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PROPOSED MARALLA WEST WIND ENERGY FACILITY NEAR SUTHERLAND, NORTHERN CAPE

ENVIRONMENTAL AND SOCIAL MANAGEMENT PROGRAMME

PUBLIC

FEBRUARY 2017

WSP | PARSONS BRINCKERHOFF

PROPOSED MARALLA WEST WIND ENERGY FACILITY NEAR SUTHERLAND, NORTHERN CAPE

ENVIRONMENTAL MANAGEMENT PROGRAMME

BioTherm Energy (Pty) Ltd

Version 1
Public

Project no: 47579
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QUALITY MANAGEMENT

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GLOSSARY OF TERMS AND ABBREVIATIONS

Abbreviation	Definition
AEL	Atmospheric Emissions License
BBBEE	Broad-Based Black Economic Empowerment
Contractor	A person or company appointed by the Project Company to carry out stipulated activities
DEA	Department of Environmental Affairs
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
ECF	Employment Creation Fund
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
Emergency	An undesired event that may result in a significant environmental impact and requires the notification of the relevant statutory body such as a local authority
EMPr	Environmental Management Programme
EMS	Environmental Management System
Environment	In terms of the National Environmental Management Act (No. 107 of 1998), "environment" means the surroundings within which humans exist and that are made up of: → the land, water and atmosphere of the earth; → micro-organisms, plant and animal life; → any part or combination of (i) of (ii) and the interrelationships among and between them; and → the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.
Environmental Control Officer	A suitably qualified individual who, on behalf of the Project Company, would on a weekly basis monitor the project compliance with conditions of the EMPr and conditions of the environmental authorisation.

Environmental Impact	A change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's activities, products or services
FMP	Fire Management Plan
General Waste	Waste that does not pose an immediate hazard or risk to health or to the environment and includes domestic waste, building and demolition waste, business waste and inert waste.
GNR	Government Notice Regulation
Hazardous Waste	Waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment.
Incident	An undesired event which may result in a significant environmental impact but can be managed through internal response
km	Kilometre
m	Metre
SDS	Safety Data Sheets
NCR	Non-conformance register
NEMA	National Environmental Management Act (No. 107 of 1998)
NEMWA	National Environmental Management Waste Act (No. 59 of 2008)
NWA	National Water Act (No. 36 of 1998)
PPE	Personal Protective Equipment
Project Manager	An appointed person, appointed to act as the manager of the project on behalf of the Project Company
SANS	South African National Standard
Site Manager	The Project Company appointed person, appointed to act as Site Manager by the Project Company, and is responsible for managing the construction process onsite
WUL	Water Use License
WSP	WSP Environmental (Pty) Ltd

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1 INTRODUCTION

1.1 BACKGROUND

BioTherm has proposed the development of up to three 250 MW Wind Energy Projects within the Western Cape and a portion of the Northern Cape, namely Maralla East, Maralla West and Esizayo Wind Energy Projects. The projects are summarised in **Table 1-1.**

This Environmental Management Programme (EMPr) is for Maralla West Wind Energy Facility (WEF) only.

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

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

The environmental impact assessment (EIA) Regulations (Government Notice Regulation (GNR) 982 of 2014), promulgated under the National Environmental Management Act (No. 107 of 1998) (NEMA), identify the Maralla West WEF as an activity being subject to a scoping and environmental impact reporting (S&EIR) process due to the applicability of the EIA Listing Notices, GNR 983 and 984 (8 December 2014). In order for the proposed project to proceed it will require an environmental authorisation (EA) from the Department of Environmental Affairs (DEA).

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. **Table 1-2** outlines the details of the EAP and their expertise. The CVs of the Project Director and Project Manager are available in **Appendix A**.

Table 1-2: Details of the Environmental Assessment Practitioner

NAME OF CONSULTANT:	WSP ENVIRONMENTAL (PTY) LTD
Contact Person:	Ashlea Strong
Postal Address:	P O Box 98867 Sloane Park 2152
Telephone:	011 361 1392
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Expertise to conduct this EIA	Ms A. Strong holds a Masters in Environmental Management; a BTech (Nature Conservation), and a National Diploma (Nature Conservation); She is also a Certified Environmental Assessment Practitioner of South Africa (CEAPSA) with the Interim Board of Certification. She has 13 years' experience in the environmental field - she provides technical and strategic expertise on diverse

NAME OF CONSULTANT:	WSP ENVIRONMENTAL (PTY) LTD
	projects in the environmental management field, including environmental scoping and impact assessment studies, environmental management plans, waste management, as well as the provision of environmental management solutions and mitigation measures. She has been involved in the management of a number of large EIAs within South Africa and has environmental auditing and training experience and expertise.

1.2 ENVIRONMENTAL MANAGEMENT PROGRAMME STRUCTURE

Table 1-3 cross-references the sections within the EMPr with the legislated requirements as per Appendix 4 of GNR 982 of 2014. WSP | Parsons Brinckerhoff received comments on the final scoping report from the DEA on **1 December 2016**. These comments included additional requirements for the EMPr, which are outlined in **Table 1-4**.

Table 1-3: Legislation Requirements as detailed in Appendix 4 of GNR 982

APPENDIX 4	LEGISLATED REQUIREMENTS AS PER THE NEMA GNR 982	RELEVANT REPORT SECTION
(a)	details of-	
	(i) the EAP who prepared the EMPr; and	Section 1.1
	(ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;	Section 1.1 and Appendix A
(b)	a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Section 3.2
(c)	a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that any areas that should be avoided, including buffers;	Section 3.1
(d)	A description of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including-	Section 3.4 Section 4 Section 6
	(i) planning and design;	
	(ii) pre-construction activities;	
	(iii) construction activities;	
	(iv) rehabilitation of the environment after construction and where applicable post closure; and	
	(v) where relevant, operation activities;	
(e)	a description and identification of impact management outcomes required for the aspects contemplated in paragraph (d);	Section 6
(f)	a description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable, include actions to -	Section 6
	(i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	
	(ii) comply with any prescribed environmental management standards or practices;	

APPENDIX 4	LEGISLATED REQUIREMENTS AS PER THE NEMA GNR 982	RELEVANT REPORT SECTION
	(iii) comply with any applicable provisions of the Act regarding closure, where applicable; and	
	(iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable	
(g)	the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 5.3 Section 6
(h)	the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 5.3 Section 6
(i)	an indication of the persons who will be responsible for the implementation of the impact management actions;	Section 5.1 Section 6
(j)	the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Section 6
(k)	the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 5.3 Section 5.4
(l)	a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations	Section 5.5
(m)	an environmental awareness plan describing the manner in which-	Section 5.2
	(i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and	
	(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	
(n)	any specific information that may be required by the competent authority	Section 3.1 Section 7

Table 1-4: Additional Requirements Specified by the Department of Environmental Affairs

AUTHORITY COMMENT	WSP RESPONSE
The Environmental Management Programme (EMPr) to be submitted as part of the EIAr must include the following:	
All recommendations and mitigation measures recorded in the EIAr and the specialist studies conducted.	Section 6
The final site layout map.	Section 1.1 (Figure 3.3)
Measures as dictated by the final site layout map and micro-siting.	Section 6 Measures dictated by micro-siting will be included in the amended EMPr in the event that the project is awarded preferred bidder status.
An environmental sensitivity map indicating environmental sensitive areas and features identified during the EIA process.	Section 1.1 (Figure 3.4)
A map combining the final layout map superimposed (overlain) on the environmental sensitivity map.	Section 1.1 (Figure 3.5)
An alien invasive management plan to be implemented during construction and operation of the facility. The plan must include mitigation measures to reduce the invasion of alien species and ensure that the continuous monitoring and removal of alien species is undertaken.	Section 7.1

AUTHORITY COMMENT	WSP RESPONSE
A plant rescue and protection plan which allows for the maximum transplant of conservation important species from areas to be transformed. This plan must be compiled by a vegetation specialist familiar with the site and be implemented prior to commencement of the construction phase.	Section 7.2
A re-vegetation and habitat rehabilitation plan to be implemented during the construction and operation of the facility. Restoration must be undertaken as soon as possible after completion of construction activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.	Section 7.3
An open space management plan to be implemented during the construction and operation of the facility.	Section 7.4
A traffic management plan for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted. This plan must include measures to minimize impacts on local commuters e.g. limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time and avoid using roads through densely populated built-up areas so as not to disturb existing retail and commercial operations.	Section 6.16 Section 7.5
A transportation plan for the transport of components, main assembly cranes and other large pieces of equipment	Section 7.5
A storm water management plan to be implemented during the construction and operation of the facility. The plan must ensure compliance with applicable regulations and prevent off-site migration of contaminated storm water or increased soil erosion. The plan must include the construction of appropriate design measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures must promote the dissipation of storm water run-off.	Section 7.6
A fire management plan to be implemented during the construction and operation of the facility	Section 7.7
An erosion management plan for monitoring and rehabilitating erosion events associated with the facility. Appropriate erosion mitigation must form part of this plan to prevent and reduce the risk of any potential erosion.	Section 7.9
An effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage. This must include precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or storm water systems.	Section 6.3 Section 7.10
Measures to protect hydrological features such as streams, rivers, pans, wetlands, dams and their catchments, and other environmental sensitive areas from construction impacts including the direct or indirect spillage of pollutants. ·	Section 6.6
The EAP must provide detailed motivation if any of the above requirements is not required by the proposed development and not included in the EMPr.	The above-mentioned plans are currently draft generic plans. All plans will be made site specific, as part of the financial close process, in the event that Preferred Bidder status is achieved.

1.3 APPLICABLE DOCUMENTATION

The following documents are to be read in conjunction with the EMPr:

- Environmental Impact Report (EIR) for the Proposed Maralla West WEF;
- Environmental authorisation issued by the DEA in terms of the NEMA (still to be issued); and
- The Project Company Environmental Management System.

2 ENVIRONMENTAL GOVERNANCE FRAMEWORK

2.1 SOUTH AFRICAN REGULATORY FRAMEWORK

The national environmental legislation applicable to the proposed Maralla West WEF project includes, but is not limited, to the following:

- The Constitution of the Republic of South Africa (No. 108 of 1996);
- National Environmental Management Act (No. 107 of 1998);
- National Environmental Management, Waste Act (No 59 of 2008);
- National Environmental Management, Air Quality Act (No 39 of 2004);
- National Environmental Management Biodiversity Act (No. 10 of 2004);
- The National Water Act, (No 36 of 1998);
- Occupational Health and Safety Act, (No 85 of 1993);
- National Heritage Resource Act (No. 25 of 1999);
- Civil Aviation Act (No 13 of 2009);
- Astronomy Geographic Act, 2007 (No. 21 of 2007);
- The Conservation of Agricultural Resources Act, (No 43 of 1983) (CARA); and
- Hazardous Substances Act (No. 15 of 1973).

2.2 INTERNATIONAL REGULATORY FRAMEWORK

The objectives and applicability of the eight International Finance Corporation (IFC) Performance Standards (PS) are detailed in **Table 2-1**.

Table 2-1: Objectives and Applicability of the IFC Performance Standards

REFERENCE	REQUIREMENTS	PROJECT SPECIFIC APPLICABILITY
Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts		
Performance Standard 1 underscores the importance of managing environmental and social performance throughout the life of a project. An effective Environmental and Social Management System (ESMS) is a dynamic and continuous process initiated and supported by management, and involves engagement between the client, its workers, local communities directly affected by the project (the Affected Communities) and, where appropriate, other stakeholders. **Objectives:**		

Reference	Requirements	Project Specific Applicability
→ To identify and evaluate environmental and social risks and impacts of the project; → To adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimize, and, where residual impacts remain, compensate/offset for risks and impacts to workers, Affected Communities, and the environment; → To promote improved environmental and social performance of clients through the effective use of management systems; → To ensure that grievances from Affected Communities and external communications from other stakeholders are responded to and managed appropriately; and → To promote and provide means for adequate engagement with Affected Communities throughout the project cycle on issues that could potentially affect them and to ensure that relevant environmental and social information is disclosed and disseminated.		
1.1	Policy	An Environmental and Social Management System will be developed in the event that the proposed project is identified as a preferred bidder.
1.2	Identification of Risks and Impacts	
1.3	Management Programmes	
1.4	Organisational Capacity and Competency	
1.5	Emergency Preparedness and Response	
1.6	Monitoring and Review	
1.7	Stakeholder Engagement	
1.8	External Communication and Grievance Mechanism	
1.9	Ongoing Reporting to Affected Communities	
Performance Standard 2: Labour and Working Conditions		
Performance Standard 2 recognizes that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental rights of workers. **Objectives:** → To promote the fair treatment, non-discrimination, and equal opportunity of workers; → To establish, maintain, and improve the worker-management relationship; → To promote compliance with national employment and labour laws; → To protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain; → To promote safe and healthy working conditions, and the health of workers; and → To avoid the use of forced labour.		
2.1	Working Conditions and Management of Worker Relationship → Human Resources Policy and Management → Working Conditions and terms of Engagement → Workers organisation	Human resource and labour policies will be compiled in the event that the proposed project is identified as a preferred bidder.

REFERENCE	REQUIREMENTS	PROJECT SPECIFIC APPLICABILITY
	→ Non Discrimination and Equal Opportunity → Retrenchment → Grievance Mechanism	
2.2	Protecting the Workforce → Child Labour → Forced Labour	
2.3	Occupational health and Safety	
2.4	Workers Engaged by Third Parties	
2.5	Supply Chain	
Performance Standard 3: Resource Efficiency and Pollution Prevention		
Performance Standard 3 recognizes that increased economic activity and urbanization often generate increased levels of pollution to air, water, and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional, and global levels. There is also a growing global consensus that the current and projected atmospheric concentration of greenhouse gases (GHG) threatens the public health and welfare of current and future generations. At the same time, more efficient and effective resource use and pollution prevention and GHG emission avoidance and mitigation technologies and practices have become more accessible and achievable in virtually all parts of the world. **Objectives:** → To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities; → To promote more sustainable use of resources, including energy and water; and → To reduce project-related GHG emissions		
3.1	Resource Efficiency → Greenhouse Gases → Water Consumption	The only applicable and material resource efficiency issue is water consumption due to the arid nature of the region and general propensity for drought conditions in the country. The proposed project is not GHG emissions intensive and the detailed assessment and reporting of emissions is not required.
3.2	Pollution Prevention → Air Emissions → Stormwater → Waste Management → Hazardous Materials Management → Pesticide use and Management	Dust (air pollution) in the construction phase is anticipated to have a low impact but has been adequately addressed in the EMPr. The proposed project will not result in the release of industrial effluents. Potential pollution associated with sanitary wastewater is low and mitigation measures have been included in the EMPr. Land contamination of the site from historical land use (i.e. low intensity agricultural / grazing) is not considered to be a cause for concern. The waste generation profile of the proposed project is not complex. Waste mitigation and management measures have been included in EMPr. Hazardous materials are not a key issue; small quantities of construction materials (oil, grease, diesel fuel, cement etc.) and stored sanitary sewage in the operational phase. The EMPr and emergency preparedness and response plan identifies these anticipated hazardous materials and

REFERENCE	REQUIREMENTS	PROJECT SPECIFIC APPLICABILITY
		recommends relevant mitigation and management measures.
Performance Standard 4: Community Health, Safety, and Security		
Performance Standard 4 recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts. **Objectives:** → To anticipate and avoid adverse impacts on the health and safety of the Affected Community during the project life from both routine and non-routine circumstances; and → To ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the Affected Communities		
4.1	Community Health and Safety → Infrastructure and Equipment Design and Safety → Hazardous Materials Management and Safety → Ecosystem Services → Community Exposure to Disease → Emergency Preparedness and Response	The requirements included in PS 4 have been addressed in the S&EIR process and the development of the EMPr. The following generic plans have been included in the EMPr: → Emergency Response Plan; → Transport Management Plan; → HIV Management Plan; and → Security Policy. All plans will be made site specific, as part of the financial close process, in the event that Preferred Bidder status is achieved.
4.2	Security Personnel	
Performance Standard 5: Land Acquisition and Involuntary Resettlement		
Performance Standard 5 recognizes that project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons that use this land. Involuntary resettlement refers both to physical displacement (relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or other means of livelihood) as a result of project-related land acquisition and/or restrictions on land use. **Objectives:** → To avoid, and when avoidance is not possible, minimize displacement by exploring alternative project designs; → To avoid forced eviction; → To anticipate and avoid, or where avoidance is not possible, minimize adverse social and economic impacts from land acquisition or restrictions on land use by (i) providing compensation for loss of assets at replacement cost and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected; → To improve, or restore, the livelihoods and standards of living of displaced persons; and → To improve living conditions among physically displaced persons through the provision of adequate housing with security of tenure at resettlement sites.		
5.1	Displacement → Physical Displacement → Economic Displacement → Private Sector Responsibilities under Government Managed Resettlement	In terms of the land acquisition and involuntary settlement provisions in Performance Standard 5, the development site is located on privately owned land that is utilised solely for commercial agricultural use by the landowner. The proposed project will restrict the future use of the land by the farmer as per voluntarily agreement in the lease agreement. There is no other use of the land by communities or persons and as such there will be no involuntary physical or economic displacement.

REFERENCE	REQUIREMENTS	PROJECT SPECIFIC APPLICABILITY
		The office of the regional land claims commissioner has confirmed the absence of land claims against the property in terms of the Restitution of Land Rights Act (1994).
Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources		
Performance Standard 6 recognizes that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. **Objectives:** → To protect and conserve biodiversity; → To maintain the benefits from ecosystem services; and → To promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.		
6.1	Protection and Conservation of Biodiversity	The S&EIR and EMPr development process includes a biodiversity assessment (undertaken by Simon Todd) comprising of a combination of literature review, stakeholder engagement and consultation, and in-field surveys. This substantively complies with the Performance Standard 6 general requirements for scoping and baseline assessment for determination of biodiversity and ecosystem services issues. The determination of habitat sensitivity was undertaken within the legal and best practice reference framework for South Africa. The proposed project is located within a critical biodiversity area. The prevalence of invasive alien species on the site is low; however, the S&EIR process had noted the propensity for the spread of alien invasive species in the construction and operational phases and mitigation and management measures are included in the EMPr.
Performance Standard 7: Indigenous People		
Performance Standard 7 recognizes that Indigenous Peoples, as social groups with identities that are distinct from mainstream groups in national societies, are often among the most marginalized and vulnerable segments of the population. In many cases, their economic, social, and legal status limits their capacity to defend their rights to, and interests in, lands and natural and cultural resources, and may restrict their ability to participate in and benefit from development. Indigenous Peoples are particularly vulnerable if their lands and resources are transformed, encroached upon, or significantly degraded. **Objectives:** → To ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of Indigenous Peoples. → To anticipate and avoid adverse impacts of projects on communities of Indigenous Peoples, or when avoidance is not possible, to minimize and/or compensate for such impacts. → To promote sustainable development benefits and opportunities for Indigenous Peoples in a culturally appropriate manner. → To establish and maintain an ongoing relationship based on Informed Consultation and Participation (ICP) with the Indigenous Peoples affected by a project throughout the project's life-cycle. → To ensure the Free, Prior, and Informed Consent (FPIC) of the Affected Communities of Indigenous Peoples when the circumstances described in this Performance Standard are present. → To respect and preserve the culture, knowledge, and practices of Indigenous Peoples.		
5.1	General	

Reference	Requirements	Project Specific Applicability
	→ Avoidance of Adverse Impacts → Participation and Consent	Whilst the proposed project development site and the adjacent areas appeared to be uninhabited, PS 7 identifies that cultural heritage in project areas may link to the identity and/or cultural, ceremonial, or spiritual aspects of indigenous peoples. A cultural heritage study has been undertaken and the potential impacts resulting from the installation of the proposed project on the heritage resources of the sites are considered to be of low significance. This suggests a low probability of linkages with, and impacts on potential Indigenous Peoples. The office of the regional land claims commissioner has confirmed the absence of land claims against the property in terms of the Restitution of Land Rights Act (1994).
5.2	Circumstances Requiring Free, Prior, and Informed Consent → Impacts on Lands and Natural Resources Subject to Traditional Ownership or Under Customary Use → Critical Cultural Heritage → Relocation of Indigenous Peoples from Lands and Natural Resources Subject to Traditional Ownership or Under Customary Use	
5.3	Mitigation and Development Benefits	
5.4	Private Sector Responsibilities Where Government is Responsible for Managing Indigenous Peoples Issues	
Performance Standard 8: Cultural Heritage		
Performance Standard 8 recognizes the importance of cultural heritage for current and future generations **Objectives:** → To protect cultural heritage from the adverse impacts of project activities and support its preservation; and → To promote the equitable sharing of benefits from the use of cultural heritage.		
8.1	Protection of Cultural Heritage in Project Design and Execution	A cultural heritage study was performed as part of the S&EIR process. The impact of the proposed development on the cultural heritage resources of the area was assessed to be low. Chance find provisions have been included in the EMPr.

3 PROJECT DETAILS

3.1 PROJECT LOCATION

The proposed project is to be developed approximately 34km South of Sutherland in the Northern Cape and will comprise a single site located on the farms outlined in **Table 3-1**.

Table 3-1: Farms included in the Maralla West Site

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

The Maralla West Wind Energy Facility falls within the Karoo Hoogland Local Municipality, which are located within the Namakwa District Municipality. **Figure 3-1** illustrates the location of the Maralla West WEF in relation to the broader wind energy development Project. The locality map for the Maralla West WEF is shown in **Figure 3-2**.

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

- Climatic Conditions;
- Relief and aspect;
- Land availability; and
- Access to the National Grid through Eskom's Komsburg Substation located approximately 25 km from the site

The proposed turbine layout for Maralla West WEF is illustrated in **Figure 3-3**. **Figure 3-4** shows the environmental sensitivity map which indicates the environmental sensitive areas and features identified during the S&EIR process. **Figure 3-5** illustrates the sensitivity map for the development area overlain by the proposed layout for the Maralla West WEF.

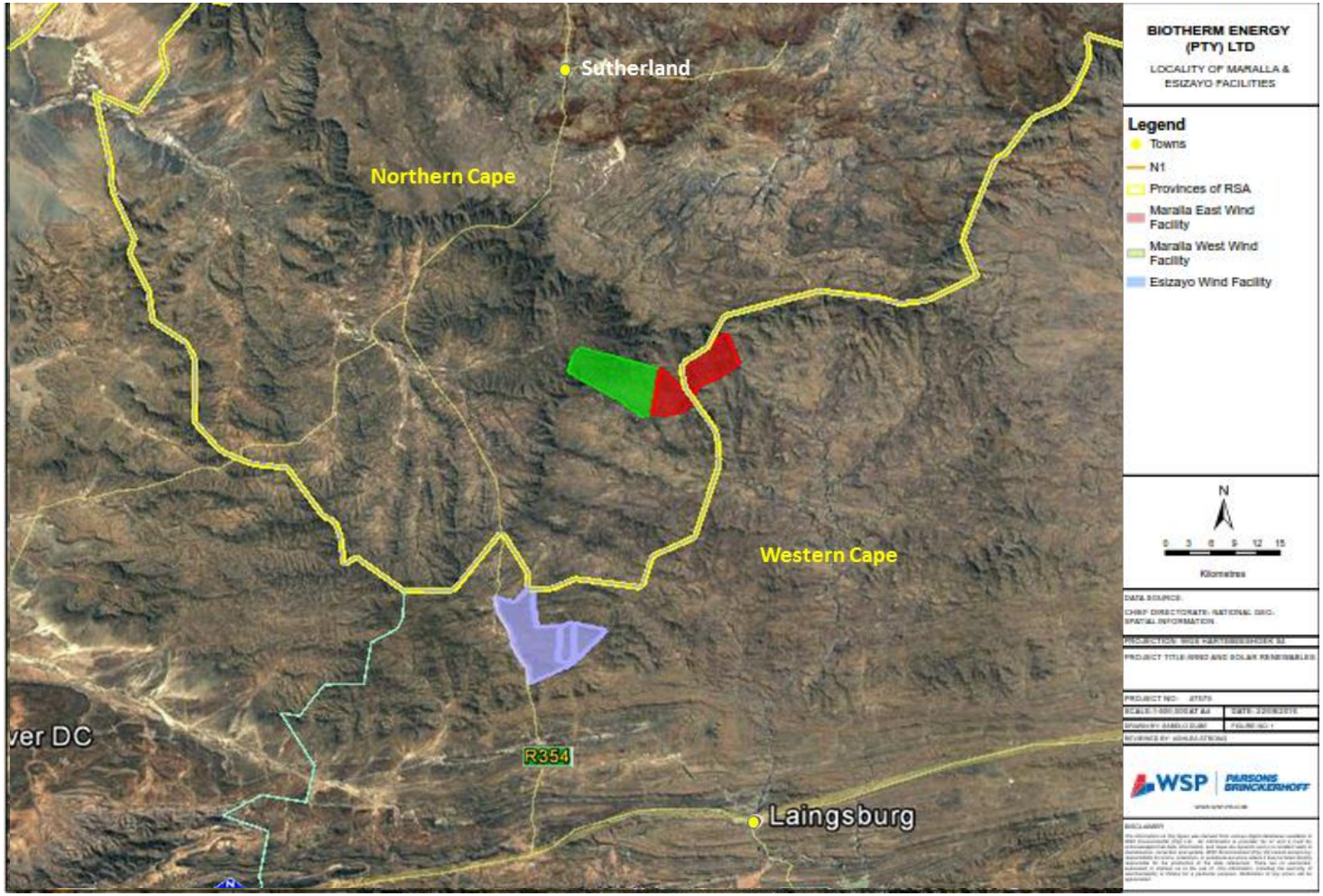

Figure 3-1: Greater Wind Development Project

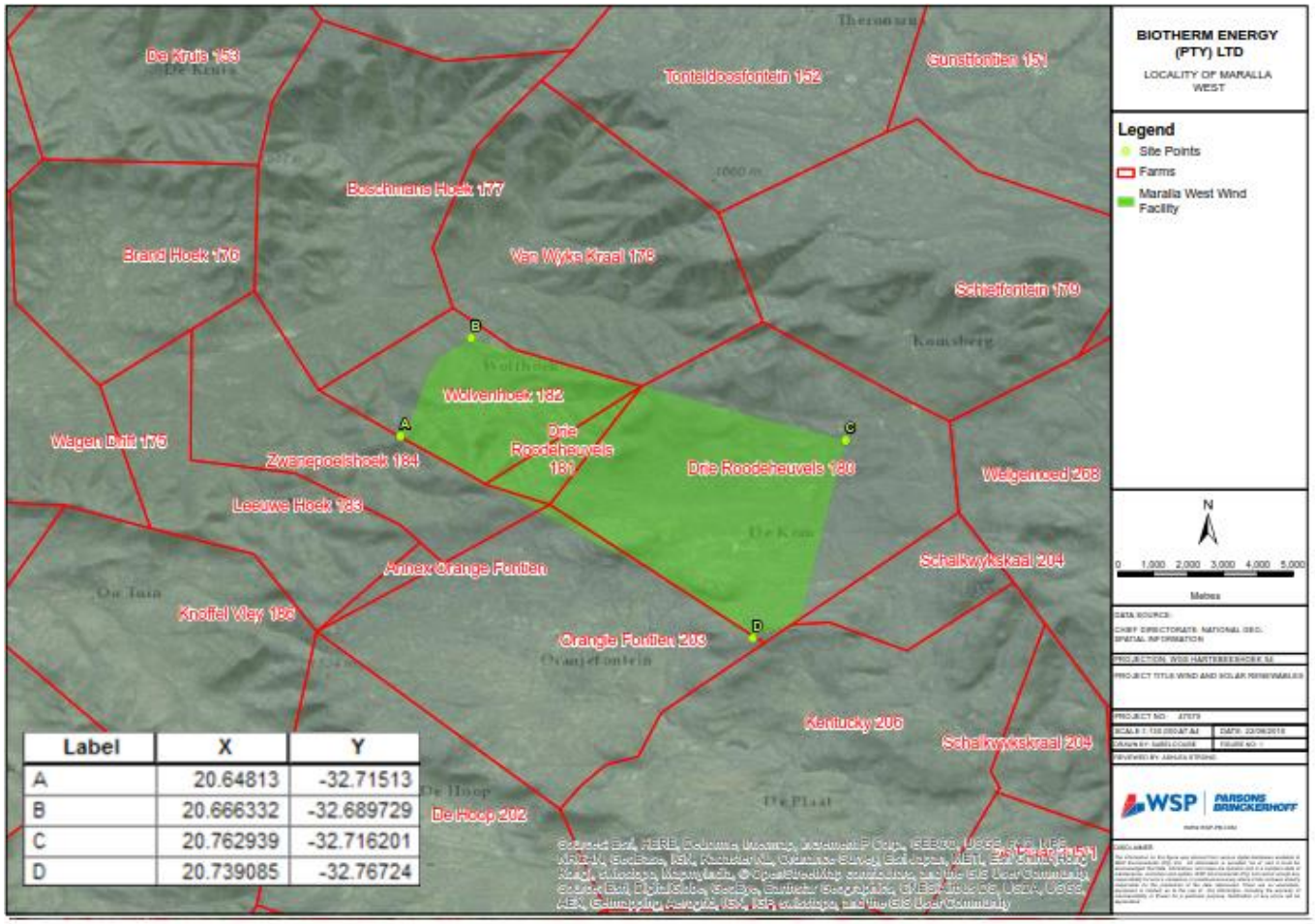

Figure 3-2: Location of the Maralla West Wind Energy Facility

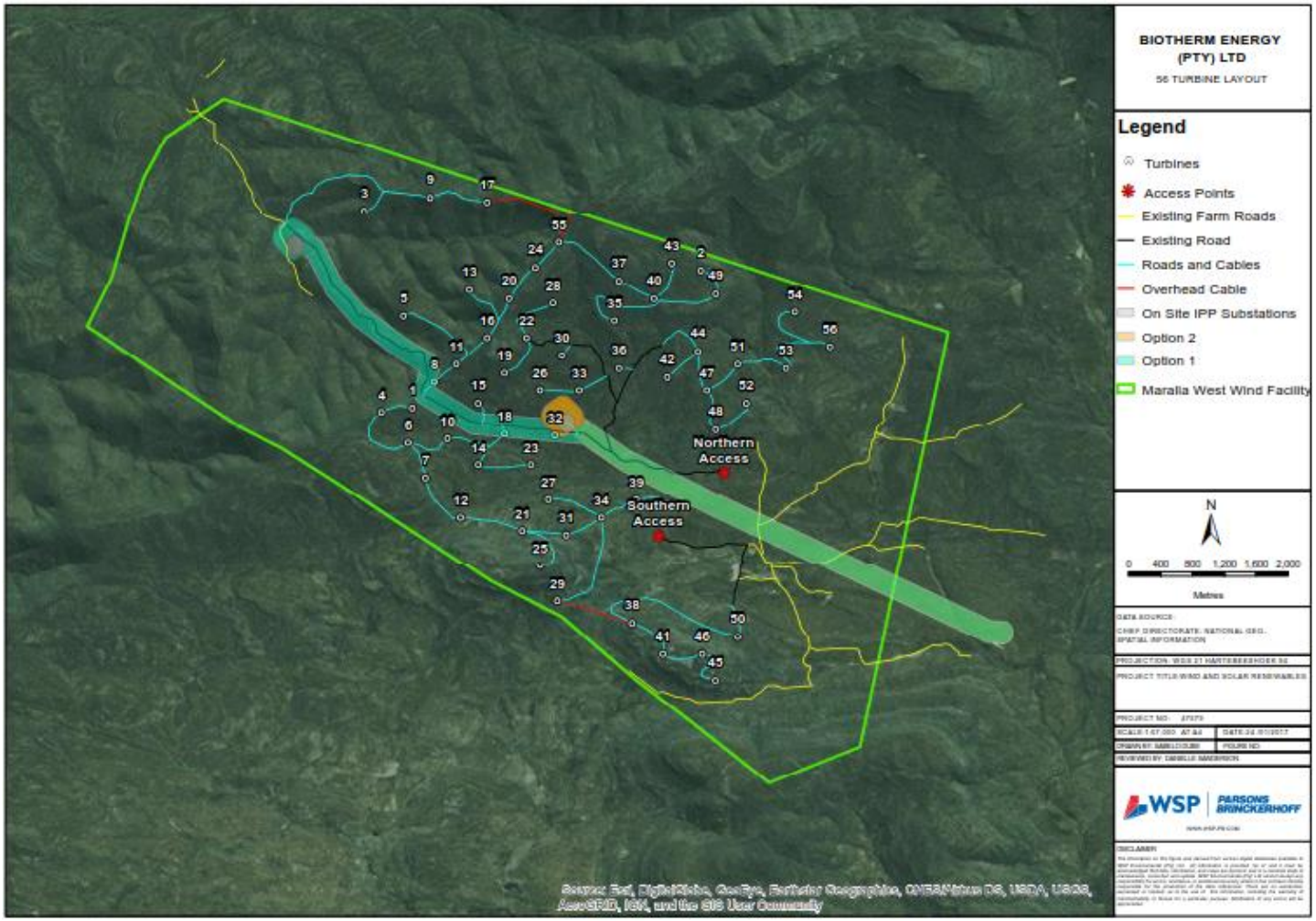

Figure 3-3: Proposed Turbine Layout for Maralla West WEF

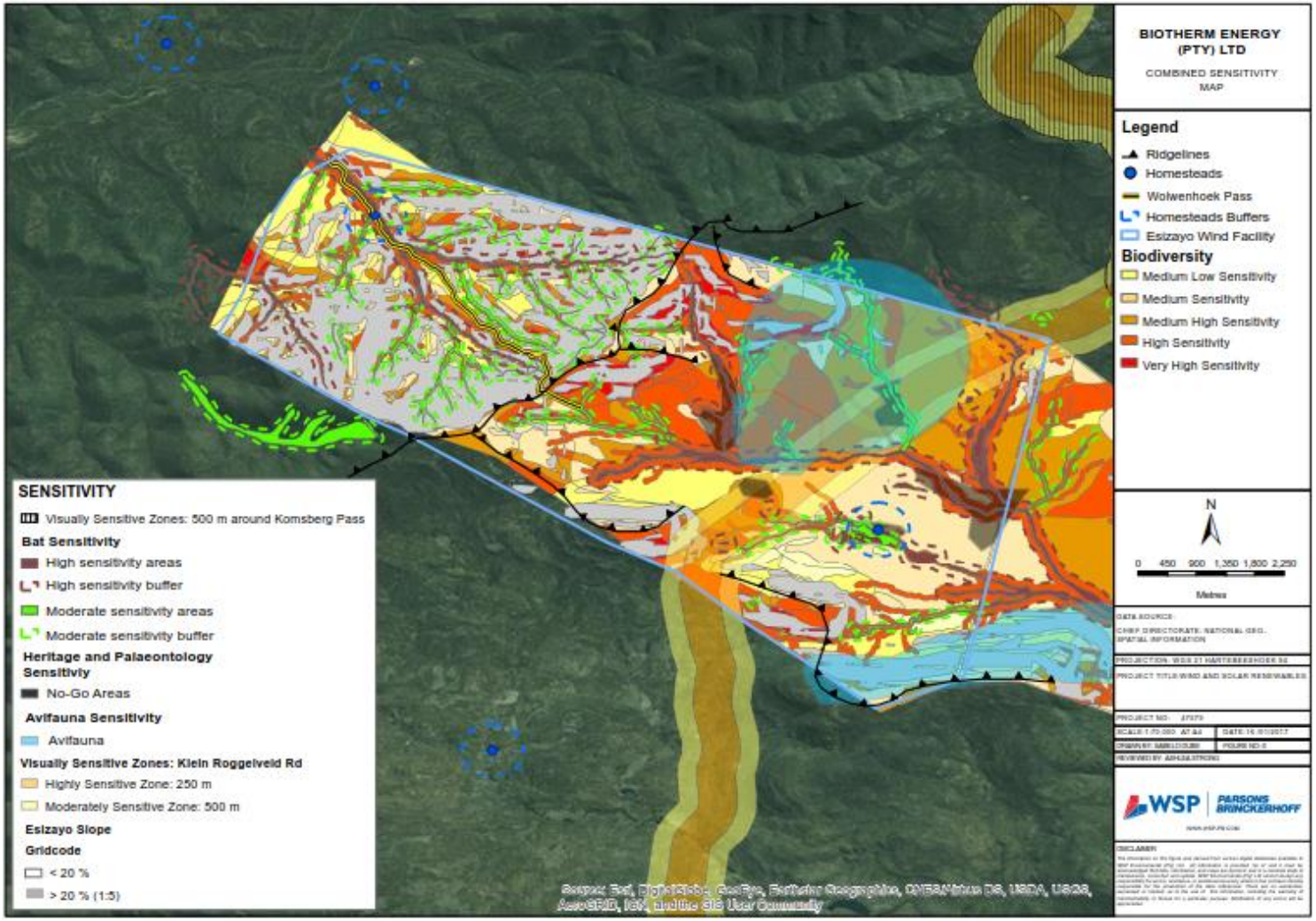

Figure 3-4: Environmental Sensitivity Map for Maralla West WEF

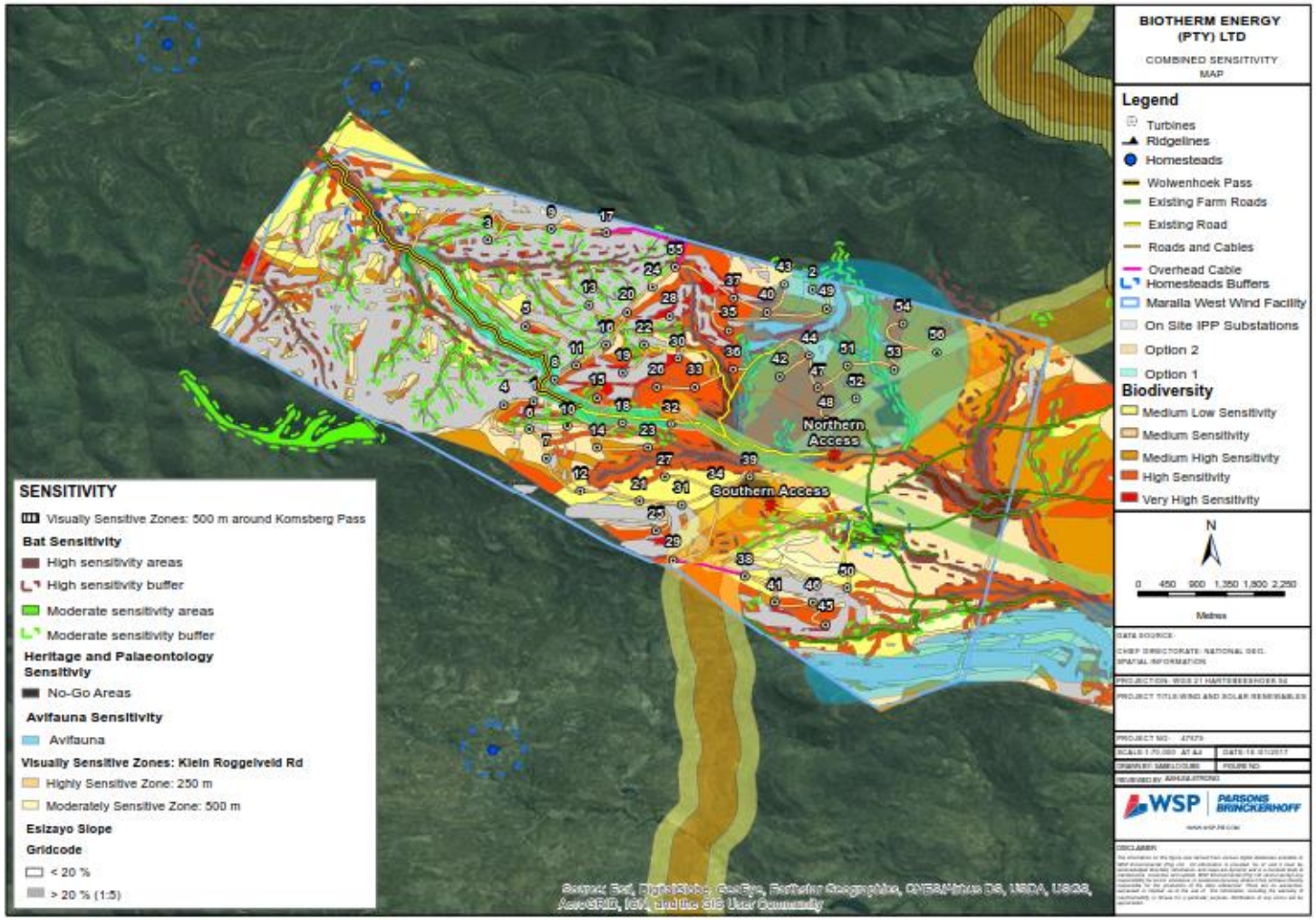

Figure 3-5: Environmental Sensitivity Map overlain by the Proposed Layout for the Maralla West WEF

3.2 PROJECT DESCRIPTION

Table 3-2 provides a summary of the Maralla West WEF project details.

Table 3-2: Maralla West WEF Project Details

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

TECHNICAL DETAILS OF THE PROPOSED MARALLA WEST WIND ENERGY FACILITY	
	→ Laydown for concrete towers (only if required) = 40 000m^2 "
Cement Batching Plant	Gravel and sand will be stored in separate heaps whilst the cement will be contained in a silo. The actual mixing of the concrete will take place in the concrete truck. The footprint of the plant will be in the order of 0.25ha. The maximum height of the cement silo will be 20m. This will be a temporary structure during construction.
Width of Internal Roads	Between 4.0m and 6.0m, however this may increase to 8m on bends
Length of Internal Roads	Approximately 60 km
Type and Height of Fencing	Approximately 5m high palisade or mesh fencing where required
Sewage	Septic tanks (with potable toilets during the construction phase)
Power Evacuation	
Footprint of Internal Onsite Substation	150m x 150m
Onsite Substation Capacity	Up to 132kV
Specifications of onsite switching stations, transformers, invertors, onsite cables etc	The medium voltage collector system will comprise of cables (1kV up to and including 33kV) that will be run underground, except where a technical assessment suggests that overhead lines are applicable, in the facility connecting the turbines to the onsite substation.
Width of the Powerline Servitude	31m (15.5m either side)
Powerline Tower Types and Height	Tower (suspension / strain) / Steel monopole structure, which may be self-supported or guyed suspension.
Closest Grid Connection Point	Komsberg Substation
Proximity to Grid Connection	Komsberg Substation is approximately 25 km from the Maralla East Site. .
List of additional infrastructure to be built	Access roads and internal roads. Administration, control and warehouse buildings.

3.3 PROJECT MOTIVATION

NATIONAL RENEWABLE ENERGY REQUIREMENT

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

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

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

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

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

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

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

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

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.

REGIONAL AND SITE SUITABILITY

The proposed project is to be developed approximately 34 km South of Sutherland in the Northern Cape and will comprise of a single site located on the Remainder of Farm Drie Roode Heuwels 180, the Remainder of Farm Annex Drie Roode Heuwels 181, Portion 1 and 2 of Farm Wolven

Hoek 182. This specific project site has been identified by BioTherm through a pre-feasibility desktop analysis on the estimation of the wind energy resource. This region of the Northern Cape has some of the highest wind resource potentials, receiving an annual mean wind resource of approximately 8 m/s, making the site suitable for the development of a wind farm. This high resource ensures the best value for money is gained for the economy of South Africa.

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

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

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

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

LOCAL NEED

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

SOCIO-ECONOMICS

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

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

province's comparative advantage lies, among others, in solar resource. The proposed project would therefore be advantageous for the province.

EMPLOYMENT

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

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

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

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

3.4 FINDINGS OF THE IMPACT ASSESSMENT

A summary of the identified impacts and corresponding (initial and residual) significance ratings for Maralla West WEF and the water supply pipeline preferred alternatives are provided in **Table 3-3**.

Table 3-3: Impact Significance Summary – Maralla West WEF

REF.	IMPACT DESCRIPTION	PHASE	STATUS	SIGNIFICANCE (PRE-MITIGATION)	RESIDUAL SIGNIFICANCE (POST-MITIGATION)
Soils and Land Capability					
SLC1	Loss of land (including wetlands) previously used for sheep and antelope grazing will be occupied by the wind facility and associated infrastructure.	Construction	Negative	**Medium**	**Low**

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

Ref.	Impact Description	Phase	Status	Significance (Pre-Mitigation)	Residual Significance (Post-Mitigation)
SLC2	Construction activities will entail vegetation clearance, soil disturbance and high traffic movement on site, resulting in a higher potential for soil erosion		Negative	**Low**	**Low**
SLC3	Potential spillage of hazardous substances such as oils, fuel, grease from construction vehicles, and sewage from on-site sanitation systems.		Negative	**Low**	**Low**
SLC4	Loss of land (including wetlands) previously used for sheep and antelope grazing will be occupied by the wind facility and associated infrastructure.	Operation	Negative	**Medium**	**Low**
SLC5	Vegetation clearance for wind turbines and roads, soil disturbance and stockpiles, and increased traffic movement on site, resulting in a higher potential for soil erosion		Negative	**Low**	**Low**
SLC6	Potential land contamination from hazardous substances. This includes spillage of oils, fuel, grease (from site operational and maintenance vehicles) and permanent onsite sewage systems Potential spillage of hazardous substances such as oils, fuel, grease from maintenance vehicles, and sewage from on-site sanitation systems.		Negative	**Low**	**Low**
SLC7	Increased potential of soil erosion due to removal of wind infrastructure (i.e. turbines), soil disturbance and a high traffic movement on site.	De-commissioning	Negative	**Low**	**Low**
SLC8	Potential spillage of hazardous substances such as oils, fuel, grease from maintenance vehicles, and sewage from on-site sanitation systems.		Negative	**Low**	**Low**
Natural Vegetation and Animal Life					
BIO1	Impacts on vegetation and protected plant species	Construction	Negative	**Medium**	**Medium**
BIO2	Faunal impacts due to construction activities		Negative	**Medium**	**Medium**
BIO3	Increased Soil Erosion risk during construction		Negative	**Medium**	**Low**
BIO4	Faunal impacts due to operational activities of the wind farm such as noise, and human presence during maintenance activities	Operation	Negative	**Medium**	**Medium**

Ref.	Impact Description	Phase	Status	Significance (Pre-Mitigation)	Residual Significance (Post-Mitigation)
BIO5	Erosion		Negative	**Medium**	**Low**
BIO6	Alien Plant Invasion		Negative	**Low**	**Low**
BIO7	Faunal impacts due to decommissioning of the wind farm such as noise, and operation of heavy machinery on-site	De-commissioning	Negative	**Medium**	**Low**
BIO8	Erosion		Negative	**Medium**	**Low**
BIO9	Alien Plant Invasion		Negative	**Medium**	**Low**
Avifauna					
AV1	Displacement of priority species due to disturbance during construction operations	Construction	Negative	**Medium**	**Medium**
AV2	Priority species mortality due to collision with the turbines	Operation	Negative	**High**	**Medium**
AV3	Displacement of priority species due to habitat transformation		Negative	**Medium**	**Low**
AV4	Priority species mortality due to collision with the on-site powerlines		Negative	**High**	**Medium**
AV5	Priority species mortality due to electrocution on the on-site powerlines		Negative	**Medium**	**Low**
AV6	Displacement of priority species due to disturbance during decommissioning operations	De-commissioning	Negative	**Low**	**Low**
Bats					
BAT1	Destruction of bat roosts due to earthworks and blasting -	Construction	Negative	**Medium**	**Low**
BAT2	Loss of foraging habitat.		Negative	**Medium**	**Low**
BAT3	Bat mortalities due to direct blade impact or barotrauma during foraging activities (not migration).	Operation	Negative	**High**	**Medium**
BAT4	Artificial Lighting		Negative	**Medium**	**Low**
BAT5	Loss of foraging habitat.	De-commissioning	Negative	**Medium**	**Low**
Surface Water					
SW1	Alterations of flow regimes of watercourses, in close proximity to the site, or that is proposed to be traversed by roads.	Construction	Negative	**Medium**	**Low**

Ref.	Impact Description	Phase	Status	Significance (Pre-Mitigation)	Residual Significance (Post-Mitigation)
SW2	Increased potential of soil erosion due to vegetation clearance, soil disturbance and a high traffic movement on site. Subsequent potential sedimentation of watercourses.		Negative	**Low**	**Low**
SW3	Potential land contamination from hazardous substances. This includes spillage of concrete onto soil surface, as well as oils, fuel, grease (from construction vehicles) and sewage from temporary on-site ablution facilities.		Negative	**Low**	**Low**
SW4	Temporary potential degradation of wetland habitat due to the proposed positioning of road access		Negative	**Medium**	**Low**
SW5	Alterations of flow regimes of watercourses, in close proximity to the site, or that is proposed to be traversed.	Operation	Negative	**Medium**	**Low**
SW6	Increased potential of soil erosion due to vegetation clearance, and more run-off from harden surfaces (i.e. roads). Subsequent potential sedimentation of watercourses.		Negative	**Low**	**Low**
SW7	Potential land contamination from hazardous substances. This includes spillage of oils, fuel, grease (from site operational and maintenance vehicles) and permanent onsite sewage systems		Negative	**Low**	**Low**
SW8	Alterations of flow regimes of watercourses, in close proximity to the site, or that is proposed to be traversed by roads.	De-commissioning	Negative	**Medium**	**Low**
SW9	Increased potential of soil erosion due to removal of wind turbine infrastructure, soil disturbance and a high traffic movement on site.		Negative	**Low**	**Low**
SW10	Potential land contamination from hazardous substances. This includes spillage of oils, fuel, grease (from construction vehicles) and sewage from on-site systems		Negative	**Low**	**Low**
Heritage					
H1	Impacts to a ruined settlement (Road Settlement) and graveyard on public access road through De Kom	Construction	Negative	**Medium**	**Low**
H2	Impacts to Late Stone Age sites along river bed (River Settlement)		Negative	**Medium**	**Low**

Ref.	Impact Description	Phase	Status	Significance (Pre-Mitigation)	Residual Significance (Post-Mitigation)
H3	Impacts to the farm house of Wolvenhoek		Negative	**Medium**	**Low**
Palaeontology					
P1	Disturbance, damage or destruction of fossils (direct, negative impacts) preserved at or beneath the ground surface within the development footprint during the construction phase, mainly due to surface clearance or excavation activities	Construction	Negative	**Low**	**Low**
Visual					
V1	Visual impact during construction due to dust, vehicles and equipment	Construction	Negative	**Medium**	**Low**
V2	Visual impact during construction due to vegetation clearing		Negative	**Medium**	**Low**
V3	Visual impact during construction on landforms		Negative	**Medium**	**Low**
V4	Intrusion on sense of place and rural landscape	Operation	Negative	**Medium**	**Medium**
V5	Visual impact of wind turbines		Negative	**High**	**Medium**
V6	Visual impact of substation and other buildings and infrastructure		Negative	**Medium**	**Medium**
V7	Visual impact of shadow flicker		Negative	**Low**	**Low**
V8	Visual impact of lighting from facility		Negative	**Medium**	**Medium**
V9	Visual impact of additional roads and road widening		Negative		**Low**
V10	Visual impact during decommissioning due to dust, vehicles and equipment	De-commissioning	Negative	**Medium**	**Low**
Noise					
N1	Acoustic impact on residential receptors	Construction	Negative	**Medium**	**Low**
N2	Acoustic impact on residential receptors	Operation	Negative	**Medium**	**Low**
N3	Acoustic impact on residential receptors	De-commissioning	Negative	**Medium**	**Low**
Traffic					
T1	Noise, dust and exhaust pollution due to vehicle trips on-site	Construction	Negative	**Low**	**Low**
T2	Noise, dust and exhaust pollution due to additional trips on the access roads		Negative	**Medium**	**Medium**

Ref.	Impact Description	Phase	Status	Significance (Pre-Mitigation)	Residual Significance (Post-Mitigation)
T3	Noise and exhaust pollution due to additional vehicle trips on the R354		Negative	**Low**	**Low**
Social					
SE1	Increase in Employment Opportunities	Construction	Positive	**Medium**	**High**
SE2	Increased Economic Development Opportunities		Positive	**Medium**	**High**
SE3	Disruption due to influx of job seekers		Negative	**Medium**	**Medium**
SE4	Increase in communicable diseases and reduced public health		Negative	**Medium**	**Medium**
SE5	Change in sense of place		Negative	**Medium**	**Low**
SE6	Nuisance from noise, dust and traffic disturbances		Negative	**Medium**	**Low**
SE7	Increased risk to neighbouring land users		Negative	**Low**	**Low**
SE8	Increased risk of veld fires		Negative	**Medium**	**Low**
SE9	Increased employment opportunities	Operation	Positive	**Medium**	**High**
SE10	Increased economic development opportunities		Positive	**Medium**	**Medium**
SE11	Change in sense of place		Negative	**Medium**	**Medium**
SE12	Loss of permanent employment	De-commissioning	Negative	**Medium**	**Low**
SE13	Gain of short term employment		Positive	**Low**	**Medium**
SE14	Nuisance from dust, noise and traffic		Negative	**Low**	**Low**
SE15	Increased risk to neighbouring land users		Negative	**Low**	**Low**
SE16	Increased risk of veld fires		Negative	**Medium**	**Low**

4 ENVIRONMENTAL MANAGEMENT OBJECTIVES

An EMPr is defined as “an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented or mitigated, and that the positive benefits of the projects are enhanced.”

This EMPr has been compiled in accordance with Appendix 4 of GNR 982, in compliance with section 24N of NEMA, with the purpose of ensuring that negative impacts are reduced and positive effects are enhanced through a process of continual improvement, during both the construction and operational phases of the Maralla West WEF project.

Due to the nature of the continual improvement process, this EMPr is seen as a working document and is therefore subject to change depending on the requirements of the various project phases. These changes are to be approved by an environmental practitioner or the appointed environmental control officer prior to the implementation onsite.

This EMPr has the following objectives:

- Identify mitigation measures and environmental specifications which are required to be implemented for the planning, construction and rehabilitation, operation, and decommissioning phases of the project in order to manage and minimise the extent of potential environmental impacts associated with the facility;
- Ensure that all the phases of the proposed project do not result in undue or reasonably avoidable adverse environmental impacts, and ensure that any potential environmental benefits are enhanced;
- Identify entities responsible for the implementation of the measures and outline functions and responsibilities;
- Create management structures that address the concerns and complaints of interested and affected parties (I&APs) with regards to the proposed project;
- Propose mechanisms and frequency for monitoring compliance, and preventing long-term or permanent environmental degradation; and
- Facilitate appropriate and proactive responses to unforeseen events or changes in project implementation that was not considered in the EIA process.

To facilitate compliance to the EMPr by appointed contractors and sub-contractors, it is required that all onsite personnel are aware of the requirements of the EMPr as well as the prescribed penalties should a non-conformance be identified during the construction, operation and decommissioning activities.

Further to the above, appointed contractors and sub-contractors will also be required to comply with all relevant legislation and standards.

It is recommended that environmental and social objectives (as outlined in this document) be emphasised to the appointed contractors and sub-contractors as minimum requirements. Objectives should include:

- Prevention of hazardous spillages/leaks or incidents onsite for the duration of the construction and operation periods. This should include the use of construction vehicles and plant equipment, as well as material storage;

- Avoidance of any complaints from the surrounding land users for the duration of the construction and operation periods;
- Prohibition of waste from remaining onsite for extended periods. Skips and waste receptacles need to be appropriately labelled, covered and regularly emptied;
- Reduction of waste generation;
- Mitigation against dusty conditions as much as is practicable;
- Maintenance of site aesthetics throughout the construction and operational period;
- Utilisation of natural resources sustainably; and
- Completion of work (to the required standard) timeously and prevention of work outside the legislated working hours; and management of activities according to a philosophy of “We respect the environment” and “We are committed to continually improving our processes in order to prevent pollution”.

5 MANAGEMENT PROCEDURES AND ADMINISTRATIVE REQUIREMENTS

5.1 ORGANISATIONAL STRUCTURE AND RESPONSIBILITY

Formal responsibilities are necessary to ensure that key management measures/procedures are executed. The Project Company, will be responsible for the overall control of the project site during the pre-construction, construction, operation, decommissioning and rehabilitation phases of the project. The Project Company's responsibilities will include the following:

- Appointing an independent environmental control officer (ECO) for the duration of the Contract and notify the DEA of their contact details;
- Being fully familiar with the EIA Report, EA conditions and the EMPr;
- Notifying the DEA of changes in the developments that result in significant environmental impacts;
- Notifying the DEA within 30 days of change of ownership;
- Notifying the DEA of any change of address of the owner/Project Company;
- The overall implementation of the EMPr;
- Ensuring compliance, by all parties, and the imposition of penalties for noncompliance
- Implementing corrective and preventive actions, where required;
- Preventing pollution and actions that will harm or may cause harm to the environment;
- Ensuring the activity does not commence within 30 days of the EA being issued;
- Notifying the DEA within 30 days that construction activity will commence;
- Notifying the DEA in writing within 24 hours if any condition in the EA cannot be or is not adhered to; and
- Notifying the DEA 14 days prior to commencement of the operational phase.

Specific roles and responsibilities for the construction phase of this project are as defined in **Table 5-1**.

Table 5-1: Roles and Responsibilities – Construction

Responsible Person	Responsibilities
Project Manager	→ Ensure that the Project Company and the contractor are aware of all specifications, legal constraints pertaining to the project specifically with regards to the environment → Ensure that all stipulations within the EMPr and conditions of the environmental authorisation are communicated and adhered to by the Project Company and its contractor(s) → Monitor the implementation of the EMPr and conditions of the environmental authorisation throughout the project by means of site inspections and meetings. This will be documented as part of the site meeting minutes → Be fully conversant with the EIR for the project, the conditions of environmental authorisation and all relevant environmental legislation

Responsible Person	Responsibilities
Site Manager	→ Be fully conversant with the EIR, the conditions of environmental authorisation and the EMPr → Approve method statements → Provide support to the ECO → Be fully conversant with all relevant environmental legislation and ensure compliance thereof → Have overall responsibility for the implementation of the EMPr and conditions of the environmental authorisation → Ensure that audits are conducted to ensure compliance to the EMPr and conditions of the environmental authorisation → Liaise with the Project Manager or his delegate, the ECO and others on matters concerning the environment → Prevent actions that will harm or may cause harm to the environment, and take steps to prevent pollution and unnecessary degradation onsite → Confine construction activities to demarcated areas
Environmental Officer (EO)	The EO must be appointed by the Contractor and is responsible for managing the day-to-day onsite implementation of the EMPr, and for the compilation of weekly environmental monitoring reports. In addition, the EO must act as liaison and advisor on all environmental and related issues, seek advice from the ECO when necessary, and ensure that any complaints received from I&APs are duly processed and addressed and that conflicts are resolved in an acceptable manner and timely manner. The EO shall be a full time dedicated member of the Contractor's team and must be approved by the Project Company. The following qualifications, qualities and experience are recommended for the individual appointed as the EO: → A relevant environmental diploma or degree in natural sciences, as well as a minimum of three years' experience in construction site monitoring, excluding health and safety; → A level-headed and firm person with above-average communication and negotiating skills. The ability to handle and address conflict management situations will be an advantage; and → Relevant experience in environmental site management and EMPr compliance monitoring. The EO's responsibilities include: → Monitoring, on a daily basis, environmental specifications on site and compliance with the conditions of the EA, environmental legislation and EMPr; → Keeping a register of compliance / non-compliance with the environmental specifications; → Identifying and assessing previously unforeseen, actual or potential impacts on the environment; → Ensuring that a brief weekly environmental monitoring report is submitted to the ECO; → Conducting site inspections during the defects liability period, and bringing any environmental concerns to the attention of the ECO and Contractor; → Advising the Contractor on the rectification of any pollution, contamination or damage to the construction site, rights of way and adjacent land;

Responsible Person	Responsibilities
	→ Attending site meetings (scheduled and ad hoc); → Presenting the environmental awareness training course to all staff, Contractors and Sub contractors, and monitoring the environmental awareness training for all new personnel on-site, as undertaken by the Contractor; → Ensuring that a copy of the EA and the latest version of the EMPr are available on site at all times; → Ensuring that the Contractor is made aware of all applicable changes to the EMPr that are approved by the DEA; → Assisting the Contractor in drafting environmental method statements and/or the Environmental Policy where such knowledge/expertise is lacking; → Undertaking daily environmental monitoring to ensure the Contractor's activities do not impact upon the receiving environment. Such monitoring shall include dust, noise and water monitoring; and → Maintaining the following on site: ▪ A weekly site diary. ▪ A non-conformance register (NCR). ▪ An I&AP communications register, and ▪ A register of audits. The EO will remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site is handed over to the Operator.
ECO	A suitably qualified ECO must be appointed by the Project Company to monitor the project compliance with the EMPr and conditions of the environmental authorisation on a monthly basis. The costs of the ECO shall be borne by the Project Company (proof of appointment must be maintained onsite). Responsibilities of the ECO include: → Be fully conversant with the EIR, the conditions of environmental authorisation and the EMPr; → Be fully conversant with all relevant environmental legislation and ensure compliance thereof; → Approve method statements; → Remain employed until the completion of the construction activities; and → Report to the Project Manager, including all findings identified onsite. In addition, the ECO will: → Undertake monthly inspections of the site and surrounding areas in order to audit compliance with the EMPr and conditions of the environmental authorisation; → Take appropriate action if the specifications contained in the EMPr and conditions of the environmental authorisation are not followed; → Monitor and verify that environmental impacts are kept to a minimum, as far as possible; and → Ensure that activities onsite comply with all relevant environmental legislation.

Responsible Person	Responsibilities
Contractors, Staff and Service Providers	→ Complying with the Project Company's environmental management specifications → Be conversant with all EMPr and conditions of the environmental authorisation, and ensure compliance thereto → Adhering to any environmental instructions issued by the Site Manager/Project Manager on the advice of the ECO

5.2 ENVIRONMENTAL AWARENESS AND COMPETENCE

It is important to ensure that all relevant personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and ongoing minimisation of environmental degradation and harm.

To achieve effective environmental management, it is important that employees, contractors (including subcontractors) are aware of the responsibilities in terms of the relevant environmental legislation and the contents of the EMPr, conditions of the environmental authorisation.

The Project Company will provide appropriate resources to facilitate social and environmental awareness training during the construction, operational and decommissioning phases of the project. The Project Company will require that all managers associated with the project adhere to the mitigation/management measures detailed in the EMPr and identify, evaluate, and minimise risks to the social, physical and biophysical environments. This will be implemented by educating employees in social and environmental matters and responsibilities relating to performance of their assigned tasks. Furthermore, employees will be entrusted to maintain the necessary level of environmental performance for their activities. Contractors, and their associated sub-contractors, will also need to demonstrate compliance to mitigation/ management measures included in the EMPr.

The following methodology will be used to implement and ensure environmental and social awareness:

INTERNAL COMMUNICATION

Internal communication of environmental and social issues to ensure environmental awareness will be achieved by using any combination of the following means:

- → Meetings;
- → Memos;
- → Notice boards;
- → Briefs;
- → Reports;
- → Monthly themes;
- → Daily operational bulletins;
- → Newsletters;
- → E-mail;
- → Telephone; and
- → Induction training.

STANDARD MEETINGS

The following standard meetings will be held at specific times to ensure that environmental and social awareness; potential problems; complaints etc. are heard and addressed proactively:

- Safety, Health and Environmental Meetings will be held monthly by the Senior Management;
- Safety, Health and Environmental Meetings will be held weekly (during construction) and monthly (during operation) by the relevant personnel, environmental and social issues will form part of the agenda;
- Communication between all personnel and Senior Management will be facilitated through the appropriate reporting lines, or by using complaint and incident forms.

ENVIRONMENTAL AND SOCIAL TALK TOPICS

Monthly environmental and social talk topics will be compiled and distributed to relevant personnel and will be displayed on appropriate notice boards. As a minimum, the following topics must be covered:

- Water Quality;
- Water Use and Consumption;
- Air Quality i.e. dust;
- Power Consumption and Energy Efficiency;
- Waste Management;
- Fauna and Flora;
- Emergency Procedures;
- Incidents Reporting;
- Systems;
- Noise;
- Heritage Impacts;
- Landowner Etiquette; Speed Limits;
- Health Risks (such as HIV/ Aids); and
- General Awareness (e.g. World Environment Day, National Arbour Day).

GENERAL COMMUNICATIONS

Communication to the community, government, landowners, neighbouring farmers, environmental groups, non-government organisations and other stakeholders will be communicated to ensure environmental and social awareness by means of the following:

- Fax or E-mail;
- Telephone;
- Formal meetings; and
- Open days.

TRAINING

It is important to ensure that all personnel, contractors and their sub-contractors have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm. As a minimum environmental training must include the following:

- Employees must have a basic understanding of the key environmental features of the site and the surrounding environment;
- Employees will be thoroughly familiar with the requirements of the EMPr and the environmental specifications as they apply to the project.
- Employees must undergo training for the operation and maintenance activities associated with project and have a basic knowledge of the potential environmental impacts that could occur and how they can be minimised and mitigated.
- Awareness of any other environmental matters, which are deemed to be necessary by the Environmental Officer.
- Training must include the environment, health and safety as well as basic HIV/AIDS education.

The following facets to training form part of this Environmental and Social Awareness Plan:

- **Induction**: Environmental and social awareness training will be given at induction when personnel join the company and/or return from leave. Induction training will also be given to visitors entering the site.
- **Job Specific Training**: Job specific training programmes will be developed as and when required. The programs will be based on the significant environmental and social aspects/ impacts that are identified during regular audits and site inspections. Supervisory staff will be equipped with the necessary knowledge and information to guide their employees on environmental and social aspects applicable to performing a specific task.
- **Competency Training**: The Environmental Officer will be responsible for the environmental and social competency and awareness training of Middle Management and supervisors. This training will be performed both on a one-on-one basis and through workshops and presentations. Competence and the effectiveness of training and development initiatives will be determined through the following methods:
  - Trend analysis of incidents reported; and
  - Analysis of work areas during visits and audits.

  The process to declare competency of personnel is documented in the ISO9001:2000 procedure. This plan will be amended periodically in light of operational changes, learning experienced during its implementation and other activities that can affect the risk profiles.
- **Training Records**: Training can be done either in a written or verbal format but will be in an appropriate format for the receiving audience. Persons having received training must indicate in writing that they have indeed attended a training session and have been notified in detail of the contents and requirements of the EMPr. The attendance registers must be kept on file.

5.3 MONITORING

The internal EO will monitor the day-to-day site activities on an ongoing basis and will produce weekly monitoring reports. The external ECO will undertake monthly audits to ensure compliance with the EMPr and conditions of the environmental authorisation during the construction activities, and will report to the Site Manager should any non-compliance be identified or corrective action deemed necessary.

During the operational phase, the Project Company will establish, implement and maintain a procedure to monitor and measure, on a regular basis, the key characteristics of the operations that may have a significant environmental impact. The procedure shall include the documenting of information to monitor performance, applicable operational controls and conformity with the operation's environmental objectives and targets.

The Project Company will ensure that all instruments and devices used for the measurement or monitoring are calibrated and appropriately operated and maintained. Calibration records must be kept on site or in close proximity to the equipment for ease of availability.

All the conditions outlined in the EMPr (Section 6) will be subject to the required internal day-to-day monitoring and external compliance monitoring. Where required, any specific additional monitoring has been outlined in the EMPr (Section 6).

5.4 NON-CONFORMANCE AND CORRECTIVE ACTION

The auditing of the construction and operational activities may identify non-conformances to the EMPr and conditions of the environmental authorisation. Non-conformances may also be identified through incidents, emergencies or complaints recorded. In order to correct non-conformances, the source must be determined and corrective actions must be identified and implemented.

COMPLIANCE WITH THE EMPR AND CONDITIONS OF THE ENVIRONMENTAL AUTHORISATION

- A copy of the EMPr and conditions of the environmental authorisation will be available onsite at all times for the duration of the construction and operational activities;
- All persons employed by a contractor or their sub-contractors will abide by the requirements of the EMPr and conditions of the environmental authorisation;
- Any members of the workforce found to be in breach of any of the specifications contained within the EMPr and conditions of the environmental authorisation may be ordered by the Site Manager to leave the site. A contractor will not direct a person to undertake any activity which would place them in contravention of the specifications contained within the EMPr and conditions of the environmental authorisation;
- Should a contractor be in breach of any of the specifications contained in the EMPr and conditions of the environmental authorisation, the Site Manager will, in writing, instruct the contractor responsible for the incident of non-compliance regarding corrective and/or remedial action required, specify a timeframe for implementation of these actions, implement a penalty and/or indicate that work will be suspended should non-compliance continue;
- Should non-compliance continue, further written notification will be forwarded to the contractor responsible for the incident of non-compliance outlining the required corrective and/or remedial action, the timeframe for implementation, penalties and/or work will be suspended as specified previously; and
- Departmental officials will be given access to the property referred to in the EIR and EMPr for the purpose of assessing and/or monitoring compliance with the EMPr and conditions of the environmental authorisation, at all reasonable times.

DUTY OF CARE

All personnel involved with the construction and operational activities onsite will be responsible for implementing measures to prevent pollution or degradation of the environment from occurring, continuing or recurring. Insofar as such harm to the environment is authorised by law, or cannot reasonably be avoided or stopped, personnel shall minimise and rectify such pollution or degradation of the environment.

5.5 DOCUMENTATION AND REPORTING

The following documentation must be kept onsite in order to record compliance with the EMPr and conditions of the environmental authorisation:

- Record of complaints; and
- Record of emergencies and incidents.

The contractor will be required to report on the following:

- Environmental incidents involving contractor/ employees and/or the public;
- Environmental complaints and correspondence received from the public; and
- Incidents that cause harm or may cause harm to the environment.

The above records will form an integral part of the ECO's reports and records thereof maintained for the duration of the project. These records will be kept with the EMPr and conditions of the environmental authorisation, and will be made available for scrutiny if so requested by the Site Manager or his delegate and the ECO.

The contractor will ensure that the following information is recorded for all environmental complaints/incidents/emergencies:

- Date of complaint/incident/emergency;
- Location of complaint/incident/emergency;
- Nature of complaint/incident/emergency;
- Causes of complaint/incident/emergency;
- Party/parties responsible for causing complaint/incident/emergency;
- Immediate actions undertaken to stop/reduce/contain the causes of the complaint/incident/emergency;
- Additional corrective or remedial action taken and/or to be taken to address and to prevent reoccurrence of the complaint/incident/emergency;
- Timeframes and the parties responsible for the implementation of the corrective or remedial actions;
- Procedures to be undertaken and/or penalties to be applied if corrective or remedial actions are not implemented; and
- Copies of all correspondence received regarding complaints/incidents/emergency.

5.6 PUBLIC COMPLAINTS

A signboard must be erected at the entrance to the project site, informing the public of the construction activities taking place. The signboard must include the following information:

- The name of the contractor; and
- The name and contact details of the site representative to be contacted in the event of emergencies or the location of the complaint registration.

6 ENVIRONMENTAL MANAGEMENT PROGRAMME

The EMPr contains guidelines, operating procedures, rehabilitation and pollution control requirements which will be binding to the onsite personnel working for, or on behalf of the Project Company. It is essential that the EMPr be carefully studied, understood, implemented and adhered to at all times.

In instances where the method statements provided by the contractor conflict with the EMPr, such conflicts will be discussed between the Site Manager, ECO and contractor and if unresolved the EMPr will take precedent.

To simplify the EMPr requirements, each column related to the EMPr tables has been described in **Table 6-1**. The EMPr identifies various actions which are undertaken throughout the construction and operational phases. Not every action will be required during the entire course of activities. Therefore, the actions identified in the EMPr have been given priority timeframes for proposed implementation.

Table 6-1: Structure of EMPr

Column	Description
Reference Number	The reference numbers link the mitigation measures to the impacts identified by the specialists in the Environmental Impact Report. Generic Mitigation measures are allocated an “EMP” number.
Activity / Impact	Highlights the various activities/aspects associated with the project i.e. the contractors’ activities that will interact with the environment. Each impact / activity is cross referenced to the impacts identified in the EIA report.
Mitigation and Management Measures	Indicates the actions required to prevent and/or minimise the potential impacts on the environment that are associated with the project
Responsibility	Indicates the party responsible for implementing the environmental measures and action plans laid out in the EMPr. Please note that the site manager will have authority to stop works if/as necessary
Development Phase	Indicates during which phase of development the actions for the specific aspect must be implemented and/or monitored
Condition of Authorisation	Indicates whether the specific mitigation measures should or should not be included as a condition in the Environmental authorisation
Additional Monitoring Requirements	Indicates the method and frequency of any additional monitoring requirements over and above the day-to-day monitoring undertaken by the EO and the monthly compliance monitoring undertaken by the ECO.

The following assumptions have been made in the development of the environmental specification in this EMPr:

- An environmental file containing the information/documentation required by this EMPr is to remain onsite and to be made available at the request of the auditor or similar monitoring body; and

- For ease of reference, any person(s) employed to assist in the project i.e. contractors, sub-contractor and permanent and temporary staff, will be collectively referred to as ‘onsite personnel’.

6.1 CONTRACTOR LAYDOWN AREA AND SITE ACCESS

OBJECTIVES

To implement measures to minimise impacts on the environment from the initiation of construction activities through planning, careful site access route selection and implementation of mitigation measures.

INDICATOR AND COMPLIANCE MECHANISMS

The following indicator and compliance mechanisms are applicable:

- Health, safety, environmental and community incident and complaints management system register;
- Close-out on incidents;
- Monitoring and audit reports;
- Inductions training and register; and
- Environmental awareness programme/toolbox talks.

MITIGATION AND MANAGEMENT MEASURES

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
EMP1	Project Initiation of Construction Activities	Construction activities to remain within demarcated project footprint	ECO Contractor Project Manager	Construction	No	No additional monitoring required.
EMP2		Site clearing and topsoil removal must be limited to the footprint of the infrastructure requirements				
EMP3		Clearly mark health and/or safety hazards onsite				

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
EMP4		Locate firefighting measures onsite, such as fire extinguishers, and make personnel aware of fire prevention and firefighting measures.				
EMP5		Firefighting equipment must be securely placed and inspected monthly				
EMP6		Undertake fuel and chemical management for storage, handling and spillages in accordance Section 6.3.				
EMP7		Manage surface and groundwater impacts as per Water Management section.				

6.2 VEHICLE, EQUIPMENT AND MACHINERY MANAGEMENT

OBJECTIVES

To implement measures to minimise impacts on the environment from poorly maintained equipment, machinery and vehicles onsite.

INDICATOR AND COMPLIANCE MECHANISMS

The following indicator and compliance mechanisms are applicable:

- Health, safety, environmental and community incident and complaints management system register;
- Close-out on incidents;
- Monitoring and audit reports;
- Transport route delineation;

- Daily equipment, machinery and vehicle checklists; and
- Incident classification and reporting procedure.

MITIGATION AND MANAGEMENT MEASURES

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
EMP8	Vehicle and Equipment Maintenance	Undertake all significant vehicle maintenance work off-site at a registered workshop. Evidence of such maintenance must be recorded and maintained onsite for verification.	EO ECO Contractor Operator	Construction Operation De-commissioning	No	No additional monitoring required.
EMP9		Minor maintenance can be undertaken onsite within a designated area on a hard standing.				
EMP10		Utilise drip trays under all stationary vehicles and equipment.				
EMP11	Operation of Equipment, Machinery and Vehicles	Adequately maintain equipment, machinery and vehicles so as to reduce the potential for spillages of oil, diesel, fuel or hydraulic fluid, as well as to ensure road-worthiness. Evidence of such maintenance must be recorded and maintained onsite for verification.				
EMP12		Large loads must be secured before entering the local road network.				
EMP13		Increase visibility of heavy vehicles by utilising sufficient reflectors and activating headlights during operation				
EMP14		Do not allow machinery or plant equipment used onsite to pose a pollution hazard. The contractor must order any equipment to be repaired or withdrawn from use if evident that it is not operating optimally. The contractor shall inspect all vehicles, machinery and equipment every morning for defects (indicator lights, oil leaks, etc.) and excessive emissions				

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
EMP15		Identify and use transport routes that will least impact local road users and traffic i.e. routes which minimise right turns across traffic. Identified routes must be documented and made available for inspection on request.				
EMP16		Avoid heavy vehicle use on the local road network during peak hours i.e. 07h00 – 08h00 and 16h00 – 17h00				
EMP17		Undertake fuel and chemical management for storage, handling and spillages in accordance with the Fuel and Chemical Management section				
EMP18		Manage air quality as per the Air Quality section below (Section 6.9)				

6.3 FUEL AND CHEMICAL MANAGEMENT

OBJECTIVES

To ensure the correct storage and handling of fuels and chemicals in order to prevent impacts to the surrounding environment

INDICATOR AND COMPLIANCE MECHANISMS

The following indicator and compliance mechanisms are applicable:

- Maintenance records;
- Safe Disposal certificates (if applicable);
- Material safety data sheets;

- Health, safety, environmental and community incident and complaints management system register;
- Chemicals management procedure (to be developed);
- Waste management procedure (to be developed);
- Monitoring and audit reports; and
- Training records.

MITIGATION AND MANAGEMENT MEASURES

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
EMP19	Fuel and Chemical Management	Undertake fuel and chemical management for storage, handling and spillages in accordance with an Incident Classification and Reporting Procedure	ECO Contractor Operator	Construction Operation	No	No additional monitoring required.
EMP20		Indicate the location of the fuel and chemical storage area on the layout plans				
EMP21		Securely fence and lock the storage areas to accommodate all hazardous substances such as fuel, oils and chemicals. The storage area must be covered and the floor must be an impermeable surface and suitably bunded as per the requirements outlined in SANS 10089-1 (2008)				
EMP22		Develop and implement a procedure for the management of all hydrocarbon spillages				
EMP23		Maintain oil traps or interceptors on a regular basis and maintain records				
EMP24		Develop and implement a procedure for the storage and handling of chemicals, hydrocarbon materials and hazardous substances onsite. The procedure must ensure adherence to				

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
		the Hazardous Substances Act (No. 15 of 1973) and its relevant regulations.				
EMP25		Label all liquids (chemicals and hydrocarbons) stored onsite for easy identification. Safety data sheets (SDS) for onsite chemicals, hydrocarbon materials and hazardous substances must be readily available. SDSs must include mitigation measures to ameliorate potential environmental impacts which may result from a spill, incorporating health and safety mitigation measures				
EMP26		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.				
EMP27	Health and Safety	Display “no smoking” and “no naked flame” signs in and around the project area, as well as near the hazardous material store	EO ECO Contractor Operator	Construction Operation De-commissioning	No	No additional monitoring required.
EMP28		Strategically place the correct types of fire extinguishers onsite and near the hazardous material store. Train key personnel on basic firefighting skills				
EMP29		Frequently inspect and maintain containment facilities and retain records onsite				

6.4 WASTE MANAGEMENT

OBJECTIVES

To ensure the correct handling, storage, transportation and disposal of general waste and hazardous waste.

INDICATOR AND COMPLIANCE MECHANISMS

The following indicator and compliance mechanisms are applicable:

- Induction training and records;
- Material safety data sheets;
- Waste Management Procedure (to be developed);
- Relevant SANS Codes of Practice;
- Safety disposal certificates and waste manifests (all waste streams);
- Emergency preparedness and response procedure (to be developed);
- Incident classification and reporting management procedure (to be developed);
- Waste manifest documentation;
- Health, safety, environmental and community incident and complaints management system register; and
- Monitoring and audit reports.

MITIGATION AND MANAGEMENT MEASURES

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
EMP30	General Waste Management	General waste generated as a result of construction and operational activities should be managed in accordance with a Waste Management Procedure	EO ECO Contractor Operator	Construction Operation De-commissioning	Yes	No additional monitoring required.
EMP31		Train and inform all onsite personnel regarding general waste minimisation, management and disposal as per the Waste Management Procedure			No	
EMP32		Prohibit littering and burning of waste onsite				

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
EMP33		Place an adequate number of general waste bins around the site during construction and operational activities in order to minimise littering. The bins must be suitably labelled "General Waste" to prevent mixing of waste. The bins must be removed from the site on a regular basis for disposal at a registered or licensed disposal facility				
EMP34		Retain records of appropriate safety disposal certificates associated with general waste removal, transportation and disposal				
EMP35		Prohibit the mixing of general waste with hazardous waste. Should general waste be mixed with hazardous waste, it will be considered hazardous waste				
EMP36		Recover, recycle and reuse waste of general waste as far as possible.				
EMP37	Hazardous Waste Management	Hazardous waste generated as a result of construction, operational and de-commissioning activities should be managed in accordance with a Waste Management Procedure.	EO ECO Contractor Operator	Construction Operation De-commissioning	Yes	No additional monitoring required.
EMP38		The Waste Management Procedure must include a procedure for handling spillages.				
EMP39		Train and inform all onsite personnel regarding hazardous waste minimisation, management and disposal as per the Waste Management Procedure			No	
EMP40		A designated and appropriately demarcated and covered hazardous waste storage area must be established on a hard standing area.				

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
EMP41		Ensure that all hazardous wastes temporarily stored on site are stored in a covered skip and are placed on a hard standing				
EMP42		Clean areas where hazardous waste spills have occurred and dispose of the hazardous material appropriately. Key personnel must be trained on handling spillages.				
EMP43		Retain records of appropriate safety disposal certificates associated with hazardous waste removal, transportation and disposal				
EMP44		Ensure cognisance of the following SANS codes of practice: → SANS 10234: Classification and Labelling of Chemicals → SANS 10228: The Identification and Classification of Dangerous Substances → SANS 10229: Packing of Dangerous Goods for Road and Rail Transportation				
EMP45		Manage all liquid hazardous waste spillages as per the Waste Management Procedure				
EMP46		An emergency preparedness and response plan is to be developed by the contractor/operator for any hazardous waste being removed, transported and disposed of offsite				
EMP47		Ensure that waste manifest documentation (as per the draft Classification and Management Regulations, GNR.614 of 2012) is prepared and maintained for the generation, transportation and disposal of hazardous waste				

6.5 SOIL AND LAND MANAGEMENT

OBJECTIVES

To prevent any disturbance, erosion or contamination of soil resources

INDICATOR AND COMPLIANCE MECHANISMS

The following indicator and compliance mechanisms are applicable:

- Induction training and records;
- Waste Management Procedure (to be developed);
- Incident Classification and Reporting Management Procedure (to be developed);
- Health, safety, environmental and community incident and complaints management system register;
- Monitoring and audit reports; and
- Stormwater Management Plan.

MITIGATION AND MANAGEMENT MEASURES

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
SLC1 SLC4	Loss of land previously used for sheep, cattle and antelope grazing will be occupied by the solar power facility and associated infrastructure.	Areas of construction should be (where practical) limited to the extent of the project footprint, and activities outside of the site should be kept to a minimum.	EO ECO Contractor Operator	Construction Operational	Yes	No additional monitoring required.

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
SLC2 SLC5 SLC7 SW2 SW6 SW9	Increased potential for soil erosion (especially wind driven) due to vegetation clearance, soil disturbance and high traffic movement on site.	Areas of construction should be (where practical) limited to the extent of the project footprint, and activities outside of the site should be kept to a minimum.	EO ECO Contractor Operator	Construction, Operational Decommissioning	No	
		Traffic of construction vehicles should be kept to a minimum to reduce soil compaction, and limited to existing or proposed roadways where practical.				
		Soils excavated during construction of the facility should be appropriately stored in stockpiles which are protected from erosion (wind and water) (i.e. through use of vegetation cover in the case of long-term stockpiles- this should form part of the rehabilitation process after the construction phase).				
		Water erosion action is considered limited, however backfilling with soil and use of gabions or Reno Mattresses should be used where evidence of erosion is present.				
SLC3 SLC6 SLC8 SW3 SW7 SW10	Potential spillage of hazardous substances such as oils, fuel, grease from construction and operational vehicles, and sewage from on-site sanitation systems	The proper handling and storage of hazardous materials, the use of hardstanding in storage areas of hazardous substances and where spillages are possible. The use of bunding around storage of hazardous materials and proper upkeep of machinery and vehicles. A complete spill kit must be onsite at all times.	ECO Contractor Operator	Construction, Operational Decommissioning	No	
EMP48	Stockpile Management	Adequately maintain stockpiled material to prevent becoming the source air pollution (windblown dust)	EO	Construction	No	

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
EMP49		Level and shape the area designated for the deposition of stockpiled material to ensure the efficient drainage of the site. No general or hazardous waste may be disposed of at this site	ECO Contractor			
EMP50		Stormwater control systems must be implemented within the site and should be managed and maintained to ensure no contamination of soil reserves				
EMP51	Soil and Land Management	Soils excavated during construction of the facility must be appropriately stored in stockpiles which are protected so as to limit the loss of soils.	EO ECO Contractor	Construction	No	
EMP52		Topsoil is expected to have a higher fertility than the subsoil horizons, and contains the vegetation seeds. As a result, the topsoil must be stored separately from the subsoils				
EMP53		Due to the potential for soil compaction due to vehicles, traffic must be limited to existing or proposed roadways as far as possible.				
EMP54		The construction of roads must be limited in width and length as far as is practical to limit impacts.				
EMP55		Where soil compaction outside of the designated development areas occurs, this needs to be rehabilitated to the pre-development soil permeability to maintain infiltration				
EMP56		Vegetation removal must be kept to a minimum and limited to the area of development				

Ref	Impact / Activity	Mitigation and Management Measure	Responsible Person	Applicable Development Phase	Include as Condition of Authorisation	Additional Monitoring requirements
EMP57		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				
EMP58		Once the operations have concluded, the stockpiled soils must be returned to the impacted land to reinstate the land capability, with topsoil being returned as the top layer. If necessary, soil amelioration in the form of fertilisers may be required to return the fertility to baseline conditions. To limit erosion, it must be ensured that the soils are rehabilitated to their pre-development characteristics as far as is practicable to ensure infiltration and vegetation rooting.	EO ECO Contractor Operator	Construction Operation Decommissioning		
EMP59		The ECO or a suitably qualified ecologist should be appointed to monitor the rehabilitation and to ensure that the vegetation health is returned to the baseline health where practically feasible				
EMP60		Erosion observed (both on- and off-site) must be rehabilitated, with mitigation measures adopted in high risk areas (i.e. gabions, gabion mattresses)				
EMP61		Machinery must be regularly checked to ensure hydrocarbon leaks (including fuel and hydraulic fluids) are not occurring. Drip trays must be used where necessary. In addition, 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				
EMP62		Sufficient on-site ablutions must be made available during site construction and decommissioning				

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
EMP63		Weed and invader species growth needs to be appropriately monitored and managed, both during the site construction, operation and after decommissioning				
EMP64		The decommissioning and rehabilitation measures must be phased to limit areas of exposed soil. Vegetation must be reintroduced during rehabilitation as soon as possible to limit erosion	EO Project Manager Operator	Decommissioning		

6.6 WATER MANAGEMENT

OBJECTIVES

- To implement measures to prevent the contamination on surface and groundwater resources; and
- To prevent erosion and loss of topsoil.

INDICATOR AND COMPLIANCE MECHANISMS

The following indicator and compliance mechanisms are applicable:

- Induction training and records;
- Waste Management Procedure (to be developed);
- Incident classification and reporting management procedure (to be developed);
- Water Use License;
- Environmental awareness programme/toolbox talks; and
- Stormwater management plan (to be developed).

MITIGATION AND MANAGEMENT MEASURES

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
SW1 SW5 SW8	Alterations of flow regimes of watercourses, in close proximity to the site, or that is proposed to be traversed.	Construction of the turbines and associated infrastructure (e.g. access roads and cables) should, where feasibly possible, occur during the dry season and the site rehabilitated before major rainfall events occur. Access roads and cables must only cross perpendicular to a watercourse and the chosen alignment must endeavour that the span across the watercourse is minimalised. Regular inspections during operation are required to ensure the structural integrity of the roads and cables. These crossings (and infrastructure located within 500m of a wetland) have a potential of requiring a Water Use Licence in terms of the National Water Act.	ECO Contractor Operator Surface Water and Aquatic Specialists	Planning and Design Construction Operation Decommissioning	Yes	A freshwater habitat specialist must conduct an in-depth site walkover prior to the construction phase commencing to assess the area for any freshwater habitats which may be affected by the actions conducted during the construction phase (e.g. road construction, trenching, etc.). Any identified systems must be visibly demarcated
SW4	Degradation of wetland habitat due to the proposed positioning of road access	Should BioTherm be recognised as a Preferred Bidder, the required application for a Water Use Licence (WUL) in terms of Section 21 of the National Water Act (NWA) (Act 36 of 1998) may commence. This application (WULA) will require detailed functional assessments (i.e. PES, EIS and EcoServices) of freshwater habitats potentially affected by the roads and infrastructure. At this stage design details should be available allowing the freshwater specialist to assess specific areas within the site. Therefore, a more in-depth and thorough freshwater functional assessment should be conducted should BioTherm be recognised as a Preferred Bidder. The detailed freshwater habitat assessment must provide recommendations in terms of road access in relation to freshwater habitats.	ECO Contractor Operator Surface Water and Aquatic Specialists	Planning and Design Construction	Yes.	
EMP65	Surface Water Management	The evaporation ponds must be adequately designed and lined.	Project Manager	Planning and Design	Yes	No additional monitoring required.

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
EMP66		To appropriately manage storm water, the Storm Water Management Plan needs to be implemented, including the following recommendations incorporating measures outlined in the DWA GN704 and Best Practice Guidelines as well as on-site observations: → To prevent contamination, it must be ensured that there is no storage and handling of materials (i.e. raw materials, product and waste material) within the designated "clean areas" → All channels must be checked monthly and after any major rainfall events to ensure that there are no blockages and that the water will not be restricted in any way → Spills must be appropriately managed on site, including within the bunds → At the outlet of the stormwater channel discharging to the environment, erosion protection is required → To reduce the velocity of runoff generated from site, velocity dissipation infrastructure must be constructed at the point of stormwater discharge to the environment. Any areas of erosion must be suitably rehabilitated	Project Manager ECO Contractor Operator	Planning Construction Operation	Yes	
EMP67	Groundwater Management	Areas with the potential to contaminate the groundwater must be underlain by hardstanding of suitable integrity.	EO ECO Contractor Operator	Construction Operation	No	
EMP68	Potable Water Management	Onsite staff are to be provided with an appropriate potable water supply, safe and healthy sanitary facilities and protection against exposure to environmentally dangerous or unhealthy situations or conditions.				
EMP69		Onsite staff should be made aware and encouraged to use water sparingly such that there is no water wastage.				

6.7 BIODIVERSITY MANAGEMENT

OBJECTIVES

To ensure that impacts to the biodiversity (fauna and flora) of the surrounding environment are ameliorated

INDICATOR AND COMPLIANCE MECHANISMS

The following indicator and compliance mechanisms are applicable:

- Induction training and records;
- Incident Classification and Reporting Management Procedure (to be developed);
- Environmental awareness programme/toolbox talks; and
- Biodiversity monitoring procedure (to be developed).

MITIGATION AND MANAGEMENT MEASURES

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
BIO1	Impacts on vegetation and protected plant species	Placement of turbines within the High and Very High Sensitivity areas should be avoided	EO ECO Contractor	Construction	No	No additional monitoring required
		Preconstruction walk-though of the approved development footprint to ensure that sensitive habitats and species are be avoided where possible				
		Ensure that lay-down and other temporary infrastructure is within low sensitivity areas, preferably previously transformed areas if possible				

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
		Minimise the development footprint as far as possible and rehabilitate disturbed areas that are no longer required by the operational phase of the development				
		A large proportion of the impact of the development stems from the access roads and the number of roads should be reduced to the minimum possible and routes should also be adjusted to avoid areas of high sensitivity as far as possible, as informed by a preconstruction walk-though survey				
		Preconstruction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness as to no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimizing wildlife interactions, remaining within demarcated construction areas etc				
		Demarcate all areas to be cleared with construction tape or similar material. However caution should be exercised to avoid using material that might entangle fauna				
BIO2	Faunal impacts due to construction activities	Preconstruction walk-through of the facility to identify areas of faunal sensitivity	EO ECO Contractor	Construction	No	No additional monitoring required
		During construction any fauna directly threatened by the construction activities should be removed to a safe location by the ECO or other suitably qualified person				
		The illegal collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the construction site				

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
		No fires should be allowed within the site as there is a risk of runaway veld fires				
		No fuelwood collection should be allowed on-site				
		No dogs or cats should be allowed on site apart from that of the landowners				
		If any parts of site such as construction camps must be lit at night, this should be done with low-UV type lights (such as most LEDs), which do not attract insects and which should be directed downwards				
		All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill				
		No unauthorized persons should be allowed onto the site and site access should be strictly controlled and vehicles which need to roam around the site should be accompanied by the ECO or security personnel				
		All construction vehicles should adhere to a low speed limit (40km/h for cars and 30km/h for trucks) to avoid collisions with susceptible species such as snakes and tortoises and rabbits or hares. Speed limits should apply within the facility as well as on the public gravel access roads to the site				
		All personnel should undergo environmental induction with regards to fauna and in particular awareness about not harming				

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
		or collecting species such as snakes, tortoises and owls which are often persecuted out of superstition				
BIO3	Increased Soil Erosion risk during construction	Runoff management and erosion control should be integrated into the project design;	EO ECO Contractor	Construction	No	No additional monitoring required
		Development on steep slopes should be avoided as much as possible and specific additional mitigation may be required where this cannot be avoided				
		Dust suppression and erosion management should be an integrated component of the construction approach				
		Disturbance near to drainage lines should be avoided and sensitive drainage areas near to the construction activities should demarcated as no-go areas				
		Regular monitoring for erosion problems along the access roads and other cleared areas				
		Erosion problems should be rectified on a regular basis				
		Sediment traps may be necessary to prevent erosion and soil				
		movement if there are topsoil or other waste heaps present during the wet season				
		A low cover of vegetation should be left wherever possible within the construction footprint to bind the soil, prevent erosion and promote post-disturbance recovery of an indigenous ground cover				

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
BIO4	Faunal impacts due to operational activities of the wind farm such as noise, and human presence during maintenance activities	Management of the site should take place within the context of an Open Space Management Plan;	EO ECO Operator	Operation	No	No additional monitoring required
		No unauthorized persons should be allowed onto the site				
		Any potentially dangerous fauna such snakes or fauna threatened by the maintenance and operational activities should be removed to a safe location				
		The illegal collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden by anyone expect landowners with the appropriate permits where required				
		If the site must be lit at night for security purposes, this should be done with downward-directed low-UV type lights (such as most LEDs), which do not attract insects				
		All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill				
		All vehicles accessing the site should adhere to a low speed limit (40km/h max) to avoid collisions with susceptible species such as snakes and tortoises				
		If parts of the facility are to be fenced, then no electrified strands should be placed within 30cm of the ground as some species such as tortoises are susceptible to electrocution from electric fences as they do not move away when electrocuted but rather adopt defensive behaviour and are killed by repeated shocks.				

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
		Alternatively, the electrified strands should be placed on the inside of the fence and not the out				
BIO5	Erosion	Erosion management at the site should take place according to the Erosion and Rehabilitation Plan	EO ECO Operator	Operation	No	No additional monitoring required
		All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk				
		Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance				
		All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques				
		All cleared areas should be revegetated with indigenous perennial shrubs and grasses from the local area. These can be cut when dry and placed on the cleared areas if natural recovery is slow				
BIO6	Alien plant invasion	Wherever excavation is necessary, topsoil should be set aside and replaced after construction to encourage natural regeneration of the local indigenous species	EO ECO Operator	Operation	No	No additional monitoring required
		Due to the disturbance at the site as well as the increased runoff generated by the hard infrastructure, alien plant species are likely to be a long-term problem at the site and a long-term control plan will need to be implemented. Problem woody species such as Prosopis are already present in the area and are likely to increase rapidly if not controlled				

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
		Regular monitoring for alien plants within the development footprint as well as adjacent areas which receive runoff from the facility as there are also likely to be prone to invasion problems Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible				
BIO7	Faunal impacts due to decommissioning activities of the wind farm such as noise, and human presence during maintenance activities	Any potentially dangerous fauna such snakes or fauna threatened by the decommissioning activities should be removed to a safe location All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill All vehicles accessing the site should adhere to a low speed limit (40km/h max) to avoid collisions with susceptible species such as snakes and tortoises All above-ground infrastructure should be removed from the site. Below-ground infrastructure such as cabling can be left in place if it does not pose a risk, as removal of such cables may generate additional disturbance and impact	EO ECO Contractor	De-commissioning	No	No additional monitoring required
BIO8	Erosion	Any roads that will not be rehabilitated should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk; There should be regular monitoring for erosion for at least 2 years after decommissioning by the applicant to ensure that no	EO ECO Contractor	De-commissioning	No	No additional monitoring required

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
		erosion problems develop as result of the disturbance, and if they do, to immediately implement erosion control measures				
		All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques				
		All disturbed and cleared areas should be revegetated with indigenous perennial shrubs and grasses from the local area				
BIO9	Alien plant invasion	Wherever excavation is necessary for decommissioning, topsoil should be set aside and replaced after construction to encourage natural regeneration of the local indigenous species;	EO ECO Contractor	De-commissioning	No	No additional monitoring required
		Due to the disturbance at the site alien plant species are likely to be a long-term problem at the site following decommissioning and regular control will need to be implemented until a cover of indigenous species has returned				
		Regular monitoring for alien plants within the disturbed areas for at least two years after decommissioning				
		Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible				

6.8 AVIFAUNA MANAGEMENT

OBJECTIVES

To ensure that impacts to avifauna are ameliorated

INDICATOR AND COMPLIANCE MECHANISMS

The following indicator and compliance mechanisms are applicable:

- Induction training and records;
- Incident classification and reporting management procedure (to be developed);
- Environmental awareness programme/toolbox talks; and
- Avifauna monitoring procedure (to be developed).

MITIGATION AND MANAGEMENT MEASURES

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
AV1	Displacement of priority species due to disturbance during construction operations	A site-specific Construction Environmental Management Plan must be implemented, which gives appropriate and detailed description of how construction activities must be conducted. All contractors are to adhere to the CEMP and should apply good environmental practice during construction. ECO to oversee activities and ensure that the site-specific construction environmental management plan is implemented and enforced The appointed ECO must be trained by an avifaunal specialist to identify the potential priority species as well as the signs that indicate possible breeding by these species.	EO ECO Contractor Avifaunal specialist	Construction	Yes	No additional monitoring required.

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
		The ECO must then, during audits/site visits, make a concerted effort to look out for such breeding activities of Red Data species, and such efforts may include the training of construction staff to identify Red Data species, followed by regular questioning of staff as to the regular whereabouts on site of these species. If any of the Red Data species are confirmed to be breeding (e.g. if a nest site is found), construction activities within 500 m of the breeding site must cease, and an avifaunal specialist is to be contacted immediately for further assessment of the situation and instruction on how to proceed.				
		Prior to construction, an avifaunal specialist should conduct a site walkthrough, covering the final road and power line routes as well as the final turbine positions, to identify any nests/breeding/roosting activity of priority species, as well as any additional sensitive habitats. The results of which may inform the final construction schedule in close proximity to that specific area, including abbreviating construction time, scheduling activities around avian breeding and/or movement schedules, and lowering levels of associated noise.				
		No turbines should be constructed in no-go areas, while associated infrastructure (roads, powerlines and substations) should be avoided where possible in these areas.				
		During the construction phase, an avifaunal specialist must conduct surveys/exploration of the WEF site (particularly focussing on potential Martial Eagle and Verreaux's Eagle roost sites as well as suitable nesting habitat). This should be done during and after, the breeding season (i.e. approximately in July and again in September) of large Eagles (e.g. Martial and Verreaux's Eagle). The aim will be				

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
		to locate nest sites, so that these may continue to be monitored during the construction and operation phase.				
AV2	Priority species mortality due to collision with the turbines	The results of the pre-construction monitoring must guide the lay-out of the turbines, especially as far as proposed no-turbine zones are concerned. No turbines must be constructed in the high-risk areas which were identified based on the results of the pre-construction monitoring, with a specific view to limiting the risk of collisions to Verreaux's Eagle, Martial Eagle, Black Harrier and Greater Flamingo. Once the turbines have been constructed, post-construction monitoring should be implemented under the guidance of an avifaunal specialist to assess collision rates, in accordance with the latest version of the Best practice guidelines for avian monitoring and impact mitigation at proposed wind energy development sites in southern Africa. If collision rates indicate unacceptable mortality levels of priority species, curtailment of selective turbines should be implemented if sufficient evidence emerges to link mortality to specific turbines. Care should be taken not to create habitat for prey species that could draw priority raptors into the area and expose them to collision risk. Rock piles must be covered with topsoil to prevent them from becoming habitat for Rock Hyrax (Dassie). The booms on the wind mast must be modified to prevent them from becoming roost sites for large raptors. It is recommended that a horizontal thick steel cable is installed	EO ECO Contractor Avifaunal specialist	Operational	Yes	Once the turbines have been constructed, post-construction monitoring should be implemented under the guidance of an avifaunal specialist to assess collision rates, in accordance with the latest version of the Best practice guidelines for avian monitoring and impact mitigation at proposed wind energy development sites in southern Africa.

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
		300 - 400mm above the boom to create a physical barrier to prevent large raptors from perching on the boom)				
AV3	Displacement of priority species due to habitat transformation	A site-specific Construction Environmental Management Plan must be implemented, which gives appropriate and detailed description of how construction activities must be conducted to reduce unnecessary destruction of habitat. All contractors are to adhere to the CEMP and should apply good environmental practice during construction	EO ECO Contractor Avifaunal specialist Rehabilitation specialist	Operational	Yes	Environmental Control Officers to oversee activities and ensure that the site-specific construction environmental management plan (CEMP) is implemented and enforced;
		Existing roads and farm tracks should be used where possible;				
		The minimum footprint areas of infrastructure should be used wherever possible, including road widths and lengths				
		No off-road driving;				
		Environmental Control Officers to oversee activities and ensure that the site-specific construction environmental management plan is implemented and enforced;				
		Any clearing of stands of alien trees on site should be approved first by an avifaunal specialist				
		Following construction, rehabilitation of all areas disturbed (e.g. temporary access tracks and laydown areas) must be undertaken and to this end a habitat restoration plan is to be developed by a rehabilitation specialist and included within the Construction Environmental Management Plan				

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
AV4	Priority species mortality due to collision with the on-site powerlines	An avifaunal specialist must conduct a site walk through of final pylon positions prior to construction to determine if, and where, bird flight diverters (BFDs) are required. Install BFDs as per the instructions of the specialist following the site walkthrough, which may include the need for modified BFDs fitted with solar powered LED lights on certain spans. The operational monitoring programme must include regular monitoring of the internal power lines for collision mortalities.	EO ECO Contractor Avifaunal specialist	Operational	Yes	The operational monitoring programme must include regular monitoring of the grid connection power line for collision mortalities.
AV5	Priority species mortality due to electrocution on the on-site powerlines	An avifaunal specialist must certify that the pole structures to be used on the internal MV network is bird-friendly.	EO ECO Contractor Avifaunal specialist	Design	Yes	No additional monitoring required.
AV6	Displacement of priority species due to disturbance during decommissioning operations	A site-specific Decommissioning Environmental Management Plan must be implemented, which gives appropriate and detailed description of how decommissioning activities must be conducted to reduce unnecessary destruction of habitat. All contractors are to adhere to the DEMP and should apply good environmental practice during decommissioning. Following decommissioning, rehabilitation of all areas disturbed must be undertaken and to this end a habitat restoration plan is to be developed by a rehabilitation	EO ECO Contractor Rehabilitation specialist	Decommissioning	Yes	No additional monitoring required.

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
		specialist and included within the Decommissioning Environmental Management Plan.				

6.9 BATS

OBJECTIVES

To ensure that impacts to bats are ameliorated.

INDICATOR AND COMPLIANCE MECHANISMS

The following indicator and compliance mechanisms are applicable:

- Induction training and records;
- Incident classification and reporting management procedure (to be developed);
- Environmental awareness programme/toolbox talks; and
- Bat monitoring procedure (to be developed)

MITIGATION AND MANAGEMENT MEASURES

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

	TERMS OF MITIGATION IMPLEMENTATION
Peak activity Met Mast (times to implement curtailment/ mitigation)	Met Mast (80m): 18 November – 01 February; sunset – 04:20
Environmental conditions in which to implement curtailment/ mitigation	Met Mast (80m): Wind speed below 5.5m/s and temperature above 12°C
Peak activity (times to implement curtailment/ mitigation)	Met Mast (10m): 25 November - 06 January; sunset – 22:00
Environmental conditions in which to implement curtailment/ mitigation	Met Mast (10m): Wind speed below 5.5m/s and temperature above 12°C
Peak activity (times to implement curtailment/ mitigation)	Met Mast (10m): 18 January – 22 March; sunset – 01:10
Environmental conditions in which to implement curtailment/ mitigation -	Met Mast (10m): Wind speed below 6.0m/s and temperature above 15.0°C
Peak activity (times to implement curtailment/ mitigation)	Met Mast (10m): 12 September – 29 October; sunset – 01:30
Environmental conditions in which to implement curtailment/ mitigation	Met Mast (10m): Wind speed below 6m/s and temperature above 9.5°C

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

- **Curtailment:**

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

- **Cut-in speed:**

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

- **Feathering or Feathered:**

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

- **Free-wheeling:**

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

- **Increasing cut-in speed:**

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

- **Acoustic deterrents:**

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

- **Light lures:**

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

- **Habitat modification:**

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

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

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

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

- Level 6 - Ninety degree feathering throughout the entire night.

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

6.10 AIR QUALITY MANAGEMENT

OBJECTIVES

To ensure that impacts to air quality of the surrounding environment are ameliorated.

INDICATOR AND COMPLIANCE MECHANISMS

The following indicator and compliance mechanisms are applicable:

- Complaints register
- Incident reporting system
- Health, safety, environmental and community incident and complaints management system register
- Incident Classification and Reporting Management Procedure (to be developed)
- Equipment, machinery and vehicle maintenance/inspection registers

MITIGATION AND MANAGEMENT MEASURES

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
EMP70	Dust	Before the commencement of any site works and during the operation, as much vegetation as possible should be retained, including patches and strips to minimise dust.	EO ECO Contractor	Construction De-commissioning	No	No additional monitoring required.
EMP71		Activities with high dust-causing potential, such as topsoil stripping, should not be carried out in sensitive areas during adverse wind conditions. When necessary, topsoil should be stripped in discrete sections, allowing buffer strips (windbreaks) between clearings.				
EMP72		Earth-moving works have the potential to generate large amounts of dust. Pre-planning of earth-moving works can reduce dust emissions by limiting the time the site is exposed. Options for dust control can include the following: → Plan earth-moving works so that they are completed just prior to the time they are needed → Observe weather conditions and do not commence or continue earth moving works if conditions are unsuitable e.g., under conditions of strong winds → Reduce off-site hauling via balanced cut and fill operations Pre-water areas to be disturbed				
EMP73		Material stockpiles are capable of generating large amounts of dust. In particular, fine materials stored in stockpiles can be subject to dust pick-up. Materials being loaded onto conveyor belts or into trucks are also potential sources of dust emissions. Dust emissions from material stockpiles can be minimised through the use of the following procedures: → Locate stockpiles in sheltered areas. Otherwise, stockpiles should be covered				

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
		→ Where stockpiles are located in open areas, limit the height and slope of the stockpiles to reduce wind pick up, orient stockpiles lengthwise into the wind so they offer the minimum cross-sectional area to prevailing winds, install wind barriers on three sides of the stockpile → Limit activity to the downwind side of the stockpile → Limit drop heights from loading facilities and use closed conveyors where possible Transfer points should also be minimised				
EMP74		Watering is a very effective short-term measure. However, its efficiency decreases as wind velocity and evaporation rate increase. Dust emissions can be minimised using the following watering procedures: → The surface should be dampened to prevent dust from becoming airborne but should not be wet to the extent of producing run-off. Alternatively, wetting agents could be used, particularly for non-wetting soils → Watering is more effective when undertaken prior to strong breezes → Use watering sprays on materials to be loaded and during loading In cases where severe water restrictions are imposed, other measures like the use of wetting agents such as chemical stabilisation or hydromulch, could be considered				
EMP75		Vehicles bearing open loads of potentially wind-borne materials must be covered or wet down in order to minimise dust entrainment				

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
EMP76	Volatile Organic Compounds and Other Emissions	All equipment, machinery and vehicles should be fitted with appropriate emission control equipment, are maintained frequently and serviced to the manufacturers' specifications	EO ECO Contractor Operator	Construction Operation De-commissioning	No	
EMP77		Ensure incident and complaint registers are established and maintained				
EMP78		Prohibit burning of waste or vegetation onsite				

6.11 NOISE MANAGEMENT

OBJECTIVES

To ensure that noise impacts to the surrounding environment are minimal or mitigated.

INDICATOR AND COMPLIANCE MECHANISMS

The following indicator and compliance mechanisms are applicable:

- Complaints register;
- Incident reporting system;
- Health, safety, environmental and community incident and complaints management system register;
- Incident classification and reporting management procedure (to be developed); and
- Equipment, machinery and vehicle maintenance/inspection registers.

MITIGATION AND MANAGEMENT MEASURES

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
EMP79	General Noise Management	Fit equipment, machinery and vehicles generating excessive noise with appropriate noise abatement measures and undergo regular maintenance to ensure optimum efficiency during operation	EO ECO Contractor Operator	Construction Operation	No	No additional monitoring required.
EMP80		Provide a complaints register to report any excessive noise incidents. Manage all complaints as per the Incident Classification and Reporting Management Procedure				
EMP81		Regular maintenance of equipment to reduce the generation of additional unwanted noise				
N1 N3	Acoustic impact on residential receptors during construction and de-commissioning	Plan construction activities in consultation with local communities so that activities with the greatest potential to generate noise are planned during periods of the day that will result in least disturbance. Information regarding construction activities should be provided to all local communities. Such information includes: → Proposed working times; → Anticipated duration of activities; → Explanations on activities to take place and reasons for activities; and → Contact details of a responsible person on site should complaints arise.	EO ECO Contractor	Construction De-commissioning	No	No additional monitoring required.
		When working near (within 500 m) a potential sensitive receptor, limit the number of simultaneous activities to a minimum as far as possible				

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
		Avoid or minimizing project transportation through community areas				
		Use noise control devices, such as temporary noise barriers and deflectors for impact and blasting activities, and exhaust muffling devices for combustion engines				
		Select equipment with the lowest possible sound power levels				
		Ensure equipment is well-maintained to avoid additional noise generation				
N2	Acoustic impact on residential receptors during operation	Operate turbines in reduced noise mode should any complaints be received (IFC, 2015)	EO ECO Operator	Operation	No	No additional monitoring required.
		Build walls/appropriate noise barriers around potentially affected buildings (IFC, 2015)				
		Limit turbine operations above the wind speed at which turbine noise becomes unacceptable in the project-specific circumstances (IFC, 2015)				
		Ensure a larger setback distance from potentially sensitive receptor locations				
		Consideration of installing larger capacity wind turbines, limiting the number of turbines to be installed but having the same power generation potential				
EMP82	Blasting	Should blasting activities be required, adequate blast management techniques should be employed. These include:	EO ECO	Construction	No	No additional monitoring required.

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
		→ Informing nearby residents as to when blasting will occur on a certain day at a given time; → Displaying highly visible blast notices along the roadside within a certain vicinity of the site in order to notify any passing receptors; → Not blasting after day-time hours; and → Not allowing any blasting activities at the turbine locations surrounding the Farmhouse 1 receptor, which is located in close proximity (500 m) to the proposed turbines	Contractor			

6.12 SITE OF CULTURAL, HERITAGE OR PALAEONTOLOGICAL SIGNIFICANCE

OBJECTIVES

To ensure that sites/artefacts of heritage or palaeontological value are identified and protected.

INDICATOR AND COMPLIANCE MECHANISMS

The following indicator and compliance mechanisms are applicable:

- → Health, safety, environmental and community incident and complaints management system register;
- → Chance Find Procedure (to be developed);
- → Incident Classification and Reporting Management Procedure (to be developed); and
- → Monitoring and audit reports

MITIGATION AND MANAGEMENT MEASURES

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
H1 H2 H3	Chance Finds	If any archaeological and/or historical sites, features or artefacts are discovered, a qualified archaeologist be called in to investigate the occurrence and the find must be reported to the South African Heritage Resources Agency (SAHRA).	EO ECO Contractor Project Manager	Planning Construction	Yes	Monitor incident register as to whether there have been any chance finds
		A Chance find procedure is to be drafted and implemented before the start of construction				
		Report high concentrations of stone artefacts				
		Report human remains				
H1 H2 H3	Impacts on archaeological and historical sites	The access road and underground cabling which run within a few metres of the Wolven Hoek farmhouse must be relocated. This will require careful placement, since there is a stone kraal on the opposite side of the road	EO ECO Contractor Project Manager	Construction	Yes	No additional monitoring required
		Since heritage resources (in particular LSA sites with pottery) are concentrated in the river valleys, it is important that access roads and underground cabling is carefully placed to avoid negative impacts to heritage sites along rivers. This will require a final walk down during the EMP phase, of all river crossings				
		The gravel farm road which bisects Drie Rode Heuvels, has cut through an historic ruined settlement, separating the ruins from the graveyard. Any widening of the gravel road will result in the destruction of the graves				
		If any human remains are uncovered during the excavations for the Wind Farm, work must stop in that area and SAHRA must be alerted immediately				

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
		Any abandoned farm buildings (such as Wolven Hoek) should be protected from vandalism during the operational phase of the wind farm. If there are any proposals for adaptive re-use of the building during the operational phase of the wind farm, then the provisions of the NHRA must be complied with regarding any restoration or renovation of the building.		Operational	Yes	
P1	Disturbance, damage or destruction of fossils	Monitoring of all surface clearance and substantial excavations (>1 m deep) by the ECO for fossil material (e.g. bones, teeth, fossil wood) on an on-going basis during the construction phase.	EO ECO Contractor Project Manager	Construction	Yes	No additional monitoring required
		Safeguarding of chance fossil finds (preferably in situ) during the construction phase by the responsible ECO, followed by reporting of finds to Heritage Western Cape (HWC)				
		Recording and judicious sampling of significant chance fossil finds by a qualified palaeontologist, together with pertinent contextual data (stratigraphy, sedimentology, taphonomy) (Phase 2 mitigation).				
		Curation of fossil material within an approved repository (museum / university fossil collection) and submission of a Phase 2 palaeontological heritage report to HWC by a qualified palaeontologist				

6.13 VISUAL IMPACT MANAGEMENT

OBJECTIVES

To ensure that the changes to the landscape character of the area are mitigated to minimise the negative impact.

INDICATOR AND COMPLIANCE MECHANISMS

The following indicator and compliance mechanisms are applicable:

- Health, safety, environmental and community incident and complaints management system register;
- Incident classification and reporting management procedure (to be developed); and
- Monitoring and audit reports.

MITIGATION AND MANAGEMENT MEASURES

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
EMP83	Detailed design and specification	Design structures and buildings close together in clusters as far as possible.	Design Team/ECO	Planning and Design	Yes	Specifications to be incorporated by Design Team and verified by ECO prior to construction.
		Cables and pipelines should be located underground wherever possible				
		Cluster or group turbines to break up overly long lines of turbines				
		Ensure that the revised alternative layout, with reduced number of turbines, and fewer turbines in elevated positions, is approved				
		Create visual order and unity among turbine clusters				

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
		Ensure uniformity in shape and colour of turbines				
		No corporate or advertising signage is to be permitted on turbines				
		Use non-reflective paints and coatings on turbines and other structures to minimise visibility and avoid reflectivity and glare				
		If security lighting is required: → Use light fixtures that provide precisely directed illumination; → If possible, use lighting that is activated only on movement of illegal entry to the site; → Avoid high pole top security lighting if possible				
		Specify wire mesh or Clear-Vu type fencing for perimeter fencing.				
		Signage related the project must be discreet and confined to the entrances				
V1 V2 V3 SE5	Site clearing	The construction footprint must be kept as small as possible, to avoid unnecessary disruption to the existing vegetation.	ECO Contractor	Construction	Yes	No additional monitoring required.
		No blanket clearing or removal of vegetation outside of the building zone is allowed				
V1		Site perimeter (building zone) must be clearly demarcated	ECO	Construction	Yes	

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
V2 V3 SE5	Excavation and construction of facility	The handling and transportation of materials which may generate dust must be avoided during high wind conditions	Contractor			
		Ground level at site boundary should remain natural ground level				
		The building site and construction facilities must be well maintained and strictly controlled				
		Dust and litter control measures must be included in the Environmental Management Programme				
		No dumping in unauthorised and/or highly visible areas is permitted				
V4 V5 V6 V7 V8 V9 SE11	Operations	Establishing vegetative screens /shelterbelts around affected homesteads should be considered in consultation with the owners.	ECO Contractor	Operational	No (only if acceptable to neighbouring land owner).	
		An ecologist (preferably the ecological specialist appointed to undertake the assessment) must be appointed to assist with the plant selection for vegetative screening				
		Natural vegetation must be re-established on disturbed areas after construction;				
		Roads and drainage for runoff should be appropriately stabilised to avoid erosion and visual scars.			Yes	
		Turbines must be kept in good repair and cleaned as required.				

Ref	Impact / Activity	Mitigation and Management Measure	Responsible Person	Applicable Development Phase	Include as Condition of Authorisation	Additional Monitoring requirements
V10	Rehabilitation	A detailed rehabilitation plan must be prepared.	ECO Contractor	Decommissioning	Yes	
		An ecologist must be appointed to assist with the plant selection and methods for vegetative rehabilitation				
		Mitigation measures applicable to the construction phase are also applicable to decommissioning			No	

6.14 HEALTH AND SAFETY

OBJECTIVES

- To ensure communication with members of the public to promote safety awareness;
- To prevent public access to construction sites and storage areas; and
- To ensure safety for all onsite personnel.

INDICATOR AND COMPLIANCE MECHANISMS

The following indicator and compliance mechanisms are applicable:

- Induction training and records
- Health, safety, environmental and community incident and complaints management system register
- Monitoring and audit reports
- Incident classification and reporting management procedure (to be developed)
- PPE register
- Occupational health and safety plan (to be developed)

→ Health and safety protocol (to be developed)

MITIGATION AND MANAGEMENT MEASURES

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
EMP84	Health and Safety	All onsite personnel are required to undergo induction training and regular toolbox talks in order to raise awareness of the conditions contained herein	SHE Officer Contractor Operator	Construction Operation	No	No additional monitoring required.
EMP85		Safety conditions are to be monitored during construction. Continuous monitoring will be undertaken by the SHE Officer will audit monthly.	SHE Officer	Construction		
EMP86		Develop and implement an occupational health and safety plan	SHE Officer Operator	Construction Operation		
EMP87		The appointed contractor will be responsible for the development of a comprehensive health and safety protocol which must be adhered to	Contractor	Construction		
EMP88		Provide and wear appropriate PPE onsite	SHE Officer Contractor Operator	Construction Operation		
EMP89		Train all onsite personnel handling chemical or hazardous substances in the use of such substances and the environmental, health and safety consequences of incidents				
EMP90		Provide onsite personnel with sufficient potable water for drinking				
EMP91	Public Safety	Restrict public access	Contractor Operator	Construction Operation		

6.15 SOCIO-ECONOMIC IMPACT MANAGEMENT

OBJECTIVES

- To ensure that the negative socio-economic impacts are mitigated and managed; and
- To ensure that the positive economic impacts are enhanced.

INDICATOR AND COMPLIANCE MECHANISMS

The following general indicator and compliance mechanisms are applicable:

- Induction training and records;
- Health, safety, environmental and community incident and complaints management system register;
- Monitoring and audit reports;
- Incident classification and reporting management procedure (to be developed);
- PPE register;
- Occupational health and safety plan;
- Health and safety protocol;
- HIV/AIDS awareness and prevention program;
- Trafficking in persons awareness programme;
- Business and skills development plan (to be developed);
- Grievance mechanism.

The following project specific indicator and compliance requirements are applicable:

- Local employment and business targets to be formalised in a document before the construction phase commences;
- Database of potential local service providers to be developed, before the construction phase commences;
- 40% of the construction labour and 60% during operation could be sourced locally;

- Record of engagement with the Laingsburg Local Municipality and community representatives in respect of employment opportunities and community upliftment projects;
- Engagement with the Khâi-Ma Local Municipality and local enterprises in respect of accommodation of labour;
- Health and Safety Plan prepared and implemented during the construction phase;
- HIV/AIDS campaign implemented throughout the construction and operations phase;
- Evidence of workforce transportation home during and after construction phase;
- Number of complaints raised by stakeholders;
- Code of conduct for workers in place, signed, and implemented; and
- Retrenchments meet South African Labour legislation.

MITIGATION AND MANAGEMENT MEASURES

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
SE1 SE2 SE9 SE10 SE13 SE14	Maximise local employment and business opportunities	Appointment of local contractors and use of local suppliers and manufacturers where possible.	Project Manager Contractor ECO	Construction Operational Decommissioning	Yes	No additional monitoring required
		Development of a database of local companies for service provision				
		Target 40% of the construction labour and 60% during operation particularly semi and unskilled opportunities could be sourced locally.				
		Communication with Karoo Hoogland Local Municipality and community representatives in respect of employment opportunities.				
		Ongoing engagement with the Karoo Hoogland Local Municipality in respect of anticipated community investment and upliftment projects.				

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
		Review of Department of Labour skills audits and undertake relevant skills development programmes targeted at local community members.				
SE3	Minimise disruption caused by influx of job seekers	Communicate employment opportunities to Karoo Hoogland Local Municipality and community representatives in order to manage employment expectations as far as possible and to allow these parties to manage potential issues associated with influx of people.	Project Manager Contractor ECO	Construction Operational Decommissioning	Yes	
		Engage with, and gain support from, the Karoo Hoogland Local Municipality in respect of accommodation of labour brought into the area by contractors / developers.				
SE4	Minimise the increase in communicable diseases and reduced public health	Preparation and implementation of a labour force Health and Safety Plan.	Project Manager Contractor ECO	Construction	No	
		In consultation with local HIV/AIDS organisations and government structures all contractors must design and implement a proactive and ongoing HIV/AIDs awareness and prevention campaign.			Yes	
		Provide opportunities for workers to go home over the weekends or regularly. The cost of transporting workers home and back should be the responsibility of the contractor			No	
		All workers are to be transported back to their homes within 2 days of completion of the construction contract at the cost of the contractor			No	
SE6	Minimise nuisance from	Implement EMPr conditions in respect of mitigating dust, noise and traffic related impacts	ECO	Construction	No	

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
SE14	dust, noise and traffic	Establish a grievance mechanism to provide a means for affected stakeholders to communicate	Contractor Project Manager	Decommissioning		
SE7 SE15	Minimise risk to neighbouring land users	Development of a code of conduct for workers, signed by the contractor, and communicated to work force. Contractor to be held liable for compensating farmers for any losses / damage that can be linked to workers.	ECO Contractor	Construction Decommissioning	No	
SE8 SE16	Minimise risk of veld fires	No open fires allowed for cooking / heating; Activity that pose a fire risk to be properly managed and confined to a designated area; Adequate fire-fighting equipment to be provided on site, and appropriate training conducted; etc.	ECO Contractor	Construction Decommissioning	No	
SE12	Minimise impacts of loss of permanent employment	Relocation of employees to other renewable energy facilities where possible Provision of adequate retrenchment packages, that as a minimum meet relevant South African Labour legislation.	Project Manager	Decommissioning	No	

6.16 TRAFFIC MANAGEMENT

OBJECTIVES

To ensure that the traffic impacts of the project are mitigated and managed.

INDICATOR AND COMPLIANCE MECHANISMS

The following indicator and compliance mechanisms are applicable:

- Induction training and records;
- Health, safety, environmental and community incident and complaints management system register;
- Monitoring and audit reports;
- Incident classification and reporting management procedure (to be developed);
- PPE register;
- Occupational health and safety plan;
- Health and safety protocol; and
- Traffic and transportation management plan.

MITIGATION AND MANAGEMENT MEASURES

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
T2 T3	Traffic Management	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 to 60km/h in advance of the site access roads	Project Manager Contractor ECO	Construction Decommissioning	No	No additional monitoring required.
T2 T3		Intersection warning signs must be erected either side of the access roads in accordance with the requirements of the South African Road Traffic Signs Manual and it is recommended that supplementary warning plates be added to these warning signs indicating the presence of heavy vehicles at the intersection. The aforementioned road signs are shown below:				

Ref	Impact / Activity	Mitigation and Management Measure	Responsible Person	Applicable Development Phase	Include as Condition of Authorisation	Additional Monitoring requirements
						
T2 T3		The additional loading due to the project is not very high, but is likely to accelerate the deterioration of the existing surfacing.				Monitor intersections and roads for deterioration and repair as necessary
T2 T3		The transport route/s of the construction materials, components and any oversized/weight components may be National, Provincial or Local roads; and approval will have to be obtained from each authority for the transportation of any oversized or abnormally heavy components.				No additional monitoring required.
T2 T3		Construction vehicles should only use the roads during daylight hours. No construction vehicles should be operational from 6pm to 6am				
T1 T2 T3		All heavy vehicles should ensure that their headlights are on to increase their visibility to other vehicles and pedestrians				
T1 T2		All drivers should comply with the relevant traffic laws and regulations				

REF	IMPACT / ACTIVITY	MITIGATION AND MANAGEMENT MEASURE	RESPONSIBLE PERSON	APPLICABLE DEVELOPMENT PHASE	INCLUDE AS CONDITION OF AUTHORISATION	ADDITIONAL MONITORING REQUIREMENTS
T3						

7 MANAGEMENT PLANS

A number of management plans have been requested by the DEA to be included in the EMPr. It must be noted that many of these plans cannot be compiled until detailed designs have been completed for the proposed project. Detailed designs will only be completed in the event that the project is identified as a preferred bidder in terms of the REIPPPP.

The plans included below provide an indication of the requirements that should be included in the site specific plans to be compiled at a later stage.

7.1 ALIEN INVASIVE MANAGEMENT PLAN

Invasive alien species pose the second largest threat to biodiversity after direct habitat destruction. The purpose of this Plan is to provide a framework for the management of alien and invasive plant species during the construction and operation of the project, which in turn serves to manage open spaces, as required. The broad objectives of the plan include the following:

- Ensure alien plants do not become dominant in parts or the whole site through the control and management of alien and invasive species presence, dispersal and encroachment.
- Managing and maintaining the ecosystem in a near-natural state and restoring and/or rehabilitating the ecosystems to such a state.
- Develop and implement a monitoring and eradication programme for alien and invasive species.
- Promote the natural re-establishment and planting of indigenous species in order to retard erosion and alien plant invasion.

Mitigation and management measures include, but are not limited to the following:

- Stockpiles should be kept clear of weeds and alien vegetation growth by regular weeding.
- Alien vegetation and the spread of exotic species on the site will need to be controlled.
- The contractor should be responsible for implementing a programme of weed control (particularly in areas where soil has been disturbed); and grassing of any remaining stockpiles to prevent weed invasion.
- Herbicide use shall only be allowed according to contract specifications. The application shall be according to set specifications and under supervision of a qualified technician. The possibility of leaching into the surrounding environment shall be properly investigated and only environmentally friendly herbicides shall be used.
- The use of pesticides and herbicides on the site must be discouraged as these can impact on important pollinator species of indigenous vegetation.
- Six monthly checks of the area should take place for the emergence of invader species.
- Mitigation measures mentioned for the construction phase above must be implemented for any maintenance of the development that may be undertaken during the operation phase.
- Correct rehabilitation with locally indigenous species.
- Monitoring programme to ensure that rehabilitation efforts are successful to ensure that risks such as erosion, spread of exotic species and the edge effect are avoided.

- Constant maintenance of the area to ensure re-colonisation of floral species.
- Regular removal of alien species which may jeopardise the proliferation of indigenous species.

7.2 PLANT RESCUE AND PROTECTION PLAN

The purpose of the plant rescue and protection plan is to implement avoidance and mitigation measures, in addition to the mitigation measures included in the EMPr to reduce the impact of the development of the project on listed and protected plant species and their habitats, and to provide guidance on search and rescue of species of conservation concern.

Mitigation and management measures include, but are not limited to the following:

- Vegetation clearing should only commence after a walk down has been conducted by a suitably qualified ecologist / botanist and the necessary permits obtained.
- Vegetation clearing to be kept to a minimum. No unnecessary vegetation to be cleared.
- Vegetation removal must be limited to the construction site and should be removed only as it becomes necessary rather than removing all the vegetation throughout the site at once
- Materials should not be delivered to the site prematurely which could result in additional areas being cleared or affected.
- No vegetation to be used for firewood.
- Gathering of firewood, fruit, medicinal plants, or any other natural material onsite or in areas adjacent to the site is prohibited unless with prior approval of the ECO.
- Construction site office and laydown areas must be clearly demarcated and no encroachment must occur beyond demarcated areas.
- All natural areas impacted during construction must be rehabilitated with locally indigenous plant species.
- A buffer zone should be established in areas where construction will not take place to ensure that construction activities do not extend into these areas.
- The use of pesticides and herbicides in the study area must be discouraged as these impacts on important pollinator species of indigenous vegetation.
- Soil stockpiles must not become contaminated with oil, diesel, petrol, garbage or any other material, which may inhibit the later growth of vegetation in the soil. Spillage can result in a loss of soil functionality thus limiting the re-establishment of flora

7.3 RE-VEGETATION AND HABITAT REHABILITATION PLAN

The purpose of the rehabilitation plan is to ensure that areas cleared or impacted during construction activities are rehabilitated with a plant cover that reduces the risk or erosion from these areas as well as restores some ecosystem function. The purpose of the rehabilitation plan for the site can be summarised as follows:

- Achieve long-term stabilisation of all disturbed areas to minimise erosion potential.
- Re-vegetate all disturbed areas with suitable local plant species.
- Minimise visual impact of disturbed areas.
- Ensure that disturbed areas are safe for future uses

Mitigation and management measures include, but are not limited to the following:

- Re-vegetation should aim to accelerate the natural succession processes so that the plant community develops in the desired way, i.e. promote rapid vegetation establishment
- Re-vegetation of disturbed surfaces should occur immediately after construction activities are completed. This should be done through seeding with locally indigenous species typical of the representative botanical unit.
- Re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to construction.
- Seeds from surrounding seed banks can be used for re-seeding.
- Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas.
- Planting of indigenous tree species in areas not to be cultivated or built on must be encouraged.
- Habitat destruction should be limited to what is absolutely necessary for the construction of the infrastructure, including the construction of new roads. In this respect, the recommendations from the Ecological Specialist Study should be applied strictly. Personnel should be adequately briefed on the need to restrict habitat destruction, and must be restricted to the actual construction area.
- Monitoring programme to ensure that rehabilitation efforts are successful to ensure that risks such as erosion, spread of exotic species and the edge effect are avoided.

7.4 OPEN SPACE MANAGEMENT PLAN

Open space management measures include, but are not limited to the following:

- A buffer zone should be established in areas where construction will not take place to ensure that construction activities do not extend into these areas.
- Vehicle movement should be restricted to authorised access roads.
- Before construction begins, all areas to be developed must be clearly demarcated.
- All construction camps are to be fenced off in such a manner that unlawful entry is prevented and access is controlled.
- Signage shall be erected at all access points in compliance with all applicable occupational health and safety requirements. All access points to the construction camp should be controlled by a guard or otherwise monitored, to prevent unlawful access.
- The contractor and ECO must ensure compliance with conditions described in the EA.
- Records of compliance/ non-compliance with the conditions of the authorisation must be kept and be available on request.
- Records of all environmental incidents must be maintained and a copy of these records be made available to provincial department on request throughout the project execution.
- All construction equipment must be stored within the construction camp.
- An area for the storage of hazardous materials must be established that conforms to the relevant safety requirements and that provides for spillage prevention and containment
- The Contractor must provide sufficient ablution facilities, in the form of portable / VIP toilets, at the construction camps, and shall conform to all relevant health and safety standards and codes. A sufficient number of toilets shall be provided to accommodate the number of personnel working in the area.
- No fires will be allowed

- The Contractor shall take specific measures to prevent the spread of veld fires, caused by activities at the campsites. These measures may include appropriate instruction of employees about fire risks and the construction of firebreaks around the site perimeter.
- Environmental awareness training for construction staff, concerning the prevention of accidental spillage of hazardous chemicals and oil; pollution of water resources (both surface and groundwater), air pollution and litter control and identification of archaeological artefacts.
- Staff should be educated as to the need to refrain from indiscriminate waste disposal and/or pollution of local soil and water resources and receive the necessary safety training.

7.5 TRAFFIC AND TRANSPORT MANAGEMENT PLAN

The purpose of a Traffic and Transportation Management Plan is to address regulatory compliance, traffic management practices, and protection measures to help reduce impacts related to transportation and the construction of temporary and long-term access within the vicinity of the project site. The objectives of this plan include the following:

- To ensure compliance with all legislation regulating traffic and transportation within South Africa National, Provincial, Local and associated guidelines.
- To avoid incidents and accidents while vehicles are being driven and while transporting personnel, materials, and equipment to and from the project site.
- To raise greater safety awareness in each driver and to ensure the compliance of all safe driving provisions for all the vehicles.
- To raise awareness to ensure drivers respect and follow traffic regulations.
- To avoid the deterioration of access roads and the pollution that can be created due to noise and emissions produced by equipment, machinery, and vehicles

Mitigation and management measures include, but are not limited to the following:

- All vehicles used during the transport of materials and in the construction activities are required to be roadworthy per the National Road Traffic Act (NRTA) and display all pertinent certificates as required.
- All vehicles travelling to and from the site shall adhere to all laws imposed by the law enforcement agencies, and shall comply with any requests made by the law enforcement officials.
- For each convoy of abnormal vehicles/loads a designated safety officer shall be nominated. All abnormal vehicles and loads to be transported are required to have a valid permit before any trip is begun.
- The route should be assessed to determine if any structures or vegetation need to be temporarily or permanently relocated so as to avoid damage to the load as well as public and private property during the trips.
- A designated transport coordination manager should be appointed to oversee and manage the traffic safety officers. Additionally, the designated transport coordination manager should inform and keep up-to-date the interested and affected parties of all the activities taking place that may have a direct impact on them.
- A traffic safety officer shall be nominated to make all the necessary arrangements to maintain the required traffic measures for the duration of the project as outlined in the “Standard Specifications for Road and Bridge Works for State Road Authorities,’ 1998 edition. The safety officer shall liaise daily with the transportation coordination manager to keep them apprised of the state of all the traffic arrangements.

- All construction vehicles that are entering the site shall also be available via radio or telephone communication to the transport coordination manager. So that in the event of an emergency, all vehicles can be accounted for.
- All vehicles shall comply with the posted speed limits on public roads as well as the speed limits within the development. For additional speed limits that are imposed on the construction traffic, refer to the South African Road Traffic Signs Manual (SARTSM), Volume 2, June 1999 for the restrictions.
- All construction traffic shall comply with the legal load requirements as outlined in the National Road Traffic Act and National Road Traffic Regulations.
- Construction traffic entering the site along public roads should be limited to times when peak hour traffic can be avoided. The peak traffic occurs during 7h00 to 8h30, and 16h00 to 17h30. Construction traffic can also be restricted further to avoid travelling on public holidays, long weekends, or at night.
- The South African Road Traffic Signs Manual (SARTSM), Volume 2, June 1999 is to be used for all traffic during the construction activities of the proposed project.
- During periods of high construction traffic entering and exiting the site, it is recommended that flagmen help direct the traffic. This will enable the safe movement of construction and public traffic at the entrance and reduce the number of potential conflicts.

7.6 STORM WATER MANAGEMENT AND SURFACE WATER PROTECTION PLAN

A Storm Water Management and Surface Water Protection Plan cannot be compiled until the detailed designs are complete, which will only take place in the event that the project is identified as a preferred bidder as part of the REIPPP. It is stipulated in this EMPr that a Storm Water Management Plan must be compiled before any construction commences and implemented during the construction phase. This plan must indicate how all surface runoff generated as a result of the project and associated activities (during both the construction and operational phases) will be managed prior to entering any natural drainage system or wetland and how surface water runoff will be retained outside of any demarcated buffer zones and subsequently released to simulate natural hydrological conditions.

7.7 FIRE MANAGEMENT PLAN

The purpose of this plan is to address firefighting requirements throughout the construction of the project and to preserve and protect human life as well as tangible goods and equipment in the event of a fire.

Mitigation and management measures include, but are not limited to the following:

- All construction camps shall be provided with portable fire extinguishing equipment, in accordance with all relevant legislation and must be readily accessible.
- The Contractor shall take specific measures to prevent the spread of veld fires, caused by activities at the campsites. These measures may include appropriate instruction of employees about fire risks and the construction of firebreaks around the site perimeter.
- Fire prevention facilities must be present at all storage facilities.
- No open fires shall be allowed on site under any circumstance. All cooking shall be done in demarcated areas that are safe and cannot cause runaway fires.
- The Contractor shall have operational fire-fighting equipment available on site at all times. The level of firefighting equipment must be assessed and evaluated through a typical risk assessment process.

- Emergency numbers for local police and fire department etc. must be placed in a prominent area.
- Firefighting equipment must be placed in prominent positions across the site where it is easily accessible. This includes fire extinguishers, a fire blanket as well as a water tank.
- All construction staff must be trained in fire hazard control and firefighting techniques. Translators are to be used where necessary.
- All flammable substances must be stored in dry areas which do not pose an ignition risk to the said substances.
- Smoking may only be conducted in demarcated areas.
- Firefighting equipment must be regularly maintained by an appropriate company.

7.8 EMERGENCY RESPONSE PLAN

The Project Company will provide appropriate resources to respond to process upset, accidental, and emergency situations for operations and activities during construction, operation and decommissioning phases. The procedures will include plans for addressing training, resources, responsibilities, communication and all other aspects required to effectively respond to emergencies associated with their respective hazards.

All operations/ activities associated with the project will require site-specific emergency response plans to mitigate impacts, which meet or exceed all applicable regulations.

The objectives of this plan are as follows:

- Protect the communities and the environment through the development of emergency response strategies and capabilities;
- Set out the framework for hazard identification in order to define procedures for response to the situations including the development of contingency measures;
- Structure a process for rapid and efficient response to and manage emergency situations during the construction, operational and decommissioning phases of the project; and
- Assign responsibilities for responding to emergency situations.

ROLES AND RESPONSIBILITIES

With respect to this plan, the Project Company has the responsibility to:

- Provide emergency response services and to structure and coordinate emergency response procedures for the project;
- Ensure that specific emergency responsibilities allocated to them are organised and undertaken; and
- Ensure that employees and contractor third parties are trained and aware of all required emergency procedures.

EMERGENCY COMMUNICATIONS AND COORDINATION PLAN

In an emergency situation where there is an immediate threat to communities, personnel or the environment, the Project Manager will be notified immediately. The Project Manager will dispatch the Emergency Response Coordinator who will determine the appropriate plan of action depending on the severity of the emergency, the people affected, and the need to evacuate.

If there is a developing emergency or unusual situation, where an emergency is not imminent, but could occur if no action is taken, the Project Manager (or if the Project Manager is absent the Environmental Manager) is to be informed immediately. Once the emergency or unusual situation has been managed, the correct incident/near miss must be reported to the General Manager.

If an emergency situation poses a direct threat to communities in the area, the Environmental Officer and/or Social Officer will advise persons in the vicinity of the emergency to evacuate due to the potential risk. The appropriate government authorities will immediately be notified of such an emergency evacuation. The Emergency Response Coordinator will be tasked with responding to the potential risk. Should the emergency situation be such that it can be managed by the Project Company, equipment and personnel will be deployed to the maximum extent necessary, so as to prevent/minimise potential risks.

RESPONSE TO INCIDENTS

An incident is any occurrence that has caused, or has the potential to cause, a negative impact on people, the environment or property (or a combination thereof). It also includes any significant departure from standard operating procedures. The reporting and investigation of all potential and actual incidents that could have a detrimental impact on human health, the natural environment or property is required so that remedial and preventive steps can be taken to reduce the potential or actual impacts because of all such incidents.

The actions resulting from any formal or informal investigations will be used to update the EMPr.

BUDGET FOR EMERGENCY RESPONSE

Costs for emergency response and management will be included in the capital expenditure budget for the construction phase and operational budget for the operational and decommissioning phases of the project.

VERIFICATION

An environmental emergency response system will be developed for the execution of emergency drills that will include the following, inter alia:

- Fire Drills;
- Emergency Evacuation Drills; and
- Medical and Environmental Drills.

Reporting and monitoring requirements for the plan will include:

- Monthly inspections and audits;
- Quarterly reporting of accidents/ incidents;
- Reporting at the time of the incident and monthly spill reporting developed by the Environmental and Quality, Health and Safety departments;
- Bi-annual emergency response drills; and
- Annual reporting on training.

Emergency response drills and reporting will be maintained by the Project Manager and will provide information regarding required revisions to training or the emergency response actions. Each incident reported will be reviewed and investigated upon occurring. Actions will be identified where possible to improve the site's overall response to emergencies. Updates/revisions that are necessary to protect worker or community health and safety will be implemented immediately after

approval by the General Manager. On a bi-annual basis, Key Performance Indicators (KPIs) will be compared against past-performance and analysed for trends to determine if there are areas for improvement. Changes because of the trend analysis and identified areas for improvement will be implemented following the project's change management system as required.

This plan will be amended periodically in light of operational changes, learning experienced during its implementation and other activities that can affect the risk profiles.

7.9 EROSION MANAGEMENT PLAN

Exposed and unprotected soils are the main cause of erosion in most situations. Therefore, this erosion management plan and the revegetation and rehabilitation plan are closely linked to one another and should not operate independently, but should rather be seen as complementary activities within the broader environmental management of the site and should therefore be managed together. This Erosion Management Plan addresses the management and mitigation of potential impacts relating to soil erosion, including:

- Material stockpiled for long periods (2 weeks) should be retained in a bermed area.
- Stockpiles not used in three (3) months after stripping must be seeded to prevent dust and erosion.
- Sensitive areas need to be identified prior to construction so that the necessary precautions can be implemented.
- Vegetation clearance should be phased to ensure that the minimum area of soil is exposed to potential erosion at any one time.
- Areas to be cleared must be clearly demarcated and this footprint strictly maintained.
- Areas which are not to be constructed on within two months must not be cleared to reduce erosion risks.
- Silt fences and erosion control measures must be implemented in areas where these risks are more prevalent.
- Wind screening and stormwater control should be undertaken to prevent soil loss from the site.
- Other erosion control measures that can be implemented are as follows:
  - Brush packing with cleared vegetation
  - Mulch or chip packing
  - Planting of vegetation
  - Hydroseeding / hand sowing
- All erosion control mechanisms need to be regularly maintained.
- Seeding of topsoil and subsoil stockpiles to prevent wind and water erosion of soil surfaces.
- Re-vegetation of disturbed surfaces should occur immediately after construction activities are completed. This should be done through seeding with indigenous grasses.
- No impediment to the natural water flow other than approved erosion control works is permitted.
- To prevent stormwater damage, the increase in stormwater run-off resulting from construction activities must be estimated and the drainage system assessed accordingly.

7.10 HAZARDOUS SUBSTANCES MONITORING SYSTEM

The following mitigation and management measures are applicable to the handling of hazardous substances on site:

- An area for the storage of hazardous materials (including oils, paints, grease, fuels, chemicals) must be established that conforms to the relevant safety requirements and that provides for spillage prevention and containment.
- Environmental awareness training for construction staff, concerning the prevention of accidental spillage of hazardous chemicals and oil; pollution of water resources (both surface and groundwater), air pollution and litter control.
- Spill kits must be available at construction areas.
- Pollution prevention measures for storage should include a bund wall high enough to contain at least 110% of any stored volume, and this should be sited away from drainage lines in a site with the approval of the Project Manager. The bund wall comply with the relevant SANS standards
- Storage facilities (including any tanks) must be on an impermeable surface that is protected from the ingress of storm water from surrounding areas in order to ensure that accidental spillage does not pollute local soil or water resources.
- An approved waste disposal contractor must be employed to remove and recycle waste oil, if practical.
- The contractor must ensure that its staff is made aware of the health risks associated with any hazardous substances used and has been provided with the appropriate protective clothing/equipment in case of spillages or accidents and have received the necessary training.
- Where contamination of soil is expected, analysis must be done prior to disposal of soil to determine the appropriate disposal route. Proof from an approved waste disposal site where contaminated soils are dumped if and when a spillage / leakage occur should be attained and given to the project manager.
- Topsoil and subsoil to be protected from contamination. This should be monitored on a monthly basis by a visual inspection of diesel/oil spillage and pollution prevention facilities.
- Concrete and chemicals must be mixed on an impervious surface and provisions should be made to contain spillages or overflows into the soil.
- Relevant departments and other emergency services should be contacted in order to deal with spillages and contamination of aquatic environments.
- Soils must be kept free of petrochemical solutions that may be kept on site during construction. Spillage can result in a loss of soil functionality thus limiting the re-establishment of flora.

7.11 GRIEVANCE MECHANISM

The Grievance Mechanism will be compiled in the event that the project is identified as a preferred bidder as part of the REIPPPP. The International Finance Corporation (IFC) Performance Standards on Environmental and Social Sustainability (IFC, 2012) require a “Grievance Referral and Redress Mechanism” (GRRM) which must be:

- Accessible;
- Appropriate;
- Advertised; and
- People must use it without fear of prejudice.

The ‘Grievance Mechanism’ mechanism will provide for:

- Opportunities for all stakeholders to have access to information related to the project, and report issues and complaints directly to the developer and / or relevant contractors – e.g. hotline, post box, communicating email and telephone numbers through billboards, etc.;

- Notification of key community leaders and stakeholders of activities on site that could impact the neighbouring land users and stakeholders; and
- A feedback mechanism for contractors or developers to respond to issues raised by stakeholders.

The Grievance Mechanism will be implemented for the duration of the all phases of the project. The aim of the grievance mechanism will be to:

- Receive and register external communications;
- Screen and assess the issues raised and determine how to address them;
- Provide, track, and document responses (if any); and
- Adjust the management programme to meet/respond to the issues raised

7.12 HIV/AIDS MANAGEMENT PLAN

The HIV/AIDS management plan will be compiled in the event that the project is identified as a preferred bidder as part of the REIPPPP. This plan must be compiled in consultation with the Laingsburg Local Municipality.

8 CONCLUSION

BioTherm has proposed the development of up to three 250 MW Wind Energy Projects within the Western Cape and a portion of the Northern Cape, namely Maralla East, Maralla West and Esizayo Wind Energy Projects. This EMPr is specific to the Maralla West WEF.

The S&EIR process assessed both biophysical and socio-economic environments and identified appropriate management and mitigation measures. The biophysical impact assessment revealed that there are no environmental fatal flaws and no significant negative impacts associated with the proposed project should mitigation and management measures be implemented. In addition, it should be noted that the overall socio-economic impacts associated with the project are positive and include the creation of job opportunities and contributions to the local, regional and national economies.

WSP | Parsons Brinckerhoff is of the opinion that provided this project is mitigated, as per the mitigation and management measures outlined in this EMPr, the project will result in impacts that should not negatively affect the environment. It is the applicant's responsibility to ensure that this EMPr is made binding on the contractor by including the EMPr in the contract documentation. The contractor should thoroughly familiarise himself with the requirements of the EMPr and appoint an EO to oversee the implementation of the EMPr on a day-to-day basis. In addition, the applicant should appoint an external ECO to undertake monthly compliance audits against the requirements of the EMPr as well as the EA.

Parties responsible for transgression of this EMPr should be held responsible for any corrective actions that may need to be undertaken. Parties responsible for environmental degradation through irresponsible behaviour/negligence should receive penalties.

WSP | Parsons Brinckerhoff is of the opinion that should the identified mitigation and management measures be implemented, the proposed project ought to proceed to provide the following opportunities:

- The Maralla West WEF project will be economically beneficial at the local and regional level through job creation, procurement of materials and the provision of services and other downstream economic development;
- The Maralla West WEF project will serve to diversify the economy and electricity generation mix through the addition of renewable (solar) power; and
- The establishment of Maralla West WEF will provide numerous opportunities for skills transfer and development within the local area.