Due to the high number of developments being proposed and approved in the area, this is a potentially significant long-term impact of the development.

SIGNIFICANCE SCREENING

The significance screening of the above mentioned impacts is outlined in **Table 7-6.**

Table 7-6: Impact Significance Screening for Potential Biodiversity Impacts

IMPACT	PHASE	CHARACTER	PROBABILITY	CONSEQUENCE	SIGNIFICANCE
Disturbance, loss and transformation of vegetation and listed or protected plant species	C	Negative	4	3	**High**
Impacts on Fauna	C	Negative	4	3	**High**
	O	Negative	3	2	**Medium**
Increased Risk of Erosion	O,	Negative	4	3	**High**
Proliferation of alien invasive plant species	O	Negative	3	3	**Medium**
Impacts on Critical Biodiversity Areas and broad-scale ecological processes	O	Negative	3	3	**Medium**
Effect on South Africa's commitment to conservation	O	Negative	3	3	**Medium**

POTENTIAL MITIGATION MEASURES

The following potential mitigation measures have been identified:

→ **Impact on vegetation and listed plant species**

- Minimise development footprint within high sensitivity areas and ensure that final development layout takes account of areas identified as sensitive during the field survey. Some avoidance and changes to the layout may be required if some areas with a high abundance of species of concern are shown to occur within the preferred development areas.
- Ensure that lay-down and other temporary infrastructure is within low sensitivity areas, preferably previously transformed areas if possible

→ **Direct faunal impacts during construction**

- Avoid sensitive faunal habitats such as drainage lines and wetlands.
- A variety of avoidance and mitigation measures to reduce impact on fauna will need to be implemented during construction, including limiting impacts from construction staff and the operation of construction vehicles
- Ensure than management and maintenance activities are favourable for fauna. This includes minimizing disturbance at the site

- **Soil Erosion Risk**
  - 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
- **Alien Plant Invasion**
  - Alien management plan to be part of the EMP.
  - Regular alien clearing where invasion occurs.
- **Impact on CBAs and Broad-Scale Ecological Processes**
  - Minimise the development footprint, especially within the very high sensitivity areas and some reduction in the number of turbines within these areas may be required.
  - There should be an integrated management plan for the development area during operation, which is beneficial to fauna and flora.
  - Specific avoidance and mitigation may be required to reduce the impact on certain habitats of limited extent and high ecological or conservation significance.
  - Buffers around significant landscape features such as large drainage systems are recommended to maintain corridors for faunal movement and limit impacts on landscape connectivity.
- **Impact on NPAES Focus Areas and Future Conservation Options**
  - Minimise the development footprint, especially within the very high sensitivity areas and some reduction in the number of turbines within these areas may be required.
  - Specific avoidance and mitigation may be required to reduce the impact on certain habitats of limited extent and high ecological or conservation significance.

FURTHER STUDIES RECOMMENDED IN THE EIA PHASE

BIODIVERSITY ASSESSMENT

The scoping findings are based on a site visit, a desktop assessment of the study area as well as prior knowledge of the wider area as a result of conducting previous work in the area. Additional assessment will be carried out in the EIA phase based on the final layout of the facility. The assessment will identify and quantify the abundance and distribution of species of conservation concern; identify faunal habitats; further evaluate corridor functioning; assess cumulative ecological impacts; assess cumulative habitat loss within the NPAES Focus area and the potential impact of this on future conservation options in the area. Refer to detailed plan of study (**Chapter 9**).

7.8 AVIFAUNA

SENSITIVE AREAS

The Avifauna Scoping Study identified the following areas where no turbines should be construction (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
- Martial Eagle roosting area.

The exclusion zones for the Maralla East Site are illustrated in **Figure 7-2**.

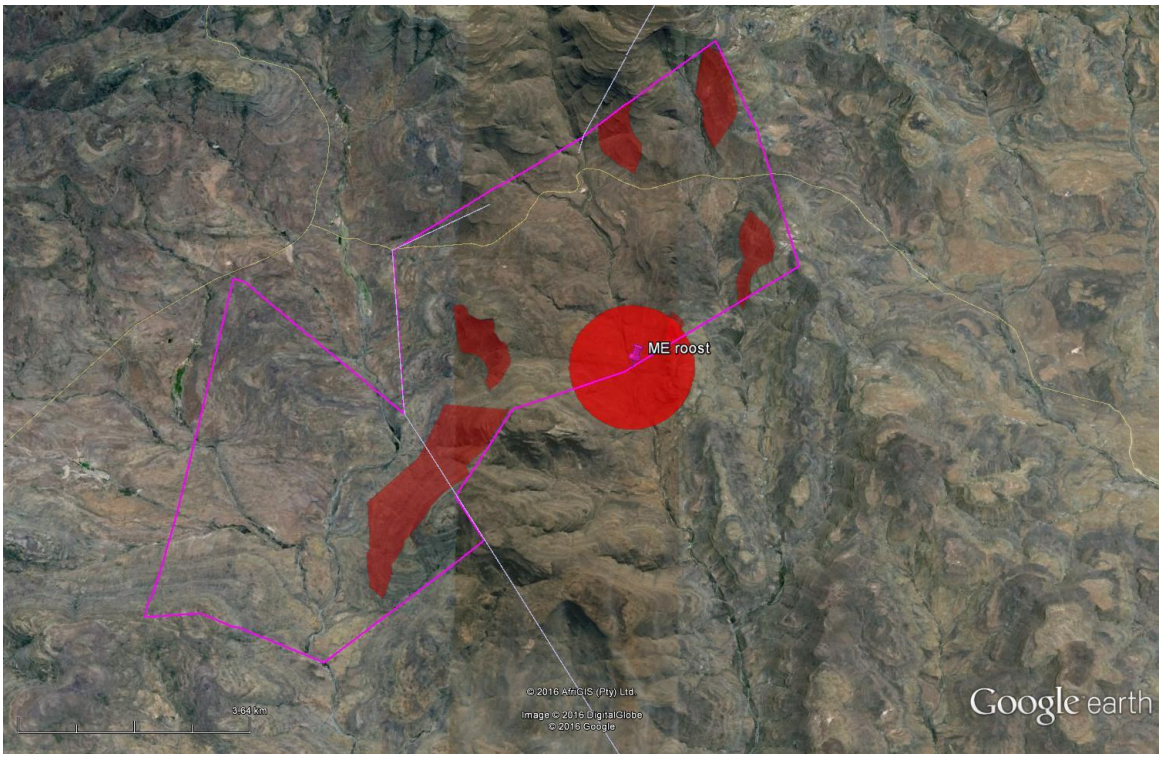


Figure 7-2: Maralla East Avifauna exclusion zones

IMPACT IDENTIFICATION

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. The following impacts on avifauna have been identified:

→ **Temporary displacement of avifauna due to construction and decommissioning of the wind energy facility**

The construction and decommissioning of infrastructure including the wind turbines, internal access roads, fencing, etc. will result in a significant amount of movement and noise leading to displacement of avifauna from the site. It is highly likely that most priority species will vacate the area for the duration of these activities and it is anticipated that most priority species listed in **Table 6-2** will vacate the area for the duration of these activities.

→ **Priority species mortality due to collision with turbines**

Priority species that could potentially be vulnerable to wind turbine collisions are listed in **Table 6-2**. 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). West facing slopes (i.e. those facing the dominant wind directions) are likely to be the most sensitive areas for slope soaring raptors.

→ **Permanent 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 6-2**. 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. Karoo Korhaan, 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,).

SIGNIFICANCE SCREENING

The significance screening of the above mentioned impacts is outlined in Table 7-7**.**

Table 7-7: Impact Significance Screening for Potential Biodiversity Impacts

IMPACT	PHASE	CHARACTER	PROBABILITY	CONSEQUENCE	SIGNIFICANCE
Temporary displacement of avifauna due to construction and decommissioning of the wind energy facility.	C / D	Negative	3	1	**Low**
Priority species mortality due to collision with turbines	O	Negative	3	3	**Medium**
Permanent displacement of priority species due to habitat transformation	O	Negative	2	2	**Low**

POTENTIAL MITIGATION MEASURES

The following mitigation measures have been identified:

→ **Temporary displacement of avifauna due to construction and decommissioning of the wind energy facility:**

- Restrict the construction activities to the construction footprint area.
- Do not allow any access by construction teams to the remainder of the property during the construction period.
- Measures to control noise and dust should be applied according to current best practice in the industry.
- Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum.
- It is recommended that appropriate no-turbine buffer zones are implemented around priority raptor nests, should any be discovered in the course of the pre-construction monitoring, which is currently ongoing. If an eagle's nest is recorded, this will entail a 3km pre-cautionary buffer zone.
- A 1km no infrastructure buffer zone is recommended around a Martial Eagle roosting area

→ **Priority species mortality due to collision with turbines**

- Pre-construction monitoring should be completed to guide the lay-out of the turbines.
- Once the turbines have been constructed, post-construction monitoring should be implemented to compare actual collision rates with predicted collision rates.

- No turbines should be constructed on west facing slopes (i.e. those facing the dominant wind direction) to minimise the risk of collisions of slope soaring species, particularly raptors.
- If actual collision rates indicate high mortality levels, curtailment of selective turbines should be implemented

→ **Permanent displacement of priority species due to habitat transformation**

- The recommendations of the specialist ecological study must be strictly adhered to.
- Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum.

FURTHER STUDIES RECOMMENDED IN THE EIA PHASE

The EIA phase will entail further accumulation and consolidation of the relevant avian data, possibly including the execution of baseline data collection work as specified by the scoping study, intended to inform the avian impact study. This is currently happening through an onsite monitoring programme which is aimed at providing a baseline picture of the avifauna over a period of a year. The EIA Phase will also entail a full assessment of the likely impacts and available mitigation options, based on the results of systematic and quantified monitoring which is currently taking place. This will include the systematic assessment of all the identified impacts. Refer to detailed plan of Study (**Chapter 9**).

7.9 BATS

SENSITIVE AREAS

The sensitive areas of the site are depicted in **Figure 7-3**. The sensitivity map is 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.

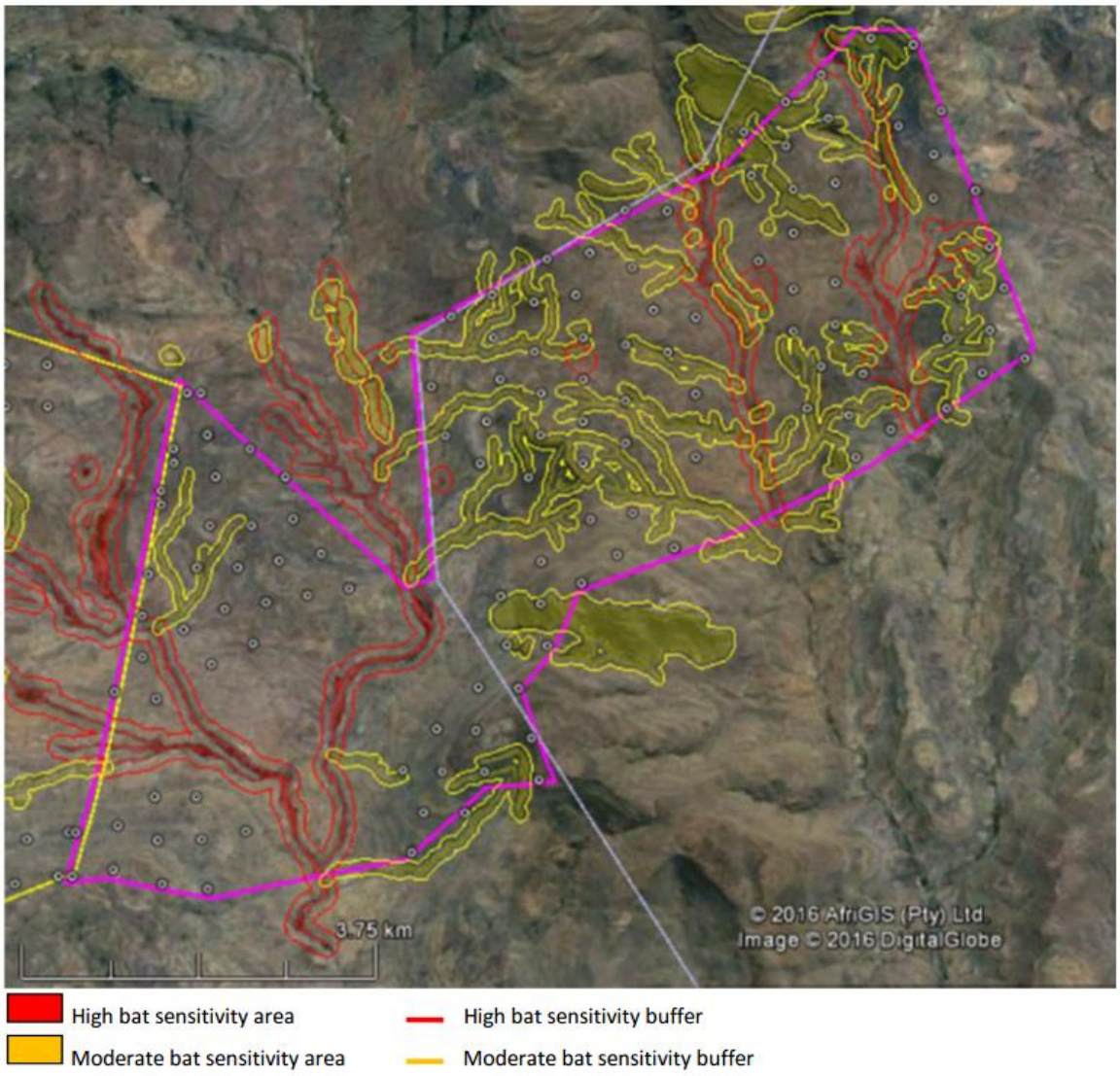


Figure 7-3: Bat Sensitivity Map for the Maralla East site

IMPACT IDENTIFICATION

The following impacts on Bats 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.

- **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.

- **Bat Mortalities due to direct blade impact or barotrauma during foraging during migration**

  Mortalities of bats due to wind turbines during migratory activities 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 project 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 projects in close vicinity to each other, insect numbers can increase regionally and possibly cause outbreaks of colonies of certain insect species. Additionally, if migrating bats are killed it can have detrimental effects on the ecology of the caves that a specific colony utilises. This is due to the fact that bat guano is the primary form of energy input into a cave ecology system, given that no sunshine that allows photosynthesis exists in cave ecosystems.

- **Artificial lighting**

  During operation, artificial lights that may be used at the turbine base or immediately surrounding infrastructure will attract insects and thereby also bats to the turbines. This will significantly increase the likelihood of mortality from collision with turbine blades of bats foraging around such lights.

- **Cumulative Impacts**

  Cumulative impacts might occur due to the number of proposed wind farms in proximity to the study area. The high number of proposed wind farms potentially increases the cumulative risk for bat fatalities, especially where the routes of migratory bat species are found. Cumulative impacts will be identified and assessed during the 12-month pre-construction study.

SIGNIFICANCE SCREENING

The significance screening of the above mentioned impacts is outlined in **Table 7-8**

Table 7-8: Impact Significance Screening for Potential Impacts on Bats

IMPACT	PHASE	CHARACTER	PROBABILITY	CONSEQUENCE	SIGNIFICANCE
Destruction of bat roosts due to earth works	C	Negative	4	4	**High**
Loss of foraging habitat	C / D	Negative	2	3	**Medium**
Bat Mortalities due to direct blade impact or barotrauma during foraging (not migration)	O	Negative	4	3	**High**

IMPACT	PHASE	CHARACTER	PROBABILITY	CONSEQUENCE	SIGNIFICANCE
Bat Mortalities due to direct blade impact or barotrauma during foraging during migration	O	Negative	4	3	**High**
Artificial lighting	O	Negative	2	3	**Medium**

POTENTIAL MITIGATION MEASURES

The following potential mitigation measures have been identified:

- Adhere to the sensitivity map and avoid development in sensitive areas during turbine placement, road and infrastructure building.
- Blasting should be minimised and used only when absolutely necessary. If blasting is scheduled to occur near exfoliating rock or manmade structure.
- A bat specialist must certify there are no bat roosts or signs of bat inhabitants in the affected areas.
- Keep to designated areas when storing building materials, resources, turbine components.
- Collection of the necessary long term data through the pre-construction monitoring study.
- Apply mitigation measures deemed necessary from the 12-month preconstruction study.
- Damaged areas should be rehabilitated by an experienced vegetation succession specialist.

FURTHER STUDIES RECOMMENDED IN THE EIA PHASE

The long-term monitoring study will aim to identify bat species at risk of fatality to wind turbines, and patterns in their activity and distributions (temporal and spatial). Ultimately, on completion of the long-term monitoring study refined mitigation measures will be proposed, if needed. The EIA Phase will also entail a full assessment of the likely impacts and available mitigation options, based on the results of systematic and quantified monitoring which is currently taking place. This will include the systematic assessment of all the identified impacts. Refer to detailed plan of Study (**Chapter 9**).

7.10 SURFACE WATER

SENSITIVE AREAS

There are a number of watercourses and drainage lines onsite (**Figure 7-4**).

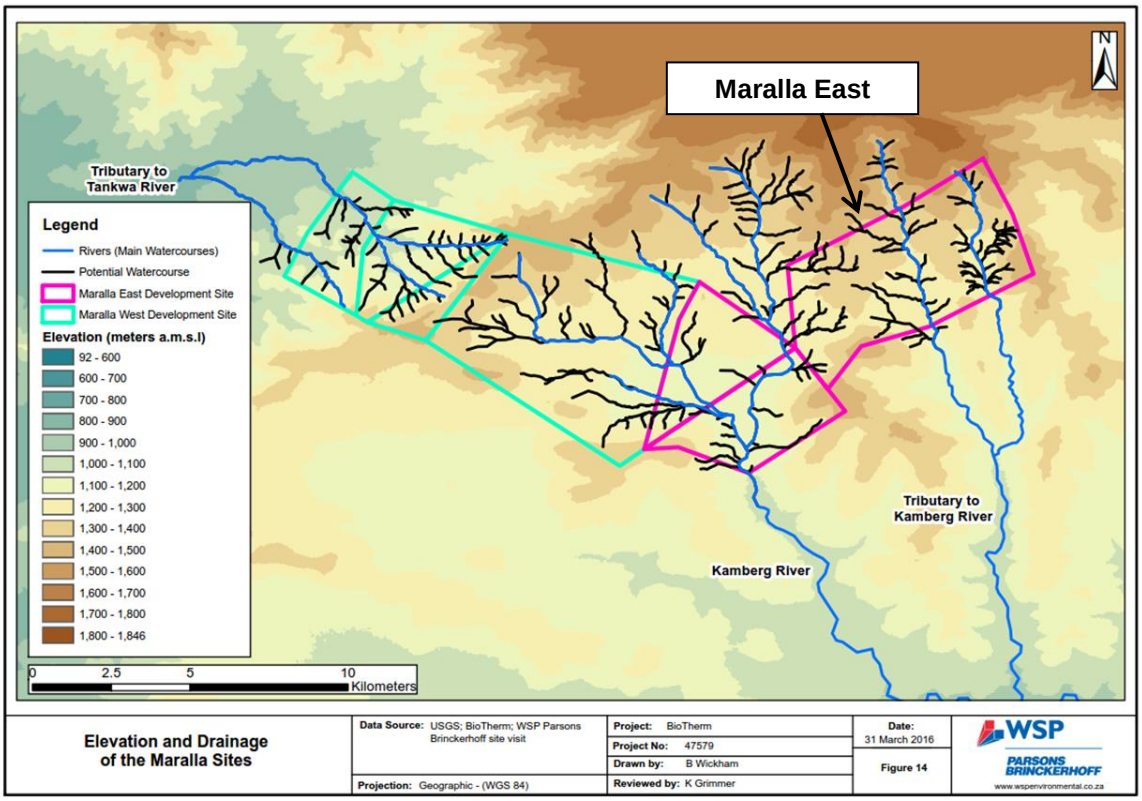


Figure 7-4: Drainage lines on the Maralla East Site

IMPACT IDENTIFICATION

The following potential impacts have been identified:

→ **Surface water contamination**

During the construction phase there is the potential for surface water contamination associated with potential releases of environmental contaminants and hazardous substances (typically sewage/ portable toilet chemicals, cement, oil, grease, and fuel).

During the construction and decommissioning phases, activities such as vegetation clearance, soil compaction, soil disturbance and the increased vehicle traffic on site may result in an increase in soil erosion on site. Soil erosion, resulting in stormwater with high suspended solids load, is an additional potential source of contamination of watercourse. The above contaminants have the potential to be transported off-site, or into more distant watercourses through entrainment in stormwater runoff and drainage channels. The potential impact on surface water will be the deterioration of water quality, which in turn will have health implications to aquatic ecology and downstream water users.

→ **Potential increase in wetland sedimentation**

During the construction and decommissioning phases there is potential for an increase in runoff due to the loss of vegetation cover. The loss of vegetation cover can result in an increased potential for soil erosion which may ultimately lead to an increase in the sedimentation of the wetlands on site.

→ **Increase in surface water flow due to the loss of vegetation cover and soil compaction**

During the construction activities and operational phase, there is potential for an increase in runoff due to the loss of vegetation cover, increased impervious areas associated with infrastructure, and soil compaction. The additional runoff has the potential to increase stormwater peak flows in drainage lines and their receiving water courses.

- **Impact on watercourses and Wetlands**

  Activities such as the construction of internal roads, internal powerlines and turbines could result in the need to construct within 32 metres of a water course or wetland which will result in a direct impact on these areas.

SIGNIFICANCE SCREENING

The significance screening of the above mentioned impacts is outlined in **Table 7-9.**

Table 7-9: Impact Significance Screening for Potential Surface water Impacts

IMPACT	PHASE	CHARACTER	PROBABILITY	CONSEQUENCE	SIGNIFICANCE
Surface water contamination	C / D	Negative	1	1	**Very Low**
Potential increase in wetland sedimentation	C / D	Negative	1	1	**Very Low**
Increase in surface water flow due to the loss of vegetation cover and soil compaction	C	Negative	2	1	**Very Low**
Impact on water courses and wetlands	C / O / D	Negative	3	3	**Medium**

POTENTIAL MITIGATION MEASURES

The following potential mitigation measures have been identified:

- Due to the potential for soil compaction due to vehicles, traffic must be limited to existing or proposed roadways as far as possible.
- The construction of roads must be limited in width and length as far as is practical to limit potential erosion impacts.
- Where soil compaction outside of the designated development areas occurs, this needs to be rehabilitated to the pre-development soil permeability to maintain infiltration.
- Vegetation removal must be kept to a minimum and limited to the area of development.
- Where an impact to the vegetation outside of the development footprint occurs, rehabilitation measures must be undertaken to maintain the baseline vegetation population and health.
- Spills must be appropriately managed on site.
- Machinery must be regularly checked to ensure hydrocarbon leaks (including fuel and hydraulic fluids) are not occurring.

- Drip trays must be used where necessary.
- During the filling of vehicles this must be undertaken in a designated area where any spills are contained.
- Fuels and oils must be stored within bunded areas.
- Parking areas for staff vehicles should ideally be placed on hardstanding (e.g. asphalt) to limit the impacts of oil leaks to the soil environment.
- On-site ablutions must be made available during site construction and decommissioning.

FURTHER STUDIES RECOMMENDED IN THE EIA PHASE

A draft report defining the Wetlands on site in more detail will be compiled during the EIA phase. This will include the associated potential impacts and corresponding mitigation measures. Following comments from the relevant stakeholders, the final report will be updated and submitted with the final EIA report. Refer to detailed plan of study (**Chapter 9**).

7.11 GROUNDWATER

SENSITIVE AREAS

No sensitive groundwater resources have been identified.

IMPACT IDENTIFICATION

- **Ground water contamination associated with the spill or loss of contamination of chemicals**

  During the construction phase there is potential for soil contamination associated with potential release of environmental contaminants and hazardous substances (typically sewage/ portable toilet chemicals, cement, oil grease and fuel).

  Product and raw material transport will be required and it has been assumed that vehicle maintenance and refuelling maybe undertaken onsite. Therefore, hydrocarbon contamination from fuel storage, fuel distribution and oil handling facilities is considered potential groundwater risk. The above contaminants have potential to be transported into the groundwater through a process of percolation.

SIGNIFICANCE SCREENING

The significance screening of the above mentioned impacts is outlined in **Table 7-10.**

Table 7-10: Impact Significance Screening for Potential groundwater Impacts

IMPACT	PHASE	CHARACTER	PROBABILITY	CONSEQUENCE	SIGNIFICANCE
Ground water contamination associated with the spill or loss of contamination of chemicals	C / D	Negative	2	1	**Very Low**

POTENTIAL MITIGATION MEASURES

The following mitigation measures have been identified:

- Chemicals, hydrocarbon materials and hazardous substances maintained onsite must be managed in accordance with the Hazardous Substances Act (No. 15 of 1973) and its relevant regulations.
- Indicate the location of the fuel and chemical storage area on the layout plans.
- Keep fuels, oils or other chemicals used outside of the bunded area to a minimum and use suitable secondary containment in the form of drip trays.
- Spills must be appropriately managed on site.
- Machinery must be regularly checked to ensure hydrocarbon leaks (including fuel and hydraulic fluids) are not occurring.
- Drip trays must be used where necessary.
- The filling of vehicles must be undertaken in a designated area where any spills are contained.

FURTHER STUDIES RECOMMENDED IN THE EIA PHASE

No further studies are recommended.

7.12 HERITAGE

SENSITIVE AREAS

Figure 7-5 depicts the Sensitive heritage areas that have been identified within the proposed facility. The sensitive heritage locations (red polygons) are situated in the valleys, and not on the ridge lines. The areas shown in pale brown are major drainage areas which are of moderate sensitivity because they have a higher probability of containing heritage sites.

Figure 7-5: Map of the Heritage Sensitivity Areas in relation to the Maralla East site

IMPACT IDENTIFICATION

→ **Physical disturbance of archaeological sites**

The construction and decommissioning of infrastructure including the wind turbines, internal road access, and fencing will result in direct impacts to the landscape and any potential heritage that lies on it.

The main impacts resulting from the operational phase are potential vandalism of heritage sites by staff of the wind facility. This includes stripping of fittings from abandoned buildings, careless damage to kraal walls, graffiti on rock art sites, etc.

Impacts resulting from the decommissioning phase of the wind farm facilities may include the dumping of electrical infrastructure on heritage sites.

The main cause of impacts to archaeological sites is direct, physical disturbance of the material itself and its context. The heritage and scientific potential of an archaeological site is highly dependent on its geological and spatial context. It is not anticipated that there will be any

impacts to the Built Environment. Historic structures and graveyards are sensitive to physical damage such as demolition as well as neglect. They are also context sensitive, in that changes to the surrounding landscape (i.e. visual impacts) will affect their significance.

SIGNIFICANCE SCREENING

The significance screening of the above mentioned impacts is outlined in **Table 7-11**.

Table 7-11: Impact Significance Screening for Potential Heritage Impacts

IMPACT	PHASE	CHARACTER	PROBABILITY	CONSEQUENCE	SIGNIFICANCE
Physical disturbance of archaeological sites	C / O / D	Negative	2	2	**Low**

POTENTIAL MITIGATION MEASURES

The following potential mitigation measures have been identified:

- Due to the fact that the subterranean presence of archaeological and/or historical sites, features or artefacts is always a distinct possibility, a “watching brief” should be developed.
- Construction activity should be restricted to the immediate footprint of the infrastructure.
- Areas of potential heritage sensitivities that are identified in the EIA phase, should be demarcated.

FURTHER STUDIES RECOMMENDED IN THE EIA PHASE

The EIA phase study will fulfil the requirements of heritage impact assessment as defined in section 38 of the NHRA. This means that the assessment has to cover the full range of potential heritage resources as defined in the National Heritage Resources Act 25 of 1999.

The aim of the EIA will be to identify and assess the significance of all heritage resources on the property, to assess the preferred and alternative options and to rate them in terms of significance, to determine the potential impacts on the heritage resources, and where appropriate to recommend “no-go’ areas and to propose mitigation if avoidance is not possible. Refer to detailed plan of Study (**Chapter 9**).

7.13 PALAEONTOLOGY

SENSITIVE AREAS

Fieldwork has indicated that fossil material such as vascular plants (equisetalean ferns, reworked woody debris), rare and fragmentary vertebrate remains (possibly amphibian) and a small range of invertebrate and vertebrate trace fossils are present within the Karoo Supergroup bedrocks. However, unique, scientifically-important fossils are very scarce indeed here, even where bedrock exposure levels are locally high.

The only highly-sensitive fossil site identified is a rippled sandstone palaeosurface located on farm Welgemoed 268 (Western Cape). The surface features several well-preserved swimming / floating and walking traces of a large temnospondyl amphibian (**Figure 7-6**).

This scientifically important site is proposed as a no-go area with a buffer zone of 20 m. It is currently being studied in collaboration with Dr Roger Smith of Wits University and Dr Claudia Marsicano of the Universidad de Buenos Aires, Argentina.

Notwithstanding the above, 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).

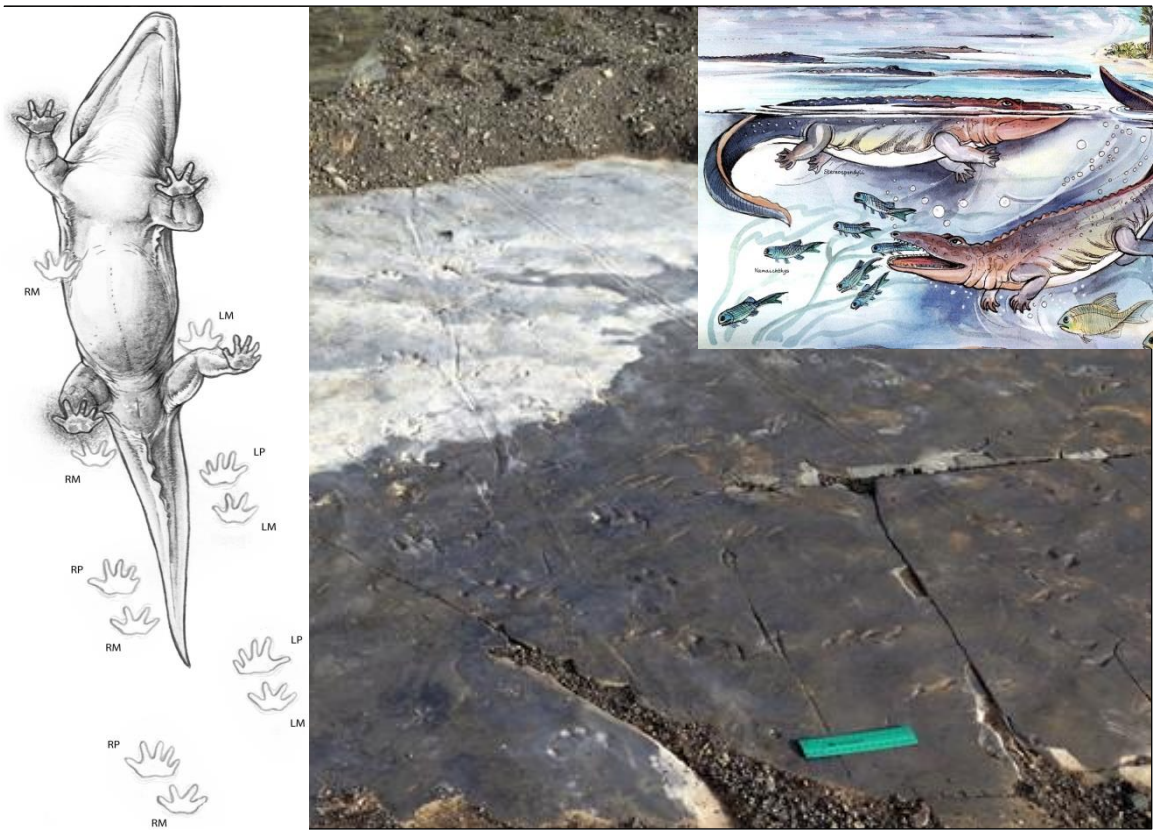


Figure 7-6: Lower Beaufort Group sandstone palaeosurface on Welgemoed 268 showing a partially-exposed temnospondyl amphibian trackway, including scalloped median trail impressions. The same surface also preserves amphibian floating or swimming trails

IMPACT IDENTIFICATION

→ **Physical Disturbance of paleontological sites**

The construction phase will entail 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.

Such impacts on fossil heritage are generally direct, negative and of permanent effect (non-reversible). The planning, operational and decommissioning phases of the wind energy facility are unlikely to involve further adverse impacts on local palaeontological heritage.

Impacts on unique or irreplaceable fossil heritage resources are improbable and their severity is anticipated to be negligible since (1) highly significant fossil sites are unlikely to be affected and (2) in many cases these impacts can be mitigated.

→ **Cumulative Impacts**

Due to the fact that only one highly-sensitive palaeontological sites or no-go areas was identified within the study area, the cumulative impacts inferred for the various alternative energy developments in in the Klein-Roggeveld region between Matjiesfontein and Sutherland are likewise assessed as low.

SIGNIFICANCE SCREENING

The significance screening of the above mentioned impacts is outlined in **Table 7-12.**

Table 7-12: Impact Significance Screening for Potential Palaeontological Impacts

IMPACT	PHASE	CHARACTER	PROBABILITY	CONSEQUENCE	SIGNIFICANCE
Physical Disturbance of palaeontological	C	Negative	1	2	**Very Low**
Cumulative Impacts	C	Negative	1	1	**Very Low**

POTENTIAL MITIGATION MEASURES

Mitigation of chance fossil finds reported by the environmental control officer would involve the recording, sampling and / or collection of chance fossil finds and associated geological data by a professional palaeontologist during the construction phase of the development. The palaeontologist concerned with potential mitigation work would need a valid fossil collection permit from Heritage Western Cape and any material collected would have to be curated in an approved depository (e.g. museum or university collection) (SAHRA 2013).

FURTHER STUDIES RECOMMENDED IN THE EIA PHASE

A four-day field assessment of the Maralla East study area carried out in February 2016 will inform the EIA phase for this project. Refer to detailed plan of Study (**Chapter 9**).

7.14 VISUAL

SENSITIVE AREAS

Visual constraints or sensitive features have been mapped on **Figure 7-7**. The main scenic resources, ridgelines, steep slopes and key receptors are indicated.

→ **Topographic Features**

- Prominent ridgelines in the landscape are visually sensitive and should be avoided, if possible, when positioning turbines and other infrastructure. The highest ridgelines on the site are indicated on Figure 6.
- 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 East: Komsberg, Wilgeboom, Gemsbokfontein, Rondawel, Koornplaats, Banksdrift, Spitskopfontien, Kareedoornkraal, Weltevreden, Damslaagte, De Hoop, De Plaat, Oranjefontein. 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, Beerfontein, Scholtzenhof, 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.
- **Towns/Urban Areas**
  - The closest town, Sutherland is situated approximately 36,5km 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. It is approximately 25km away from the proposed site at its closest point. The proposed development at Maralla East 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, the Old Lainsberg road 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 Maralla West 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 as 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. Historically sensitive areas within the valleys will be considered in the Heritage Scoping Study and scenic passes are indicated on **Figure 7-7**.

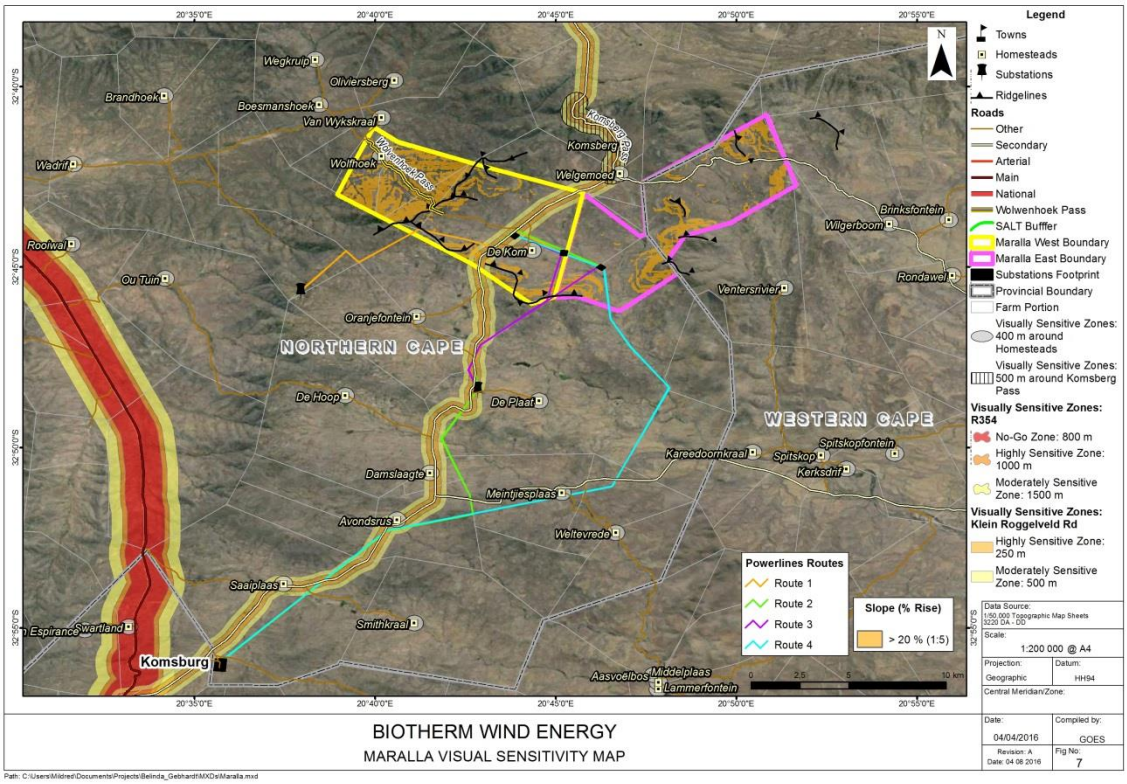


Figure 7-7: Visual Sensitivity Areas in relation to Maralla East (illustrated in pink)

IMPACT IDENTIFICATION

Potential visual issues and impacts identified are described below. Not all of these can be classified as visual impacts, but are concerns and issues that should be considered.

→ **Visual impact on the physical landscape**

Roads, turbine platforms and other earthworks may impact on the physical landscape form.

→ **Visual Intrusions on the sense of place, including scenic landscapes**

Given the size and scale of the proposed wind farm it will be visually prominent and will differ from the current visual landscape and the remote and rural character of the area. This impact would however, be reduced once the other proposed wind farms within the REDZ are constructed.

→ **Visual impacts of wind turbines on inhabitants and motorists**

Given the size and scale of Maralla East (125 turbines with a maximum height of 195m), it will be visually prominent within the landscape. The area is however sparsely populated, with few scattered homesteads. Motorists on the Klein Roggeveld Road, the Old Lainsberg Road and other farm roads will be affected by the proposed turbines along stretches of these roads.

- **Visual impacts of substation and O&M buildings on inhabitants and motorists**

  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, so will not affect many receptors.

- **Visual impact of lighting and flicker effect of the wind turbines**

  Any lighting on turbines or lighting for security at the site may have a visual impact on the particularly clear, dark skies of the Sutherland area. Detailed information regarding lighting has not yet been specified and will be considered in the EIA phase.

- **Visual impact during construction and decommissioning**

  There will be some visual impacts on motorists and inhabitants during the construction and decommissioning periods resulting from laydown areas, construction vehicles, dust and equipment. These impacts will be transitory in nature for the duration of construction /decommissioning.

- **Cumulative visual impacts**

  Many solar and wind energy projects are being proposed in the area. Three of these are highly likely to proceed to construction in the near future. The proposed development will contribute to the cumulative visual impact in the area. This needs to be considered in the context of this area having been selected as a REDZ.

SIGNIFICANCE SCREENING

The significance screening of the above mentioned impacts is outlined in **Table 7-13.**

Table 7-13: Impact Significance Screening for Potential Visual Impacts

IMPACT	PHASE	CHARACTER	PROBABILITY	CONSEQUENCE	SIGNIFICANCE
Visual impact on the physical landscape	C / O	Negative	2	2	**Low**
Visual Intrusions on the sense of place, including scenic landscapes	O	Negative	3	3	**Medium**
Visual impact during construction and decommissioning	C	Negative	3	2	**Medium**
	D	Negative	2	2	**Low**
Visual impacts of wind turbines on inhabitants and motorists	O	Negative	3	3	**Medium**
Visual impacts of substation and O&M buildings on inhabitants and motorists	O	Negative	2	2	**Low**
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	4	3	**High**

POTENTIAL MITIGATION MEASURES

The following potential mitigation measures have been identified:

- Detailed viewsheds and analysis of visual impacts is required in the EIA Phase of the project, especially for the wind turbines at Maralla East when combined with the proposed Maralla West and Maralla East wind facilities.

- Given their height, effective mitigation measures for the visual impact of wind turbines is not possible. However, impacts can be minimised to some extent, by where they are positioned.
- Detailed mitigation measures for other visual impacts must be developed in the next phase of the EIA process.
- The R354 is considered a local tourism route and runs from the N1 at the historical town of Matjiesfontein, to the town of Sutherland. Turbines located directly adjacent to the R354 will result in a very high visual impact for motorists. A minimum 800m set back with an additional 200m 'highly sensitive' zone for this road is strongly recommended.
- Visually sensitive corridors directly adjacent to gravel roads should be avoided and turbines set back as far from these as possible.
- Prominent ridgelines and high points in the landscape are visually sensitive and should be avoided where possible.
- Very steep slopes should be avoided as far as possible, because of the visibility of cut and fill embankments.

FURTHER STUDIES RECOMMENDED IN THE EIA PHASE

The EIA Phase study will employ qualitative as well as quantitative techniques and criteria will be used in the evaluation and clearly documented to ensure the reliability and credibility of conclusions and recommendations. The study will comply with the Department of Environmental Affairs and Development Planning's Guideline for Involving Visual and Aesthetic Specialists in EIA Processes (2005). Refer to detailed plan of Study (**Chapter 9**).

7.15 TRAFFIC

SENSITIVE AREAS

No sensitive traffic areas were identified during the scoping phase.

IMPACT IDENTIFICATION

- **Increased traffic generation around the study area by construction vehicles**

  The construction phase is expected to generate additional traffic volumes on the local road network due to the transport of raw materials and machinery to site. However, whilst there will be an increase in the traffic flow, it is expected that the road network can accommodate the increase due to the fact that low traffic volumes are experienced in the area.

- **Deterioration of the surrounding road network due to an increase of traffic around the site**

  Raw materials and machinery will be transported to the study area during the construction phase. It is expected that the bulk of the construction plant would remain on site during construction. The impact of the heavy vehicles on the surrounding roads is considered to be negligible.

  The operational phase of the facility will require very little to no staff, except for some inspection, maintenance and repair works. The traffic impact on the surrounding roads will therefore be negligible.

- **Transportation of abnormal loads during the construction phase**

  The construction phase will result in impacts on roads users due to the need to transport over-sized components such as generators, turbine blade, turbine mast segments etc. to site. It is

anticipated that the transport route(s) between the origin of the components and the facility may include national, provincial and local roads.

SIGNIFICANCE SCREENING

The significance screening of the above mentioned impacts is outlined in **Table 7-14**.

Table 7-14: Impact Significance Screening for Potential Traffic Impacts

IMPACT	PHASE	CHARACTER	PROBABILITY	CONSEQUENCE	SIGNIFICANCE
Increased traffic generation around the study area by construction vehicles	C, D	Negative	3	3	**Medium**
Deterioration of the surrounding road network due to an increase of traffic around the site	O	Negative	3	3	**Medium**
Transportation of abnormal loads during the construction phase	C	Negative	3	3	**Medium**

POTENTIAL MITIGATION MEASURES

The following potential mitigation measures have been identified:

- The posted speed limit on the R354 in the vicinity of the proposed development is currently 120km/h. It is suggested that the speed limit should be reduced in advance of the intersection with the access road.
- Intersection warning signs should be erected either side of the access road in accordance with the requirements of the South African Road Traffic Signs Manual.
- Construction vehicles should only use the roads during daylight hours. No construction vehicles should be operational from 6pm to 6am.
- All heavy vehicles should ensure that their headlights are on to increase their visibility to other vehicles and pedestrians.
- All drivers should comply with the relevant traffic laws and regulations
- The type and point of origin of the tower components will determine the delivery route and will again determine the special permits that may be required for transportation to the site

FURTHER STUDIES RECOMMENDED IN THE EIA PHASE

Due to the expected low trip generation (construction phase only and operational phase negligible), only a Traffic Impact Statement (TIS) will be required, as per the relevant National Standards, i.e. South African Committee of Transport Officials (COTO). Refer to detailed plan of study (**Chapter 9**).

7.16 NOISE

SENSITIVE AREAS

Three farmhouse receptor locations were identified in and around the vicinity of the Maralla East site (**Figure 7-8**).

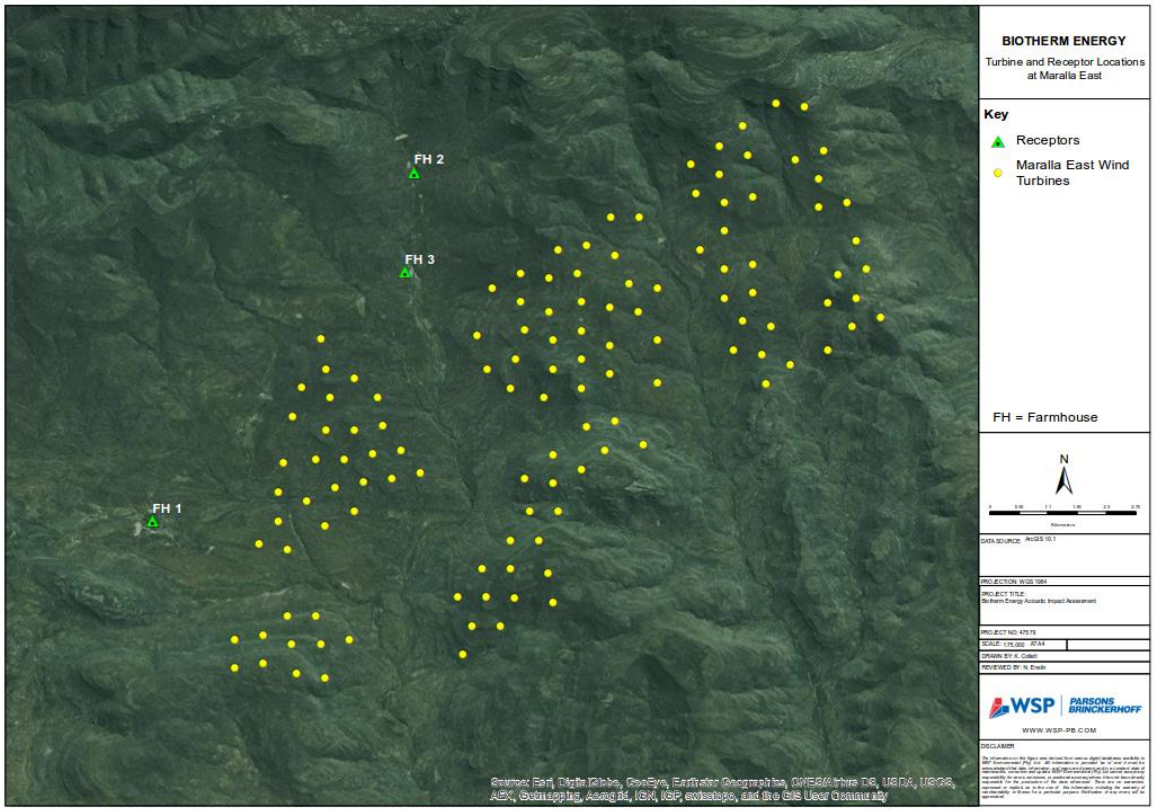


Figure 7-8: Sensitive noise receptors in the vicinity of the Maralla East site

IMPACT IDENTIFICATION

→ **Impact on sensitive receptors due to close proximity to construction activities**

Potential noise sources during the construction phase include excavators, graders, compactors, rollers, cranes, various vehicles including haulers and concrete trucks and blasting (if required).

→ **Impact on sensitive receptors due to close proximity to wind turbines**

During the operational phase the noise from the wind turbines are anticipated to impact on the noise climate at some farmhouse receptor locations. Noise from the wind turbines can originate from the mechanical components (namely the gearbox, generator, yaw drives, cooling fans and auxiliary equipment) but the main source of noise is aerodynamic, produced by flow of air over the turbine blades. Such aerodynamic noise is not deemed as intrusive, but merely an augmentation to background natural noise and as such it is advised that turbines are placed no closer than 300 m to a residential dwelling (Casey, 2013).

SIGNIFICANCE SCREENING

The significance screening of the above mentioned impacts is outlined in **Table 7-15.**

Table 7-15: Impact Significance Screening for Potential Noise Impacts

IMPACT	PHASE	CHARACTER	PROBABILITY	CONSEQUENCE	SIGNIFICANCE
Impact on sensitive receptors due to close proximity to construction activities	C	Negative	2	3	**Medium**
Impact on sensitive receptors due to close proximity to wind turbines	O	Negative	2	3	**Medium**

POTENTIAL MITIGATION MEASURES

No potential mitigation measures have been identified at this stage. Recommendations for appropriate mitigation measures will be provided in the EIA phase should this be deemed necessary.

FURTHER STUDIES RECOMMENDED IN THE EIA PHASE

ACOUSTIC IMPACT ASSESSMENT

A detailed Environmental Acoustic Impact Assessment will be performed for the site detailing the findings of the baseline assessment, acoustic modelling results and impacts. The impact rating/significance for each site will also be assessed through the utilisation of the Hacking methodology. Refer to detailed plan of study (**Chapter 9**).

7.17 SOCIAL ENVIRONMENT

SENSITIVE AREAS

There are no residents of infrastructure within the proposed site. The closest potentially sensitive receptors include:

- Welgemoed Farm (assumed to be house and infrastructure) (1 800 m north east of the site); and
- Komsberg Farm (assumed to be house and infrastructure) (1 900 m east of the site).

A social sensitivity map for the Maralla East project has been developed to present the settlements that may be directly and indirectly affected. The key settlements that are likely to be directly affected are indicated on **Figure 7-9**.

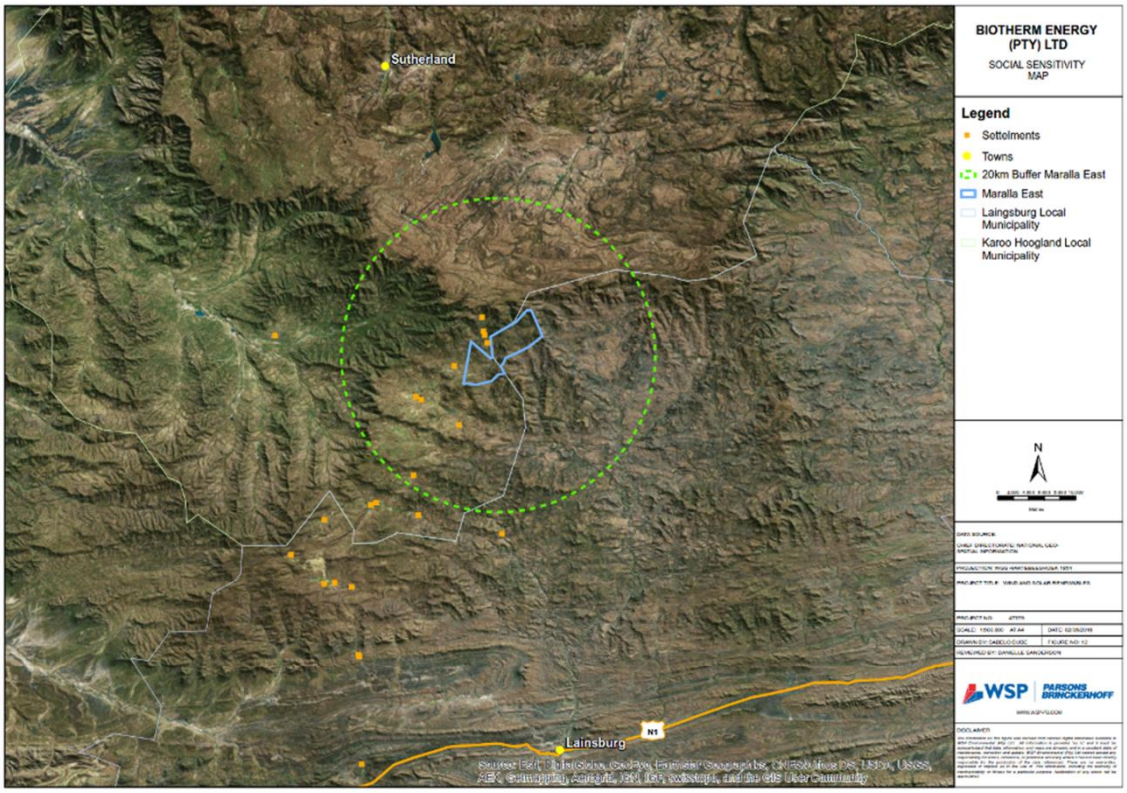


Figure 7-9: Social Sensitivity Map

IMPACT IDENTIFICATION

→ **Employment Opportunities and Skills Development**

During the construction phase a labour force will be required for the development of the proposed wind facilities. These individuals are likely to be sourced from outside of the local area (regionally and nationally) as the majority of the opportunities are highly specialised. Skilled employment from within the local and surrounding communities will be very limited due to skills shortages. There is, however, the potential for short-term local employment opportunities for unskilled and semi-skilled individuals (e.g. general labour, security, cleaning staff). BioTherm aims to fulfil 60% of the employment opportunities generated by the proposed facility from the local communities, or as far as practically possible. The generation of employment opportunities has the potential to have a positive social impact given the high levels of unemployment in the region.

The proposed development of the numerous renewable projects in the local area is also likely to develop a local skills base, which could support the proposed projects. There may, however, be an opportunity for the proposed projects to develop local skills prior to the development of the project. This would provide further benefit to the local communities.

The current operational phase of wind facilities is estimated to be approximately 20 years. Professional and skilled positions are likely to be sourced from outside of the local municipalities due to the specialised nature of the activity, including national and even international recruitment. The proposed projects will have a positive impact by providing skilled, semi-skilled and unskilled job opportunities (e.g. security and cleaners) during the operational phase. It is anticipated that up to 60% of the operational employment opportunities will be sourced from local communities, as far as practically possible.

This may improve the current low employment and lack of skills within the local municipalities. The number and type of employment opportunities will determine the impact of the operational phase on socio-economic landscape, and will be assessed further in the SIA.

There is unlikely to be a loss of permanent employment opportunities following the closure and decommissioning of the proposed wind farms as BioTherm is likely to relocate staff to a new site or renew the Power Producer Agreement after the initial 20 year operational phase. Should the facility be decommissioned, a small number of local employment opportunities may be lost. The local economy is likely to have changed (as a result of the REDZ) and therefore these individuals could potentially be absorbed by other facilities in the local area.

→ **Local Economic Development Opportunities**

The demand for services, as well as goods and materials during the construction phase of the proposed projects has the potential promote LED. The provision of services, such as accommodation, catering, and transport associated with the workers and contractors on site could encourage entrepreneurship, and local business growth and development. This could contribute towards alleviating high local unemployment. The low levels of education are, however, a hindrance to this, as education is known to provide a basis that assists households and individuals to perceive and embark on economic opportunities offered by new economic activities (Schultz, 1980 in van der Suis *et al*, 2003). The proposed project could, however, provide a means of facilitating this through partnerships with local authorities.

The proposed facilities are situated in rural areas and are likely to require the provision of supplementary services, such as catering, accommodation, and transport in surrounding centres. This could increase the development of existing and new local business opportunities. The proposed project therefore has the potential to promote LED through sourcing of services and materials locally where possible. The majority of the permanent staff are likely to reside within the local towns, which would provide a source of income for local residents through service provision to these individuals. This has the potential to contribute positively to the local economy.

The decommissioning phase may require a limited number of short-term, unskilled or semi-skilled labourers for the decommissioning and dismantling of the proposed facilities. This will increase short term employment opportunities for local communities, however is likely to be sourced on a regional or national level. The impact will be assessed further during the SIA.

→ **Disturbances to Local Communities**

The proposed projects are situated in rural areas, with a low population and scattered agricultural settlements. The nearest urban area (small towns) is over 20 km from the site.

The construction and decommissioning phases have the potential to result in a disturbance to the local urban areas, including the influx of skilled and unskilled employment seekers from outside the local area. The presence of non-residents can pose a risk to existing social structures and networks. In addition, disturbances to local farming communities may include:

- An increase in traffic on rural roads;
- A disruption to tourism activities;
- An increase in dust and noise from construction activities; and
- Increased risk of livestock poaching.

Details on the number of potential employees, as well as temporary housing and services provision for labour and contractors, will need to be investigated further during the SIA.

- **Increase in Communicable Diseases and Reduced Public Health**

  An influx of labour to the area may have a negative impact on the overall public health levels of the area. It is anticipated that up to 60% of construction phase employees will be sourced locally (or as far as possible). An increase in construction workers may, however, be associated with an increase in unwanted social behaviour, such as alcohol and drug use, and an increased likelihood of contracting communicable diseases. This potential impact is likely to affect urban areas predominantly, as this is where labour are likely to be housed and spend leisure time.

- **Change in Landscape and Sense of Place**

  The Maralla East site is located approximately 50 km from the N1 and approximately 30 km from the R354. The closest route is a secondary (farm access) road, which runs through the proposed site from the R354 to Laingsburg. The closest settlement outside of the boundary is a farm settlement, which approximately 600 m north of site boundary. The operation of the wind turbines has the potential to affect the sense of place for local farming communities through changes in visual landscape and sense of place, but is unlikely to have an impact on tourism and local business.

  The site is located within an area identified as one of the eight REDZ within South Africa, approved by the DEA as part of the REIPP process. There are three approved wind power facilities, which are due to commence construction within the next 12 to 24 months. The local landscape is therefore likely to be transformed significantly. The overall potential impact of the proposed facility will be assessed further in the EIA phase.

- **Damage to and Loss of Farmland**

  The current activities within, and adjacent to, the proposed project sites are limited to extensive sheep farming and intensive crop farming. These areas are considered non-arable, low potential grazing land. The construction phase activities have the potential to impact the agricultural potential, due to soil compaction, erosion and contamination. In addition, construction workers and construction related activities have the potential to increase the risk of veld fires (e.g. open cooking fires and welding). Fires can reduce the available grazing on the site (if grazing continues during the construction phase) and potentially damage surrounding grazing areas and settlements if the fires spread beyond the site boundaries.

  The loss of grazing land and damage to settlements could result in an impact on local farmers and employees through loss of production potential. It is understood, however that the sites selected for the turbines are in high-lying areas, unsuitable for grazing. In addition, the footprint of the wind farm is as little as 5% of the total farm size, and therefore the loss to grazing land is likely to be minimal.

  The impact of the proposed project on the loss of available grazing land, as well as the viability of allowing grazing during the operational phase, will be assessed further during the SIA.

- **Impact on Tourism**

  Tourism is an important economic activity for the Karoo Hoogland Local Municipalities. Studies in the United Kingdom have reported a positive interest by tourists in visiting windfarms and some have developed visitor centres (Isle of Anglesey County Council, 2012).

  The proposed project is located 32 km from the nearest tourism centre of Sutherland and 13 km from the nearest tourism route (R354). The proposed project is, therefore, unlikely to have a notable impact on tourism within the local context, as it is not easily accessible to the public.

- **Cumulative Development Effects on Increased Local Economic and Skills Development**

  The proposed projects have the potential to collectively contribute towards the local, regional and national economies through employment opportunities and skills development, as well as developing support services for the projects. The combined potential need, and the potential development of, services and skills locally as a result of the number of renewable projects, could promote education, tertiary training and entrepreneurship, and make skills and services more prevalent in the local population.

- **Cumulative Development Effects on the Loss of Regional Agricultural Potential**

  There is the potential for loss of agricultural land with the development of the wind farms. Cumulative impacts associated with the loss of farmland have the potential to impact on the livelihoods of the affected land owners and occupiers (farmers and staff), service providers to these farms (which may lie outside of the study area).

  It is noted, however, that the size of land transformed by the proposed windfarms in the local area is unlikely to be significant in context of the extensive farms (large), and the sites are generally selected to be on high-lying areas unsuitable for grazing. The land owners are also likely to be compensated through purchase or lease agreements with the operators. The overall loss to agriculture is not considered significant.

- **Cumulative Development Effects on the Increase in Communicable Diseases and Reduced Public Health**

  The influx of workers for several sites in the local area could result in an increase of communicable diseases and other social impacts, such as increased alcohol and drug abuse. The cumulative impacts may be long term and permanent on communities (both rural and urban) within the vicinity of the proposed projects. It is crucial that measures to prevent such social impacts are put in place to prevent long-terms social deterioration.

- **Cumulative Development Effects on the Change in Sense of Place**

  The visual impact of wind farms can affect a large area as they are visible from a distance. The site is located within an area identified as one of the eight REDZ within South Africa and it is noted that there are three approved wind power facilities, which are due to commence construction in the next few years. The sense of place is therefore likely to change before the construction phase commences. The overall potential cumulative impact of the proposed facility will be assessed further in the EIA phase.

- **Cumulative Development Effects on the Change in Tourism Activities**

  The tourism industry within the local area may be affected by the change in landscape and sense of place as a result of the construction and operation of several renewables projects within the local area. The current tourism activities are reliant on scenic landscape and historical features within the local area. The change in landscape, and the potential for new opportunities in the renewable energy sector, could have an unintended impact on tourism. The benefits could include an increase in tourism through the development of visitor's centres. This impact will be qualitatively assessed further in the SIA.

SIGNIFICANCE SCREENING

The significance screening of the above mentioned impacts is outlined in **Table 7-16.**

Table 7-16: Impact Significance Screening for Potential Social Impacts

IMPACT	PHASE	CHARACTER	PROBABILITY	CONSEQUENCE	SIGNIFICANCE
Employment Opportunities and Skills Development	C / O	Positive	2	2	**Low**
	D	Negative	2	1	**Low**
Local Economic Development Opportunities	C	Positive	3	3	**Medium**
	O / D	Positive	2	2	**Low**
Disturbances to Local Communities	C	Negative	2	2	**Low**
	D	Negative	2	2	**Low**
Increase In Communicable Diseases and Reduced Public Health	C	Negative	2	2	**Low**
Change in Landscape and Sense of Place	C	Negative	2	2	**Low**
	O	Negative	1	1	**Very Low**
	D	Positive	2	2	**Low**
Damage To And Loss Of Farmland	C	Negative	3	2	**Medium**
Impact on Tourism	O	Negative	1	1	**Very Low**
Cumulative Development Effects on Increased Local Economic and Skills Development	C / O	Positive	2	2	**Low**
Cumulative Development Effects on the Loss of Regional Agricultural Potential	C	Negative	3	2	**Medium**
Cumulative Development Effects on the Increase in Communicable Diseases and Reduced Public Health	C	Negative	2	2	**Low**
Cumulative Development Effects on the Change in Sense of Place	C / O	Negative	2	2	**Low**
Cumulative Development Effects on the Change in Tourism Activities	O	Positive	2	2	**Low**

POTENTIAL MITIGATION MEASURES

The following potential mitigation measures have been identified:

- Ensuring local communities (through formal channels such as ward councillors and Department of Labour) are made aware of the potential opportunities available during construction in order for expectations to be managed appropriately.
- Prioritisation of local labour through implementing contractor policies.
- Ensuring that labour and staff brought into the area (by contractors or the developer) can be accommodated within exiting or proposed formal housing, through discussions with the Housing and other relevant social services divisions at the local municipality.
- Undertake a survey of industries and businesses in the local area to identify potential suppliers.
- The developer and contractors must make HIV/AIDS awareness and prevention program development and implementation a condition of contract for all suppliers and sub-contractors.

FURTHER STUDIES RECOMMENDED IN THE EIA PHASE

There were no significant socio-economic impacts identified during the socio-economic screening study, and there is sufficient information available for the proposed project site and study area. It is therefore proposed that a desktop SIA is undertaken during the EIA phase for the proposed project.

The desktop assessment will include a review of the information contained within other specialist studies, as well as insights from the scoping phase stakeholder engagement process. This process will allow for the assessment of key socio-economic issues relating to the proposed project. Refer to detailed plan of Study (**Chapter 9**).

8 CONCLUSION AND RECOMMENDATIONS

The essence of any S&EIR process is aimed at ensuring informed decision-making and 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 the Maralla East Wind Facility, the requirements of all relevant legislation have been considered. This relevant legislation has informed the identification of potential impacts associated with the proposed project.

A summary of the potential impacts associated with the project, preliminary significance ratings, and requirements for EIA Phase specialist studies is provided in **Table 8-1**.

Figure 8-1 illustrates the sensitivity map for Maralla East. The results of the sensitivity mapping together with technical input from the applicant resulted in the initial footprint of the wind energy facility being revisited. **Figure 8-2** illustrates the revised turbine layout that will be investigated in more detail during the EIA phase.

Table 8-1: Summary of Scoping Phase Impact Assessment Process

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**	No	Yes	
	Increased risk of erosion	O	Negative	**High**	No	Yes	
	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	

Environmental Receptor	Impact	Phase	Character	Significance	Fatal Flaw (Yes/No)	Mitigation Required (Yes/No)	EIA Phase Study Required (Yes/No)
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

Environmental Receptor	Impact	Phase	Character	Significance	Fatal Flaw (Yes/No)	Mitigation Required (Yes/No)	EIA Phase Study Required (Yes/No)
	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	Negative	**Medium**	No	Yes	
		D	Negative	**Low**	No	Yes	
	Visual impacts of wind turbines on inhabitants and motorists	O	Negative	**Medium**	No	Yes	
	Visual impacts of substation and O&M buildings on inhabitants and motorists	O	Negative	**Low**	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 / O	Positive	**Low**	No	Yes	Yes

Environmental Receptor	Impact	Phase	Character	Significance	Fatal Flaw (Yes/No)	Mitigation Required (Yes/No)	EIA Phase Study Required (Yes/No)
		D	Negative	**Medium**	No	Yes	
	Local Economic Development Opportunities	C	Positive	**Low**	No	Yes	
		O / D	Positive	**Low**	No	Yes	
	Disturbances to Local Communities	C	Negative	**Low**	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	**Very Low**	No	Yes	
		D	Positive	**Medium**	No	Yes	
	Damage To And Loss Of Farmland	C	Negative	**Low**	No	Yes	
	Impact on Tourism	O	Negative	**Very Low**	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	**Low**	No	Yes	
	Cumulative Development Effects on the Change in Tourism Activities	O	Positive	**Low**	No	Yes	

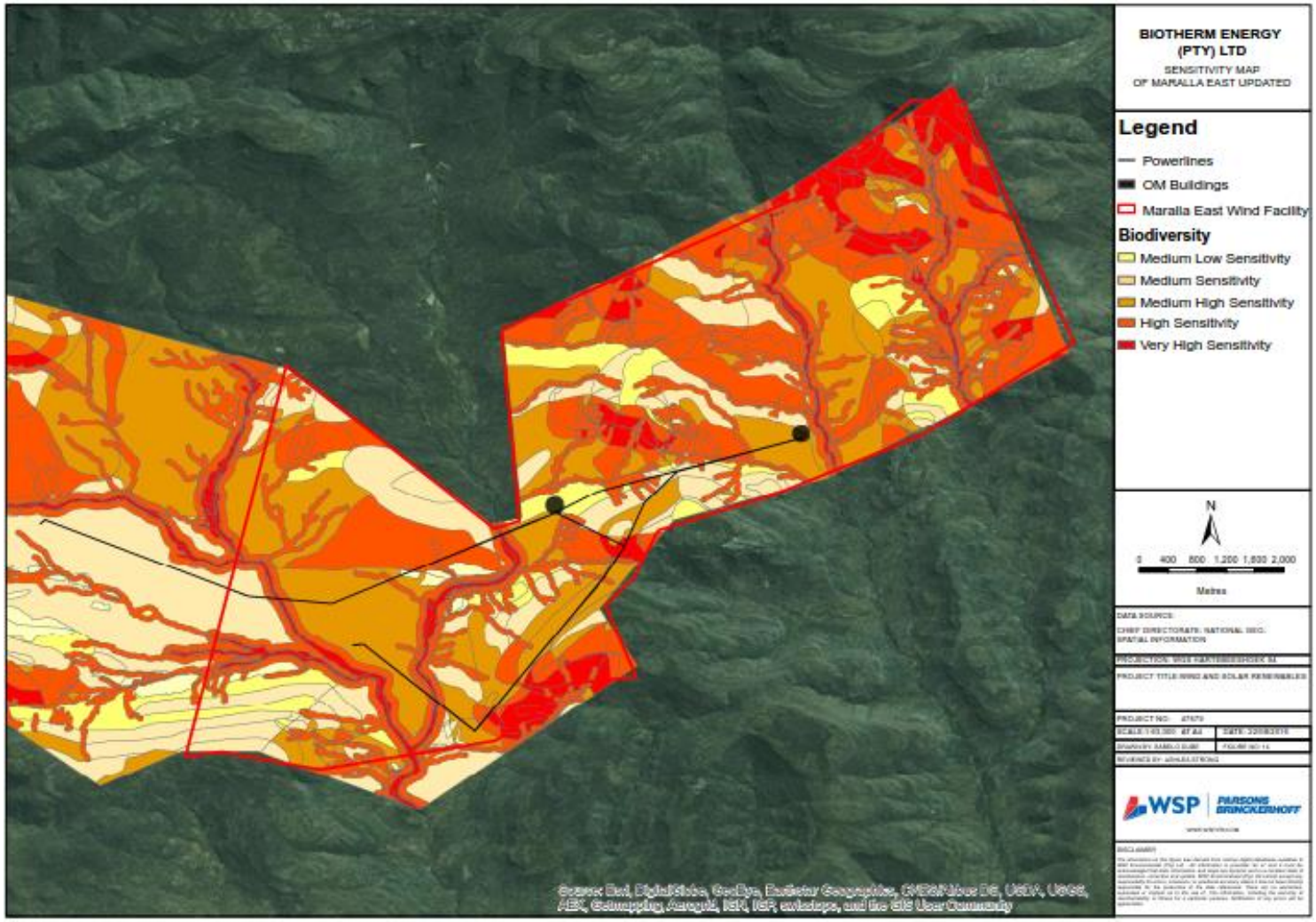


Figure 8-1: Sensitivity Map for Maralla East

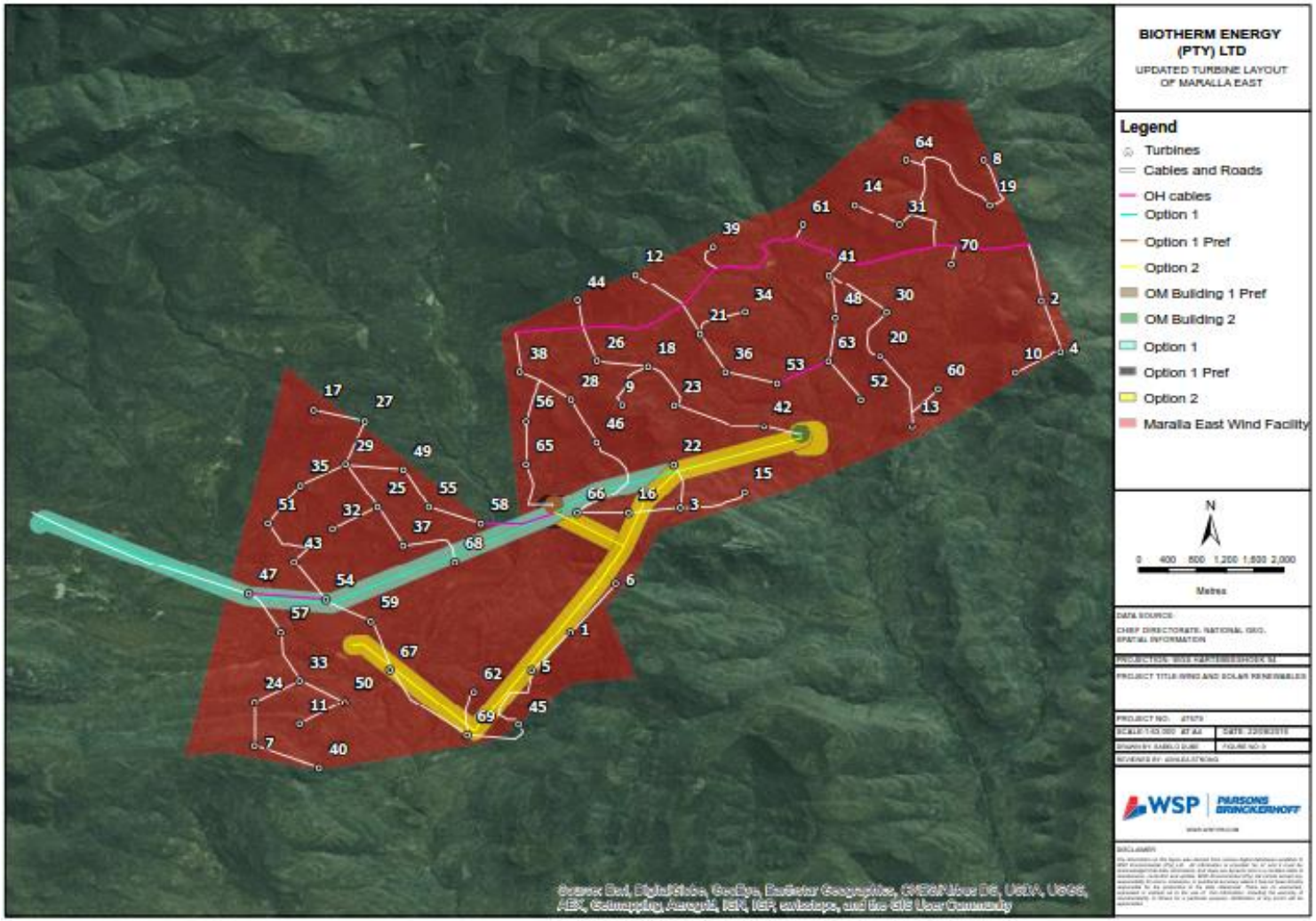


Figure 8-2: Revised Turbine Layout to be investigated in the EIA Phase

9 PLAN OF STUDY FOR ENVIRONMENTAL IMPACT REPORTING PHASE

9.1 TERMS OF REFERENCE

Table 9-1 outlines the structure of the plan of study as required in terms of Annexure 2 of GNR 982.

Table 9-1: Plan of Study Structure

PLAN OF STUDY CHAPTER	INFORMATION REQUIREMENT AS PER GNR 982
Alternatives	A description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity.
Description of EIA Tasks	A description of the tasks that will be undertaken as part of the environmental impact assessment process.
Aspects to be Assessed in the EIA Process	A description of the aspects to be assessed as part of the environmental impact assessment process.
Specialist Studies	Aspects to be assessed by specialists.
Impact Assessment Methodology	A description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists.
	A description of the proposed method of assessing duration and significance.
Environmental Impact Report	Contents of EIR as specified in GNR 982 Annex 2
Stakeholder and Authority Engagement	An indication of the stages at which the competent authority will be consulted.
	Particulars of the public participation process that will be conducted during the environmental impact assessment process.
Progression of authorisations, permits and other development approvals	N/A

The following information required in terms of Annexure 2 of GNR 982 is not provided in this Plan of Study. Reference should be made to the relevant chapter within the Scoping Report:

- → Identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored, including the option of not proceeding with the activity.

9.2 ALTERNATIVES

The Scoping Report identified and evaluated the feasibility of a range of site and technology options (**Table 9-2**). The following chapter summarises the scoping phase alternative assessment, and provides rationale for alternatives to be further considered and assessed in the EIA phase.

Table 9-2: 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 East Site	Yes
Technology Alternatives	Wind Technology	Yes
Layout and Design Alternatives	Initial Turbine layout	No
	Revised Turbine Layout	Yes
Access Road Alternatives	New access road	Yes
Internal Access Road Alternatives	None identified	Yes
Internal 132kv Powerline Route Alternatives	None identified	Yes
Tower Structure Alternatives	Steel / concrete monopole single circuit structure	Yes
	Steel / concrete monopole double circuit structure	Yes
	H-pole structure	Yes

LOCATION ALTERNATIVES

The following location alternatives were considered:

- Alternative development regions i.e. falling outside the Komsberg REDZ
- Alternative development sites i.e. within the Komsberg REDZ study area

The project development area was initially selected (prior to scoping) based a comprehensive assessment of environmental, wind resource, and grid / connectivity related criteria. This selection process ensured that the best practical / technically suitable environmental site option was selected. The scoping process subsequently provided a detailed assessment of the baseline environmental conditions on the site and the presence of potential environmental issues including the presence of fatal flaws.

The above process has determined that the project location is considered highly suitable in terms of reserve and grid / connectivity, as well as being located within the renewable energy hub that is developing in the Sutherland Area. The Scoping Report revealed no significant environmental issues or fatal flaws.

Further work in terms of identifying and assessing alternative sites cannot be rationalised. The scope of the EIA phase is therefore proposed to be limited to the identified Maralla East site.

TECHNOLOGY ALTERNATIVES

BioTherm's development concept for Maralla East is fundamentally predicated on wind technology. The assessment of alternative technologies in the EIA phase would be onerous, as there is no other development concept for the site.

Based on the above, the scope of the EIA phase is therefore proposed to be limited to wind technology.

LAYOUT AND DESIGN ALTERNATIVES

An initial turbine layout alternative for 125 turbines was available for assessment during scoping. The scoping phase identified a number of potentially environmentally sensitive areas within the site which should be avoided by the proposed development. Therefore, a revised turbine layout (for 70 turbines) has been developed. This results in the project generation Capacity being reduced form 250MW to 140MW. This turbine layout will be assessed during the EIA phase.

ACCESS ROAD ALTERNATIVES

No alternative access routes were identified during scoping. During the EIA further detailed studies will be undertaken in order to identify areas of sensitivity on or near the site. This information will be used to inform the layout of the internal roads.

INTERNAL POWERLINE ALTERNATIVES

INTERNAL 132KV POWERLINE ALTERNATIVES

The power generated by the turbines will be evacuated via 132kV overhead powerlines to the onsite substation. During the EIA further detailed studies will be undertaken in order to identify areas of sensitivity on or near the site. This information will be used to inform the layout of the internal powerlines.

TOWER STRUCTURE ALTERNATIVES

Three alternative 132kV tower structure alternatives were identified in scoping namely, 1) steel / concrete monopole single circuit structure; 2) steel / concrete monopole double circuit structure; and 3) H-pole structure. These alternatives will be considered further in the EIA Phase.

132KV POWER EVACUATION POWERLINE ALTERNATIVES

Alternative powerline corridors have been identified however; they are being assessed in a separated Basic Assessment process and will therefore not be included in the scope of this assessment.

THE "DO NOTHING" ALTERNATIVE

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. The no-go option is not the preferred option; however this will be assessed for comparative purposes in the EIA phase.

9.3 ASPECTS TO BE ASSESSED IN THE EIA PROCESS

Table 9-3 outlines the key aspects that were identified in the scoping phase; these aspects will be the subject for further assessment in the EIA Phase.

Table 9-3: Summary of aspects to be addressed in the EIA Phase

ENVIRONMENTAL RECEPTOR	IMPACT
Soils and Land Capability	Reduction in land available for grazing animals
	Soil erosion resulting in degradation of soil structure
	Degradation of soil due to contamination
Natural Vegetation and Animal Life	Disturbance, loss and transformation of vegetation and listed or protected plant species
	Impacts on fauna
	Increased risk of erosion
	Proliferation of alien invasive plant species
	Impacts on Critical Biodiversity Areas and broad-scale ecological processes
	Effect on South Africa's commitment to conservation
Avifauna	Temporary displacement of avifauna due to construction and decommissioning of the wind energy facility.
	Priority species mortality due to collision with turbines
	Permanent displacement of priority species due to habitat transformation
Bats	Destruction of bat roosts due to earth works
	Loss of foraging habitat
	Bat Mortalities due to direct blade impact or barotrauma during foraging (not migration)
	Bat Mortalities due to direct blade impact or barotrauma during foraging during migration
	Artificial lighting
Surface Water	Surface water contamination
	Potential increase in wetland sedimentation
	Increase in surface water flow due to the loss of vegetation cover and soil compaction
	Impact on watercourses and wetlands
Heritage	Physical disturbance of archaeological sites
Palaeontology	Physical disturbance of palaeontological sites
	Cumulative impacts
Visual	Visual impact on the physical landscape
	Visual Intrusions on the sense of place, including scenic landscapes
	Visual impact during construction and decommissioning
	Visual impacts of wind turbines on inhabitants and motorists

ENVIRONMENTAL RECEPTOR	IMPACT
	Visual impacts of substation and O&M buildings on inhabitants and motorists
	Visual impact of lighting and flicker effect of the wind turbines
	Cumulative visual impacts
Traffic	Increased traffic generation around the study area by construction vehicles
	Deterioration of the surrounding road network due to an increase of traffic around the site
	Transportation of abnormal loads during the construction phase
Noise	Impact on sensitive receptors due to close proximity to construction activities
	Impact on sensitive receptors due to close proximity to wind turbines
Socio-economic	Employment Opportunities and Skills Development
	Local Economic Development Opportunities
	Disturbances to Local Communities
	Increase In Communicable Diseases and Reduced Public Health
	Change in Landscape and Sense of Place
	Damage To And Loss Of Farmland
	Impact on Tourism
	Cumulative Development Effects on Increased Local Economic and Skills Development
	Cumulative Development Effects on the Loss of Regional Agricultural Potential
	Cumulative Development Effects on the Increase in Communicable Diseases and Reduced Public Health
	Cumulative Development Effects on the Change in Sense of Place
	Cumulative Development Effects on the Change in Tourism Activities

9.4 DESCRIPTION OF EIA TASKS

The EIA phase will consist of the following tasks; each of these tasks is detailed separately in the following sub-sections:

- Specialist studies;
- Continuation of Authority and stakeholder engagement;
- Assessment of the significance of potential impacts; and
- Preparation of the EIR.

9.5 SPECIALIST STUDIES

The purpose of the scoping phase is to identify possible impacts and determine what aspects need to be taken forward for detailed consideration in the EIA. The findings of the Scoping Study confirmed that the proposed Maralla East Wind Facility will have negligible or no impact on the following aspects and therefore no further assessment will be made of these aspects within the EIR:

- Topography;
- Geology;
- Climate; and
- Ground water.

Table 9-4 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 9-4: Details of the Specialist Consultants

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

All specialist studies will include a description of the baseline environment, the identification and assessment of potential impact (including cumulative impacts) and the provision of management and mitigation measures. The terms of reference for each of the above mentioned specialist studies during the EIR phase of the project are detailed below.

SOIL AND LAND CAPABILITY

There is only one concern for the land capability identified during the scoping phase *viz.* the loss of grazing land available within the development sites. However, while this may be high during the construction phase of the project, it will be medium to low impact on the land capability during the operational life span of the respective wind energy facility.

There is enough information present in this report to proceed with an in-depth EIA study of the proposed BioTherm development.

A draft report defining the Land Capability and Wetland Assessment in more detail will be compiled during the EIA phase. This will include the associated potential impacts and corresponding mitigation measures. Following comments from the relevant stakeholders, the final report will be updated and submitted with the final EIA report.

BIODIVERSITY

The current study is based on a site visit, a desktop assessment of the study area as well as prior knowledge of the wider area. Although this has increased the certainty around the findings of the Scoping Study, additional fieldwork prior to the EIA would be a key component required to better characterise the study area and identify any sensitivities prevailing at the site. This was not possible during the Scoping Phase due to the highly seasonal nature of the vegetation at the site. Additional work that will be conducted for the EIA phase of the development include the following:

- A more comprehensive site visit and field assessment in order to characterise the vegetation and plant communities present at the site in greater detail. This includes habitat mapping, developing species lists and descriptions of the typical and dominant species within the site and the potential impact of the development on these habitats and plant communities.
- Identification and quantification of the abundance and distribution of species of conservation concern within the site and especially within the development footprint.
- Evaluate the possible impact of the development on landscape connectivity in the field based on the likely use of the area as a corridor for movement by fauna as well as any local impacts on faunal communities. This should include the identification of any corridors that should be kept clear of development at the site and any buffers required around such features.
- Identify sensitive faunal habitats that should be avoided and measures that should be implemented to reduce impacts on fauna in general.
- Consider the potential impact of the development on CBAs and broad-scale ecological processes at the site. This should consider the habitats affected by the current development as well as the overall impact of renewable energy development in the area at a broader scale.
- Assess the contribution of the current development to cumulative habitat loss within the NPAES Focus Area and the potential impact of this on future conservation options in the area.
- Evaluate, based on the site attributes, what the most applicable mitigation measures to reduce the impact of the development on the site would be and if there are any areas where specific precautions or mitigation measures should be implemented.
- Assess the impacts identified above in light of the site-specific findings and the final layout to be provided by the developer.

AVIFAUNA

The Birds and Renewable Energy Specialist Group (BARESG), convened by BirdLife South Africa and the Wildlife and Energy Programme of the Endangered Wildlife Trust, proposes the following guidelines and monitoring protocols for evaluating utility-scale wind energy development proposals. The Guidelines are aimed at environmental assessment practitioners, avifaunal specialists, developers and regulators and propose a tiered assessment process, including:

- Initial screening or scoping – an initial assessment of the likely avifauna and possible impacts, preferably informed by a brief site visit and by desk-top collation of available data; also including the design of a site-specific survey and monitoring project should this be deemed necessary. This has been completed.
- Data collection – further accumulation and consolidation of the relevant avian data, possibly including the execution of baseline data collection work as specified by the scoping study, intended to inform the avian impact study. This is currently happening through an onsite monitoring programme which is aimed at providing a baseline picture of the avifauna over a period of a year.
- Impact assessment - a full assessment of the likely impacts and available mitigation options, based on the results of systematic and quantified monitoring which is currently taking place.

BATS

The long-term (12 month) monitoring study will aim to identify bat species at risk of fatality to wind turbines, and patterns in their activity and distributions (temporal and spatial). Ultimately, on completion of the long-term monitoring study refined mitigation measures will be proposed, if needed.

The following objectives will be used for the monitoring study:

- Study bat species assemblage and abundance on the site.
- Study temporal distribution of bat activity across the night as well as the four seasons of the year in order to detect peaks and troughs in activity.
- Determine whether weather variables (wind, temperature, humidity and barometric pressure) influence bat activity.
- Determine the weather range in which bats are mostly active.
- Develop long-term baseline data for use during operational monitoring.
- Identify which turbines need to have special attention with regards to bat monitoring during the operational phase and identify if any turbines occur in sensitive areas and need to be shifted into less sensitive areas or removed from the layout.
- Detail the types of mitigation measures that are possible if bat mortality rates are found to be unacceptable, including the potential times/ circumstances, which may result in high mortality rates.

HERITAGE

The EIA phase study needs to fulfil the requirements of heritage impact assessment as defined in section 38 of the NHRA. This means that the assessment has to cover the full range of potential heritage resources as defined in the National Heritage Resources Act 25 of 1999.

The aim of the EIA would be to identify and assess the significance of all heritage resources on the property, to assess the preferred and alternative options and to rate them in terms of significance, to determine the potential impacts on the heritage resources, and where appropriate to recommend “no-go’ areas and to propose mitigation if avoidance is not possible.

- The proposed study area, including proposed routes of linear infrastructure (power lines and access roads) must be subjected to a survey by the heritage practitioner/archaeologist. They must recording details and locations of any heritage material found;
- The significance of each find will need to be assessed along with the impacts of the proposed activity;
- In the case of impacts to significance heritage resources, the proposed mitigation measures may include the “No-Go” alternative, avoidance, archaeological excavations or monitoring during earthworks.

PALAEONTOLOGY

A four-day field assessment of the Maralla East study area carried out in February 2016 will inform the EIA phase for this project. The aim of the EIA would be to identify and assess the significance of palaeontological resources on the property, to assess the preferred and alternative options and to rate them in terms of significance, to determine the potential impacts on the palaeontological resources, and where appropriate to recommend “no-go’ areas and to propose mitigation if avoidance is not possible.

VISUAL

The goal of visual impact assessment is not to predict whether specific individuals will find wind energy projects attractive or not. Instead, the goal is to identify important visual characteristics of the surrounding landscape, especially the features and characteristics that contribute to scenic quality, as the basis for determining how and to what degree a particular project will affect those scenic values (Vissering, 2011).

Thus the primary aim of the visual impact assessment phase will be to ensure that visual impacts are adequately assessed and considered so that the relevant authorities can decide if the proposed wind energy facilities have unreasonable or undue visual impacts.

The secondary aim is to identify effective and practical mitigation measures. The study will use the above analysis of the visual characteristics, value and sense of place of the receiving environment as a baseline. Emphasis will be placed on sensitive visual resources and community concerns.

Qualitative as well as quantitative techniques and criteria will be used in the evaluation and clearly documented to ensure the reliability and credibility of conclusions and recommendations. The VIA will comply with the Department of Environmental Affairs and Development Planning's Guideline for Involving Visual and Aesthetic Specialists in EIA Processes (2005).

The study will include the following:

- Refining of the baseline study, description of the visual character of the sites and zone of visual influence, if required.
- Refining the list of identified visual impacts resulting from the proposed installations (with consideration of any public and/or relevant authorities' concerns).
- Assessment of visual impacts based on standard VIA rating criteria, namely:
  - Quality of landscape – the aesthetic excellence and significance of the visual resources and scenery;
  - Visual absorption capacity – the potential of the landscape to conceal the proposed development;
  - Viewshed analysis (visibility) – the geographic area from which the project may be visible (view catchment);
  - Visual intrusion (or integrity) – the level of congruence or integration with existing landscape; and
  - Viewer numbers and sensitivity – the level of acceptable visual impact is influenced by the type of visual receptors.
- Assessment of the significance of the visual impacts, which includes:
  - Severity, extent, duration and probability to determine consequence; and
  - Consequence considered with status (positive or negative impact) and confidence to determine significance.
- Impacts will be rated before mitigation and after (assuming) mitigation if applicable.
- Development of mitigation measures to reduce visual impacts and enhance any positive visual benefits.

SOCIAL

The screening phase has identified a number of socio-economic impacts that may result from the proposed projects. The most significant potential impact is the displacement of farm owners and occupiers from the farms on which the proposed projects are to be located.

There is currently little information available regarding these settlements. If sufficient information can be obtained during the EIA phase without a primary data collection (land owner and occupier interviews), a desktop assessment will be undertaken for the SIA. The need for primary data collection may, however, be reassessed during the SIA.

The study will include the following:

- The stakeholder review will include a review of the Scoping Phase stakeholder engagement process. This process will allow for the assessment of key socio-economic issues relating to the proposed project. An outline of the proposed approach is provided below.
- The relevant specialist reports, or information, will be reviewed (if available), including:
  - Visual Impact Assessment;
  - Hydrological Assessment;
  - Land Capability Assessment;
  - Traffic Assessment; and
  - Fauna and Flora assessment.
- These reports will provide a better understanding of the biophysical and cultural landscape of the area of direct impact. This area will be defined by the extent of the socio-economic impacts of the proposed project resulting from potential direct and indirect biophysical and other impacts. This review will also inform the SIA through providing insight into the possible socio-economic impacts, such as impacts on water provision, tourism and other aspects.
- There will be no direct stakeholder engagement undertaken during the SIA. A review of the Scoping Phase stakeholder engagement and comments and response report will, however, be undertaken to obtain insight into the local social and socio-economic issues and inform the assessment of the potential socio-economic impacts.
- Following a review and interrogation of the above information, an assessment of potential the social and socio-economic impacts will be undertaken. This will make use of the EIA impact assessment criteria to assign significance to the potential identified impact. Recommendations, in line within international base practice, will also be provided to contribute towards socio-economic sustainability during all phases of the project.
- The Draft SIA Report will be compiled, including the socio-economic context, potential impacts, assessment, and mitigation recommendations. Following stakeholder comment on the report, the final report will be updated and submitted with the final EIA Report.

TRAFFIC

The Scope of the TIS will be determined as per the requirements of the relevant National Standards, i.e. South African Committee of Transport Officials (COTO), TMH 16, Volume 1 & 2, South African Traffic Impact and Site Traffic Assessment Manual, Version 1.0, August 2012. Furthermore the COTO TMH17 South African Trip Data Manual, Version 1.01, dated September 2013 will be utilised as basis to determine the construction and operational vehicle trip generation of the facility.

Due to the expected low trip generation (construction phase only & operational phase negligible), only a TIS will be required, as per COTO standards. The TIS will cover, *inter alia:*

- Previous traffic related studies, submissions and approvals (if relevant).
- Description of the extent of the development, including location and land-use/s.
- Description of the phased development of the facility (if applicable).
- Record of liaison with authorities.
- Record of site visits.
- Description of the local and potentially affected road network, including planning and comment on the road condition, where information is available.
- Description of latent development in the vicinity of the facility that may also have an impact on the local road network.
- Assessment of the required site access, parking and internal circulation.
- Assessment of expected trip generation (construction & operational phases).
- Capacity analysis (construction & operational phases), including an assessment of the expected total E80's (heavy axle loading) for the life cycle of the facility.
- Assessment of public transport and Non-motorised transport (if applicable).
- Recommendations and conclusions with regards to the required traffic and transport related road upgrades.

NOISE

The Environmental Acoustic Impact Assessments will be conducted using the following methodology:

- The baseline assessment will consist of:
  - Review of applicable legislation including any province-specific noise regulations and by-laws
  - An assessment of the existing noise climate in the vicinity of each proposed site through baseline noise monitoring:
    - Day and night-time noise monitoring will be conducted at the seven identified farmhouse receptors. All sound level measurement procedures will be undertaken according to the relevant South African Code of Practice, South African National Standards (SANS) 10103:2008. Sound level measurements will be undertaken using a Casella™ Type 1 Integrating Sound Level Meter. Monitoring will be conducted in hourly intervals in order to develop a representative baseline for the area. Day-time monitoring will occur between 06:00 and 22:00, and the night-time monitoring between 22:00 and 06:00.
    - Assessment of monitored results against the relevant guideline rating levels as provided in SANS 10103:2008.
- A detailed inventory of all noise sources associated with the construction and operation of the proposed wind projects will be developed for each site. This will include all construction and operational equipment and associated on-site activities. Typical noise levels for wind energy projects will be calculated based on sound level data provided by the Client.
- Environmental noise modelling will be conducted using the internationally accredited noise modelling software, CadnaA (Computer Aided Noise Abatement). The CadnaA software provides an integrated environment for noise predictions under varying scenarios and calculates the cumulative effects of various sources. The model uses ground elevations in the calculation of the noise levels in a grid and uses meteorological parameters that have an effect on the propagation of noise. CadnaA has been utilised in many countries across the globe for the modelling of environmental noise and town planning. It is comprehensive software for 3-dimensional calculations, presentation, assessment and prediction of environmental noise

emitted from industrial plants, parking lots, roads, railway schemes or entire towns and urbanized areas.

- The noise source inventory detailed above will be utilised as input for the CadnaA model. Gridded outputs from CadnaA will then be input into ArcGIS to provide a visual representation (isopleth output) of noise levels throughout the region. The noise contribution of each of the proposed wind projects to the existing noise levels (monitored data) will be calculated, with comparisons being made to relevant National guidelines.
- A detailed Environmental Acoustic Impact Assessment will be performed for each site detailing the findings of the baseline assessment, acoustic modelling results and impacts. Recommendations for appropriate mitigation measures will also be provided should this be deemed necessary. The impact rating/significance for each site will also be assessed through the utilisation of the Hacking methodology

9.6 IMPACT ASSESSMENT METHODOLOGY

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

As required by 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).

SCORE	DESCRIPTION
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 EIA Report.

9.7 ENVIRONMENTAL IMPACT REPORT

Once the FSR has been submitted to and accepted by the DEA, the proposed project will proceed into the detailed EIR phase, which involves the detailed specialist investigations. WSP | Parsons Brinckerhoff will produce a Draft EIR after the completion of the required specialist studies. The Draft EIR will provide an assessment of all the identified key issues and associated impacts from the Scoping phase. All requirements as contemplated in the GNR 982 EIA Regulations will be included in the Draft EIR. The Draft EIR will contain, inter alia, the following:

- Details of the EAP who prepared the report and the expertise of the EAP to carry out the S&EIR process, including a curriculum vitae;
- The location of the activity, including the 21-digit Surveyor General code of each cadastral land parcel, where available, the physical address and farm name; and the coordinates of the boundary of the property or properties;
- A plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale;
- A description of the scope of the proposed activity, including all listed and specified activities triggered and being applied for; and a description of the associated structures and infrastructure related to the proposed project;
- 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;
- 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;
- A motivation for the preferred development footprint within the approved site;
- A full description of the process followed to reach the proposed development footprint within the approved site;
- Details of the public participation process undertaken;
- 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;
- The environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;
- The impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts;
- The methodology used in determining and ranking of potential environmental impacts and risks;
- Positive and negative impacts;
- An assessment of each identified potentially significant impact and risk;
- The possible mitigation measures that could be applied;
- An environmental impact statement;
- A description of any assumptions, uncertainties and gaps in knowledge;
- A reasoned opinion as to whether the proposed activity should or should not be authorised;
- An undertaking under oath or affirmation by the EAP; and

- An EMPr.

9.8 STAKEHOLDER AND AUTHORITY ENGAGEMENT

PUBLIC PARTICIPATION PROCESS

Public participation during the EIA phase revolves around the review and findings of the environmental impact assessment, which will be presented in the Draft EIR. All stakeholders will be notified of the progress to date and availability of the Draft EIR, via mail, email and/or SMS. A legislated period of 30 consecutive days will be allowed for public comment of the draft EIR. Reports will be made available in the following way:

- Distribution for comment at central public places, which were used during the Scoping phase;
- The document will be made available to download from the WSP website; and
- Copies of CDs will be made available on request.

A public meeting is proposed to be held during this phase (venue to be confirmed). The meeting will be facilitated by key members of the project team. The purpose of the public meeting will be to present the findings of the impact assessment and address issues of concern raised during the Scoping phase.

The following information will be provided to I&APs:

- Initial Site Plan;
- Alternatives;
- A description of activities and operations to be undertaken;
- Baseline information;
- Specialist studies;
- Impact assessment;
- Management measures;
- Monitoring and measuring plan; and
- Closure details.

The information outlined above will be presented in one or more of the following:

- Notifications;
- Scoping Report;
- EIR;
- EMPr; and
- Public meetings.

All comments received during the EIR phase will be recorded in the comments and response report, which will be included in the draft and final EIR. The final EIR will incorporate public comment received on the Draft EIR and will be made available for public review with hard copies distributed mainly to the authorities and key stakeholders.

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.

CONSULTATION WITH AUTHORITIES

It is envisaged that consultation with the DEA, DEADP and NC DENC will coincide with the compilation of the following key documents:

- PoS for EIR;
- Draft EIR/EMPr; and
- Final EIR/EMPR.

Consultation outside of the above deliverables will be undertaken as necessary in order to ensure that the DEA, NC DENC, DEADP and DWS are aware of the status of the project.

9.9 PROGRESSION OF AUTHORISATIONS, PERMITS AND OTHER DEVELOPMENT APPROVALS

A number of authorisations, permits and other development approvals are required to be obtained by the Proponent. **Table 9-5** provides a summary of the development approvals required and the current status of the applications for these approvals.

Table 9-5: Other Development approvals, Authorisations and Permits required for the Proposed Project

Approval Document Required	Department Responsible for Issuing Approval	Status of Application
A Water Use License in terms of the National Water Act (No. 36 of 1998)	Department of Water and Sanitation	The need for a WUL application process will be identified as part of the S&EIR process. Applications will only be submitted in the event that the project is identified as a preferred bidder.
A Heritage Permit issued by SAHRA in terms of the National Heritage Resource Act (No. 25 of 1999)	South African Heritage Resources Agency and Heritage Western Cape	The need for a Heritage Permit application will be identified as part of the S&EIR process. Applications will only be submitted in the event that the project is identified as a preferred bidder.
Forestry License in terms of the National Forest Act (No. 84 of 1998)	Northern and Western Cape Department of Agriculture, Forestry and Fisheries	The need for a Forestry License process will be identified as part of the S&EIR process. Applications will only be submitted in the event that the project is identified as a preferred bidder.
Rezoning of Land Permit in terms of Spatial Planning and Land Use Management Act no. 16 of 2013	Karoo Hoogland and Laingsburg Local Municipalities	The Rezoning of Land Permits will only be submitted in the event that the project is identified as a preferred bidder
Road Traffic Act (No. 29 of 1989)	Department of Transport	Permits will be required for the transportation of abnormal loads on public roads.

10 WAY FORWARD

Based on the desktop studies undertaken to date no environmental fatal flaws have been identified that would prohibit the proposed project from continuing at this stage of the process. However, a number of environmental impacts have been identified which require more in-depth investigation and the identification of detailed mitigation measures. Therefore, a detailed EIA is required to be undertaken in order to provide an assessment of these potential impacts and recommend appropriate mitigation measures.

The recommendation of this report is that detailed specialist studies be undertaken on the proposed site. The scope of work required in the EIR phase of the project is included in the Plan of Study for EIA (**Chapter 9**) of this report.

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 East project. Depending on the next bid window Maralla East 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 DSR is available for public review from the **15 September 2016** to **15 October 2016**. All issues and comments submitted to WSP | Parsons Brinckerhoff will be incorporated in the Comment and Reponses Report and will be included in the FSR.

The DSR 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

SAPECIALIST DECLARATIONS

Appendix D

DEA PRE-APPLICATION MEETING MINUTES

Appendix E

STAKEHOLDER DATABASE

Appendix F

ADVERTISEMENT

Appendix G

SOIL, LAND CAPABILITY AND WETLAND SPECIALIST STUDY

Appendix H

BIODIVERSITY SPECIALIST STUDY

Appendix I

AVIFAUNA SPECIALIST STUDY

Appendix J

BATS SPECIALIST STUDY

Appendix K

HERITAGE SPECIALIST STUDY

Appendix L

PALAEONTOLOGICAL SPECIALIST STUDY

Appendix M

VISUAL SPECIALIST STDUY

Appendix N

NOISE SPECIALIST STUDY

Appendix O

SOCIAL SPECIALIST STUDY

Appendix P

A3 MAPS