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Hendrina South Wind Energy Facility and Associated Infrastructure

On various Portions of the Farms Dunbar 189 IS, Hartebeestkuil 185 IS, Uitgezocht 194 IS and Weltevreden 193 IS,

Mpumalanga Province

Environmental Management Programme (EMPr)

Reference Number:
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Prepared for:		Completed by independent EAP	
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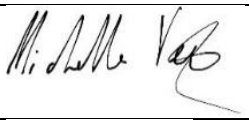
Internal Review:	Michelle Venter Cert. Sci. Nat Registered EAP		Internal Review	06/07/2022
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ACRONYMS AND ABBREVIATIONS

ACRONYM:	DESCRIPTION:
AADT	Annual Average Daily Traffic
ATNS	Air Traffic Navigational Services
BBBEE	Broad-based black economic empowerment
BESS	Battery Energy Storage System
CA	Competent Authority
CBA	Critical Biodiversity Area
COD	Commercial operation date
CV	Curriculum Vitae
CVB	Channelled Valley Bottom
DEA	Department of Environmental Affairs
DFFE	Department of Forestry, Fisheries and Environment
DM	District Municipality
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EAPASA	Environmental Assessment Practitioner's Association of South Africa
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EO	Environmental Officer
EPAP	Equator Principles Action Plan
EPC	Engineering, Procurement and Construction
ESAs	Ecological Support Area
FTE	Full time equivalent
HCS	Hazardous chemical substances
HGM	Hydro-Geomorphic
I&APs	Interested and Affected Parties
IPP	Independent Power Producer
IRP	Integrated Resource Plan
LILO	Loop-in-loop-out
m/s	Metres per second
mamsl	Metres above mean sea level
mbs	Below surface
MBSP	Mpumalanga Biodiversity Sector Plan
MSDS	Material Safety Data Sheets
MTPA	Mpumalanga Tourism and Parks Agency
MW	Mega Watt
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act, 1999 (Act No 25 of 1999)
NSR	Noise Sensitive Receptor

ACRONYM:	DESCRIPTION:
O&M	Operations and Maintenance
PES	Present Ecological Status
RAMS	Road Asset Management System
REIPPP	Renewable Energy Independent Power Producer Programme
SABAP2	South African Bird Atlas Project
SACNASP	South African Council for the Natural Scientific Professions
SAHRA	South African Heritage Resources Agency
SANS	South African National Standard
SCC	Conservation Concern
SMME	Small Medium and Micro Enterprise
SPV	Special-purpose vehicle
STLM	Steve Tshwete Local Municipality
SWMP	Stormwater Management Plan
UVB	Unchanneled Valley-Bottom
WEF	Wind Energy Facility

1 Introduction

ENERTRAG South Africa (Pty) Ltd (the Developer) proposes the development of the Hendrina Renewable Energy Complex (the Complex), comprising of four separate Projects each of which is the subject of a separate application for Environmental Authorisation (EA). The Projects are:

- Hendrina North Wind Energy Facility (up to 200MW) over 3600ha;
- **Hendrina South Wind Energy Facility (up to 200MW) over 2900ha;** (this application)
- Hendrina North Grid Infrastructure (up to 275kV) – 15km; and
- Hendrina South Grid Infrastructure (up to 275kV) – 16km.

This report is the Environmental Management Programme (EMPr) for the Hendrina South Wind Energy Facility (WEF) and associated infrastructure (The Project).

The Developer has established a Special Purpose Vehicle (SPV), who will be the Applicant for this Project, namely Hendrina South Wind Energy Facility (RF) Pty Ltd (The Applicant).

1.1 Background Information

The Project comprises up to 26 wind turbines with a generation capacity of up to 200MW of electricity, and supporting infrastructure, including a substation with battery energy storage system (BESS), Operations and Maintenance (O&M) Building, temporary construction camps with cement batching plants, temporary laydown areas and internal roads and cables.

The Project involves the undertaking of Listed Activities identified in the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) and as such require an Environmental Authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) before being undertaken.

Should the outcome of the approval process be positive, it is the Applicant's intention to bid the project into future Renewable Energy Independent Power Producer Programme (REIPPP) rounds, in line with the Integrated Resource Plan (IRP) – renewable wind energy.

1.2 Purpose of this Report

The purpose of the EMPr is to specify the proposed management, mitigation, protection or remedial measures that must be implemented to address the environmental impacts that have been identified in the EIA Report for the Project.

The EMPr is a considered a working document to enable effective environmental management at the Project Site, throughout all phases of the development (if approved).

The Developer, Applicant, contractors and subcontractors and visitors to the site will be subject to the provision of the EMPr.

The EMPr also contains the criteria against which environmental performance and compliance must be measured during the various phases of the Project.

1.3 Structure of this Report

The required content of an EMPr is provided in Appendix 4 of the EIA Regulations, 2014 (as amended), and shown in Table 1 with cross-references to the relevant section(s) of this report.

Table 1: Structure of the EMPr

No	Requirement	Section of this report
1	An EMPr must comply with section 24N of the Act and include—	
(a)	details of– (i) the Environmental Assessment Practitioner (EAP) who prepared the EMPr; and (ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;	Section 1.6 of this Report, and Appendix D of the EIA Report.
(b)	a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Section 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 should be avoided, including buffers;	Section 5
(d)	a description of the impact management outcomes, 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 — (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;	Section 7
(e)	- (repealed)	-
(f)	a description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to — (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; (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable;	Section 9
(g)	the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 8.2
(h)	the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 8.2
(i)	an indication of the persons who will be responsible for the implementation of the impact management actions;	Section 8.1
(j)	the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Section 9
(k)	the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 9
(l)	a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 8.5
(m)	an environmental awareness plan describing the manner in which— (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	Section 8.3
(n)	any specific information that may be required by the competent authority.	None

1.4 Project Developer

ENERTRAG South Africa (Pty) Ltd (the Developer) was established in 2017, with the intention to investigate and develop renewable energy projects in South Africa.

The Developer currently has numerous wind measurement campaigns throughout South Africa and owns the Darling Wind Farm in the Western Cape, and was the first Independent Power Producer (IPP) to commence with a wind measurement campaign in Mpumalanga. Data from the Developer's wind measurement mast located near Hendrina has shown that the wind resource is viable for wind farm development in the region.

1.5 Project Applicant

The Project Applicant is a special-purpose vehicle established by the Developer. Details of the Project Applicant are provided in Table 2.

Table 2 Details of the Project Applicant

Project applicant:	Hendrina South Wind Energy Facility (RF) Pty Ltd
Registration No:	2022/381753/07
Contact person:	Mercia Grimbeek/ Sandhisha Jay Narain
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1.6 EAP

Cabanga Environmental has been appointed as the independent Environmental Assessment Practitioner (EAP) to undertake the Environmental Impact Assessment (EIA) process for the Project. The details of the persons who prepared this report are provided in Table 3.

Table 3: Details of the EAP

Author and EAP	**Lelani Claassen**
Highest qualification	BSc Hons Environmental Management
Years' experience	12+ years
Professional registration	Registered EAP with the Environmental Assessment Practitioner's Association of South Africa (EAPASA). Registration Number 2018/153. SACNASP: Pr. Sci. Nat (Reg. 121645)
Co-Author and Review	**Michelle Venter**
Highest qualification	BSc Hons Geography
Years' experience	10+ years
Professional registration	Registered EAP: 2019/456 (EAPASA) SACNASP: Cert. Sci. Nat. 114447
Review	**Jane Barrett**
Highest qualification	BSc Environmental Management & Botany
Professional registration	SACNASP: Cert Sci. Nat. 130485
Years' experience	12+ years
Approval	**Ken van Rooyen**
Highest qualification	MSc Geography
Years' experience	30+ years
Professional registration	SACNASP: Pr. Sci. Nat (Reg. 400121/93)

2 Policy and Legislative Context

A comprehensive discussion on the laws, regulations and policies relevant to the Project is contained in Section 3 of the EIA Report. This section of the EMPr aims to summarise the most pertinent legal requirements, guidelines and standards relevant to the Project.

2.1 International Environmental and Social Standards

Various Development Finance Institutions, including the International Finance Corporation (IFC) have a responsibility to ensure that the projects they finance are environmentally sustainable and are conducted in accordance with key environmental and social criteria.

Compliance to the IFC's Performance Standards (PSs) must be demonstrated by any project that pursues direct investment from the IFC (including project and corporate finance provided through financial intermediaries).

Table 4 provides a brief summary of the PSs, and an explanation of how the Project responds to each.

Table 4: IFC Environmental and Social Performance Standards and the Project

Performance Standard	Explanation[1]	Project response
	Assessment and Management of Environmental and Social Risks and Impacts, by the implementation of Management Plans and Systems, to avoid, minimise and compensate for impacts as necessary.	The Project EIA Report is the culmination of a thorough EIA Process undertaken in accordance with South African Environmental Law and best practice. The project design has already managed to avoid various impacts (i.e. by placement of project infrastructure outside of sensitive environmental features and their buffer zones). The Environmental and Social Management System (ESMS) in conjunction with the EMPr ensures that potential impacts are monitored, and minimised, throughout the life of the Project. The ESMS will be compiled in the event that the Project is a preferred bidder.
	Labour and Working Conditions: PS2 asks that companies treat their workers fairly, provide safe and healthy working conditions, avoid the use of child or forced labour, and identify risks in their primary supply chain.	The Project will be undertaken with strict implementation of the South African legal framework regarding supply chain, employment, working conditions and management of worker relationships, including the provisions of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) (OHSA) and prohibition on forced labour enshrined in Section 13 of the Bill of Rights, and child labour prohibited in terms of Section 28(1)(e) of the Bill of Rights.

[1] https://www.ifc.org/wps/wcm/connect/Topics_Ext_Content/IFC_External_Corporate_Site/Sustainability-At-IFC/Policies-Standards/Performance-Standards

		Applicable Policies will be compiled in the event that the Project is a preferred bidder.
	Resource Efficiency and Pollution Prevention: PS3 guides companies to integrate practices and technologies that promote energy efficiency, use resources—including energy and water—sustainably, and reduce greenhouse gas emissions.	The aim of the Project is not only to generate renewable energy and contribute to South Africa's National Grid, but also facilitate resource efficiency and pollution prevention by contributing to the South African green economy. Renewable energy technologies, such as this Project, are not greenhouse gas (GHG) emissions intensive therefore the detailed assessment and reporting of emissions is not required. Dust air pollution in the construction phase has been adequately addressed in the EMPr (Section 9.2.7). Potential pollution associated with waste and wastewater is low and mitigation measures have been included in the EMPr. The EMPr and emergency preparedness and response plan identify anticipated hazardous materials and recommends relevant mitigation and management measures.
	Community Health, Safety, and Security: PS4 helps companies adopt responsible practices to reduce risks related to worksite accidents, hazardous materials, spread of diseases, or interactions with private security personnel, including through emergency preparedness and response, security force management, and design safety measures.	Worksite accidents and hazardous materials are largely regulated by South African legislation that will apply to the Project (Hazardous Substances Act, 1973 (Act No 15 of 1973), Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) (OHSA) etc.). Potential impacts on the socio-economic environment and surrounding communities have been assessed by specialists (Urban-Econ, April 2022) and relevant measures included in the EMPr (Section 9.2.10 and 9.3.7).
	When companies seek to acquire land for their business activities, it can lead to relocation and loss of shelter or livelihoods for communities or individual households. Involuntary resettlement occurs when affected people do not have the right to refuse land acquisition and are displaced, which may result in long-term hardship and impoverishment as well as social stress.	This PS is not relevant to the proposed Project as no resettlement will be required to accommodate the Project, and affected land owners have all agreed to the proposed Development on their Properties.

	PS6 recognises that protecting and conserving biodiversity, maintaining ecosystem services, and managing living natural resources adequately are fundamental to sustainable development.	Detailed Biodiversity Specialist studies have been undertaken for the Project (Burton, May 2022); (Hoare, May 2022); and the recommended management measures incorporated into the Project design (Plan 1) and EMPr. It is believed that adverse ecological impacts potentially caused by the project have been adequately minimised, and residual impacts can be managed effectively.
	PS7 seeks to ensure that business activities minimise negative impacts, foster respect for human rights, dignity and culture of indigenous populations, and promote development benefits in culturally appropriate ways.	The potential vulnerability of Indigenous Peoples is recognised, and all Interested and Affected Parties (I&APs) that could be located in the Project vicinity have been and will continue to be consulted as part of the project development. No displacement or direct impact on communities from placement of project infrastructure applies to this Project.
	Cultural heritage encompasses properties and sites of archaeological, historical, cultural, artistic, and religious significance. PS8 aims to guide companies in protecting cultural heritage from adverse impacts of project activities.	A Heritage Impact Assessment (Beyond Heritage, April 2022) and Palaeontological Assessment (Bamford, May 2022) have been completed for the Project – the studies concluded that it is extremely unlikely that fossils would be present on site, and that impacts to heritage resources can be managed to acceptable levels, with the necessary permits from the South African Heritage Resources Agency. A Chance-find-protocol has been included in the EMPr (Appendix H 6) to prevent impacts to important sites of heritage significance, should they be uncovered on site.

The IFC is a member of the World Bank Group, who have also published a number of Environmental, Health and Safety Guidelines that serve to support the IFC PSs. The Equator Principles (which are based on the IFC's PSs) provide a benchmark to the financial industry for determining, assessing and managing social and environmental risks associated with projects.

The Equator Principles (which are based on the IFC's PSs) provide a benchmark to the financial industry for determining, assessing and managing social and environmental risks associated with projects. EP4 is the latest iteration of the Equator Principles and came into effect on 1 October 2020. Table 5 provides a list of the equator principles and a brief summary of how the Project responds to each. Principles 8 and 10 relate to a borrower's code of conduct and are therefore not considered relevant to the EIA process and have not been included in this discussion.

In terms of the IFC Policy on Environmental and Social Sustainability (IFC, 2012), and EP4 (Equator Principles, 2020), the Project will be considered a Category B Project.

Table 5: Project Compliance to the Equator Principles

Equator Principle	Project response
Principle 1: Review and Categorisation	Project is a Category B Project (Business activities with potential limited adverse environmental or social risks and/or impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures).
Principle 2: Environmental and Social Assessment	The Assessment in progress. The impact assessment comprehensively assesses the key environmental and social impacts and complies with the requirements of the South African EIA Regulations. In addition, this EMPr addresses management of potential impacts.
Principle 3: Applicable Environmental and Social Standards	This Report meets the standards of NEMA and best practice in the industry. The IFC PS also serves as a framework for this environmental and social assessment.
Principle 4: Environmental and Social Management System and Equator Principles Action Plan	The Environmental and Social Management System (ESMS) in conjunction with this EMPr ensures that potential impacts are monitored, and minimised, throughout the life of the Project. The ESMS will be compiled in the event that the Project is a preferred bidder.
Principle 5: Stakeholder Engagement	Effective stakeholder engagement in terms of the EIA Process is demonstrated in the EIA Report (Section 7 and Appendix G). A stakeholder Engagement plan will be prepared by the Applicant and prior to Construction and evolve though the life cycle of the Project.
Principle 6: Grievance Mechanism	This EMPr includes a Grievance Mechanism Process for Public Complaints and Issues. This procedure effectively allows for external communications with members of the public to be undertaken in a transparent and structured manner. See Appendix H 8.
Principle 7: Independent Review	Cabanga is an independent environmental consulting firm. Cabanga has no objection to further due diligence or peer reviews of this assessment. This principle will only become applicable in the event that the project is identified as a preferred bidder.
Principle 9: Independent Monitoring and Reporting	Monitoring and Reporting requirements relevant to the Project are detailed in this EMPr (Section 8.2)

2.2 National Legislation, Development Strategies and Guidelines

Title	Summary	Relevance to the Project
Constitution of the Republic of South Africa, Act 108 of 1996.	The constitution is the supreme law of the country. Law or conduct that is inconsistent with the provisions of the Constitution are invalid (Section 2). Chapter 2 details the Bill of Rights. Section 24 guarantees everybody's right to an environment that is not harmful to their health or wellbeing, and to have the environment protected for the benefit of present and future generations. Section 24 (b) promotes legislative and other measures that prevent pollution and ecological degradation, promotes conservation, and secures ecologically sustainable development and the use of natural resources while promoting justifiable economic and social development.	All role players, including the Developer, contractors, interested and affected parties (I&APs), Competent Authority (CA), commenting authorities etc. must undertake their respective tasks in such a manner as to ensure that they do not threaten the constitutional rights to an environment that is not harmful to their health or wellbeing. The National Legislative Context in terms of NEMA and other laws was developed in line with the constitutional obligations. The Project takes cognisance of the relevant legislative framework. Further, the Project aims to "secure ecologically sustainable development and the use of natural resources while promoting justifiable economic and social development in line with the Constitution.
National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA) and its Regulations	The NEMA, as amended was set in place in accordance with Section 24 of the Constitution. Section 24 (1)(a) and (b) of NEMA state that the potential impact on the environment and socio-economic conditions of activities that require authorisation or permission by law and which may significantly affect the environment, must be considered, investigated and assessed prior to their implementation and reported to the organ of state charged by law with authorising, permitting, or otherwise allowing the implementation of an activity	The EIA Regulations identifies activities that require assessment due to their potential environmental impacts, and sets out the procedure for the EIA process. The application for environmental authorisation has been undertaken in terms of the provisions of NEMA.
Renewable Energy Development Zones (REDZ) and Strategic Transmission Corridors (GN 144 and GN 145, GN113)	The Regulations identify specific zones / areas for renewable energy development, and transmission corridors, and set out the procedures to be followed when applying for environmental authorisation within these areas.	The proposed project does not fall within the REDZ or strategic transmission corridors, and thus the procedures are not specifically relevant to this application process, although the guidelines for EIAs pertaining to renewable energy projects were consulted.
National Environmental Management Waste Act, 2008 (Act No. 59 of 2008) (NEMWA) and its Regulations.	NEMWA provides for national norms and standards for regulating the management of waste, and the licensing and control of waste management activities.	No Listed Waste Management Activities are associated with the project. Provisions of the Norms and Standards, and for responsible waste management as relevant to the Project, have been included in the EMPr (Section 9.2.13).

Title	Summary	Relevance to the Project
National Water Act, 1998 (Act 36 of 1998) (NWA) and its Regulations.	The NWA provides for the sustainable and equitable use and protection of water resources. A person is only entitled to use water if the use is permissible in terms of Section 22 of the NWA, or if a Water Use License (WUL) has been issued for that water use.	Water Use License / General Authorisation (GA) will have to be obtained prior to the development being undertaken, as there are water uses relevant to the Project. The Application process is administrated by the Department of Water and Sanitation and will be undertaken in accordance with the relevant regulations in due course.
National Environmental Management Air Quality Act, 2004 (Act No. 39 of 2004) (NEMAQA) and its Regulations.	Activities that are identified in GN 983 require an Atmospheric Emissions License (AEL). The NEMAQA further establishes National Ambient Air Quality Standards (NAAQS) (GN R 1210 of 2009) which provide the goals for air quality management plans and also provide the benchmarks by which the effectiveness of these management plans are measured.	No listed activities are associated with the Project and an AEL will not be required. Specific requirements for prevention and management of dust and emissions potentially arising from the Project, and monitoring and reporting requirements in terms of air quality, are incorporated into this EMPr.
Mineral and Petroleum Resources Development Act, 2002 (MPRDA) (Act No. 28 of 2002) and its Regulations.	Section 53 of the MPRDA provides that persons who intend to use the surface rights of any land in any way which may result in sterilisation of a mineral resource or impede any objects of the MPRDA, has to obtain consent from the Minister of Mineral Resources prior to undertaking such activity or land use.	The Project will have to obtain a Section 53 consent from the Department of Minerals Resources and Energy (DMRE).
Mine Health and Safety Act, 1996, (MHSA) and its Regulations.	Regulation 17(8) of the MHSA Regulations state that "no person may erect, establish or construct… any structures whatsoever within a horizontal distance of 100 (one hundred) metres from workings, unless a lesser distance has been determined safe by a professional geotechnical specialist and all restrictions and conditions determined by him or her or by the Chief Inspector of Mines are complied with."	Some of the proposed Project infrastructure traverse areas that may have been undermined, and this must be further investigated during the detailed design phase of the Project where the preferred alternatives overlap with areas of mineral rights.
National Environmental Management: Protected Areas Act, 2003 (Act No 57 of 2003) (NEMPAA)	The Act provides for the protection and conservation of ecologically viable areas of South Africa's biological diversity, natural landscapes and seascapes. It further provides for the establishment of a register of protected areas (SAPAD).	There are no formally protected areas in the immediate vicinity of the proposed Project.
National Environmental Management: Biodiversity Act,	Provides for the management and conservation of South Africa's biodiversity within the framework of the NEMA. The Act relates to the protection of species and	Certain Fauna and Flora Species of Conservation Concern (SCC) occur on the site. The protected plant species that

Title	Summary	Relevance to the Project
2004 (Act No. 10 of 2004) (NEMBA) and its Regulations.	ecosystems that warrant national protection, among others.	cannot be avoided by the proposed Project, will have to be translocated under the necessary permits.
National Forests Act, 1998 (Act 84 of 1998)	Allows for the protection of certain tree species	No Listed Tree species were identified on the Project site.
Conservation of Agricultural Resources Act, 1983 (Act No 43 of 1983) (CARA)	Provides for control over the utilisation of the natural agricultural resources of the Republic to promote the conservation of soil, water sources and vegetation and the combating of weeds and invader plants.	Weeds and invader plants have already colonised parts of the site, which infestation is likely to be exacerbated by additional ecological disturbance associated with construction activities. The Project will be associated with alien invasive species management plan (Appendix H 3).
Subdivision of Agricultural Land Act, 1970 (Act 70 of 1970)	The Act controls the subdivision and use of agricultural land. Land with high-value agricultural potential should be protected and not sub-divided or fragmented into smaller portions that would threaten the viability of agricultural activities.	Portions of the development footprint traverse land used for agricultural purposes. However, it has been determined through the EIA Process and land owner consultation that the Project will not threaten the viability of existing agricultural activities on the Site.
National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA)	The Act aims to promote good management and preservation of the country's Heritage Resources.	There are ruins and graves that have been identified on the Project site. The graves can be avoided, but permits in terms of the NHRA must be obtained for the destruction of ruins at either of the substation and BESS Alternative Sites.
National Development Plan, 2030 (NDP) (NPC, 2011). Integrated Resource Plan (IRP) (DoE, 2019).	The NDP serves as a road-map for the country's development. Goals and strategies set out in the NDP include the attainment of a decent standard of living. Access to affordable and reliable electricity is recognised as one of the core elements of a decent standard of living. The IRP recognises the imminent decommissioning of ageing coal-fired power stations and the need to generate more power. The IRP has confirmed that the installation of renewables has been brought forward to accelerate local industry.	The Project aims to generate electricity from a renewable resource (Wind), and contribute electricity to the National Grid. This is directly in line with the goals of the NDP and aligned to the IRP, especially given the Developer's intention to bid the Project into future REIPPP rounds.
Electricity Regulation Act, 2006 (Act No. 4 of 2006) National Energy Regulator Act. Electricity regulations on new generation capacity (GN R 399 of 4 May 2011), Electricity Regulations on the Integrated Resource Plan 2010 - 2030, GN 400 of 6 May 2011.	Various Acts and Regulations have been promulgated to regulate the electricity generation and distribution industries in South Africa.	The Developer will have to follow the necessary procedures and obtain the necessary approvals from the National Energy Regulator of South Africa (NERSA) and Eskom for the Project. These processes are separate to the process for application for Environmental Authorisation.

Title	Summary	Relevance to the Project
Provincial and Local Legislation and guidelines	Mpumalanga Tourism and Parks Agency Act (Act 5 of 2005), the Mpumalanga Nature Conservation Act (Act No. 10 of 1998), Mpumalanga Spatial Development Framework (SDF) (MPSDF, 2018)	The Mpumalanga Tourism and Parks Agency (MTPA) are consulted as part of the Public Participation Process for the Project. Further, the Project specifically caters for the protection of species that are protected in terms of Act 10 of 1998, and their permitted relocation where the Project necessitates their disturbance (See Appendix H 2). The MPSDF identifies the area where the Project is proposed as a mining area, although agricultural activity is also common.
Noise Control Regulations in terms of the Environmental Conservation Act, 1989 (Act No 73 of 1989) (ECA) Steve Tshwete Local Municipality (STLM) Noise By-Law, 2021	National and Local legislation governing the generation of noise or the undertaking of noisy activities, and the setting of acceptable noise limits in certain districts or types of areas.	Noise impact of the Project has been assessed (EARES, April 2022) and relevant measures to ensure noise impacts are managed adequately have been included in this EMPr.
Spatial Planning and Land Use Management Act, 2013 (Act No. 16 of 2013) (SPLUMA)	SPLUMA aims to develop a framework to govern planning permissions and the lawful use of land.	In terms of SPLUMA the Developer must ensure that the surface rights areas where the project is undertaken, is approved as such.
Restitution of Land Rights Act, 1994, the Land Reform (Labour Tenants) Act, 1996 and the Extension of Security of Tenure Act, 1997	These Acts are aimed at land restitution and addressing injustices of the past by allowing for land claims and land reform.	Extensive on-site consultation has taken place to identify parties affected by applications under these Acts, and their relation to the Project (if any). The land on which the project infrastructure is proposed is privately owned and the Project should not directly affect labour tenants or land claimants.
Local Government Municipal Systems Act, 2000 (Act No. 32 of 2000) as amended	The Act requires local government to compile an SDF, including guidelines for land use management. Additionally, Municipalities are required to develop Integrated Development Plans (IDPs)	The relevant Municipal SDFs and IDPs have been considered where relevant in this assessment and will further inform the Social-Economic Development (SED) plans associated with the Project.
Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) (OHSA)	The OHSA provides for the health and safety of persons at work and other persons who may be exposed to hazards associated with a workplace, including the use of plant and machinery.	The Developer and Applicant must ensure compliance to the OHSA for the duration of the Project.
National Road Traffic Act, Act No. 93 of 1996 (NRTA) and National Land Transport Act, Act No. 5 of 2008 (NLTA). National Ports Act, 2005 (Act No 12 of 2005)	These Acts relate specifically to the planning and development of transport systems and the safe use of roads.	Prior to construction, the following permits must be obtained by the transport and logistics company transporting the components to site: • Abnormal load permits, (Section 81 of the NRTA 93 of 1996 and National Road Traffic Regulations, 2000);

Title	Summary	Relevance to the Project
		• Port permit (Guidelines for Agreements, Licenses and Permits in terms of the National Ports Act) • Authorisation from Road Authorities to modify the road reserve to accommodate turning movements of abnormal loads at intersections.
Hazardous Substances Act, 1973 (Act No 15 of 1973)	The Act provides for the control of hazardous substances (sub-divided into four groups) defined as any substance that by their nature are toxic, corrosive, irritant, flammable, sensitising or pressure generating, which may cause ill-health, injury or death in humans.	Minimum requirements for hazardous substances associated with the project are incorporated into this EMPr and will be fully implemented on site.
South African Civil Aviation Authority (CAA) Guidelines and Air Traffic and Navigation Services (ATNS) Guidelines	Air Traffic and Navigation Services (ATNS) has been appointed as the Obstacle application Service Provider for Wind farms from 1 May 2021.	Prior to construction the Applicant must obtain permission from ATNS.
NEMA Guidelines	Various Guidelines on different aspects of integrated environmental management have been published by the Department of Environmental Affairs (currently the Department of Forestry, Fisheries and Environment, DFFE, also the CA for this Project). These include (but are not limited to): The Integrated Environmental Management (IEM) Information Series; Public Participation Guideline (2017); Guideline on Need and Desirability (2017), EIA Guideline for Renewable Energy Projects (DEA, 2015) etc.	Relevant guidelines have been considered throughout the application process and the compilation of the associated reports.

3 Project Details

The Project involves the development of the Hendrina South Wind Energy Facility (WEF) and associated infrastructure, including sub-station (IPP Portion) and Battery Energy Storage System (BESS), Operations and Maintenance (O&M) Building, Roads and Cables and temporary construction camps and laydown areas.

The Project is being developed in the context of the REIPPP, in line with the IRP – Renewable Wind Energy, and will connect to the National Grid via the Hendrina South Grid Infrastructure Project which is the subject of a separate application.

3.1 General Description of Wind Energy Facility and Turbine Technology

Wind-energy technology is one of the fastest-growing energy sources in the world (https://www.energy.gov/eere/wind/advantages-and-challenges-wind-energy). Due to the rapidly developing technology, specification of the exact turbine technology may only be finalised during the detailed design phase once the Engineering, Procurement and Construction (EPC) Contractor is appointed, after all necessary permits and permissions (including EA, if granted) has been obtained.

In essence, a wind turbine is a machine that converts mechanical energy, from blades rotated by moving air, to electricity. Individual wind turbines grouped together are commonly referred to as a Wind Farm, or Wind Energy Facility (WEF). This includes the supporting and ancillary infrastructure needed to operate and maintain the WEF, and distribute the electricity that is generated to consumers.

3.2 Project Location and Extent

The Project is located within the Steve Tshwete Local Municipality, of the Nkangala District Municipality (majority of proposed infrastructure) and in the Govan Mbeki Local Municipality of the Gert Sibande District Municipality (seven turbines, approximately 7km of internal roads, and one proposed temporary laydown area (2Ha)), in the Mpumalanga Province.

The site is approximately 12 kilometres south-west of Hendrina and 11 km south-east of Komati. The affected farm portions are detailed in Table 6.

Table 6 Affected Farm Portions

Parent Farm	Farm No	Portion No	SG Code
Dunbar	189 IS	Part of Portion 1	T0IS00000000018900001
Dunbar	189 IS	Part of Portion 3	T0IS00000000018900003
Dunbar	189 IS	Part of Portion 5	T0IS00000000018900005
Dunbar	189 IS	Part of Portion 6	T0IS00000000018900006
Dunbar	189 IS	7	T0IS00000000018900007
Halfgewonnen	190 IS	11	T0IS00000000019000011
Halfgewonnen	190 IS	14	T0IS00000000019000014
Halfgewonnen	190 IS	15	T0IS00000000019000015
Weltevreden	193 IS	0	T0IS00000000019300000
Weltevreden	193 IS	2	T0IS00000000019300002
Weltevreden	193 IS	10	T0IS00000000019300010

Parent Farm	Farm No	Portion No	SG Code
Weltevreden	193 IS	11	T0IS00000000019300011
Weltevreden	193 IS	12	T0IS00000000019300012
Weltevreden	193 IS	13	T0IS00000000019300013
Weltevreden	193 IS	Part of Portion 14	T0IS00000000019300014
Weltevreden	193 IS	Part of Portion 15	T0IS00000000019300015
Weltevreden	193 IS	Part of Portion 16	T0IS00000000019300016
Weltevreden	193 IS	Part of Portion 17	T0IS00000000019300017
Weltevreden	193 IS	18	T0IS00000000019300018

The development area comprises of 2,900ha, with the total buildable area comprising approximately 200ha. The total extent of the proposed Project is calculated in Table 7.

Table 7: Project Extent

Component	Area per component	Number of components	Total footprint
Turbines:	1Ha	26	26Ha
O&M) building:	200m² (0.02Ha)	1	0.02Ha
Workshop:	150m² (0.015Ha)	1	0.015Ha
Stores:	150m² (0.015Ha)	1	0.015Ha
Construction Camps:	5000m² (0.5Ha)	2	1Ha
Laydown Areas:	30,000m² (3Ha)	2	6Ha
Internal Roads:	10m wide, 40km long = 400000m²		40Ha
On-site substation and BESS:	3Ha	1	3Ha
76.5 Ha			**76.5 Ha**

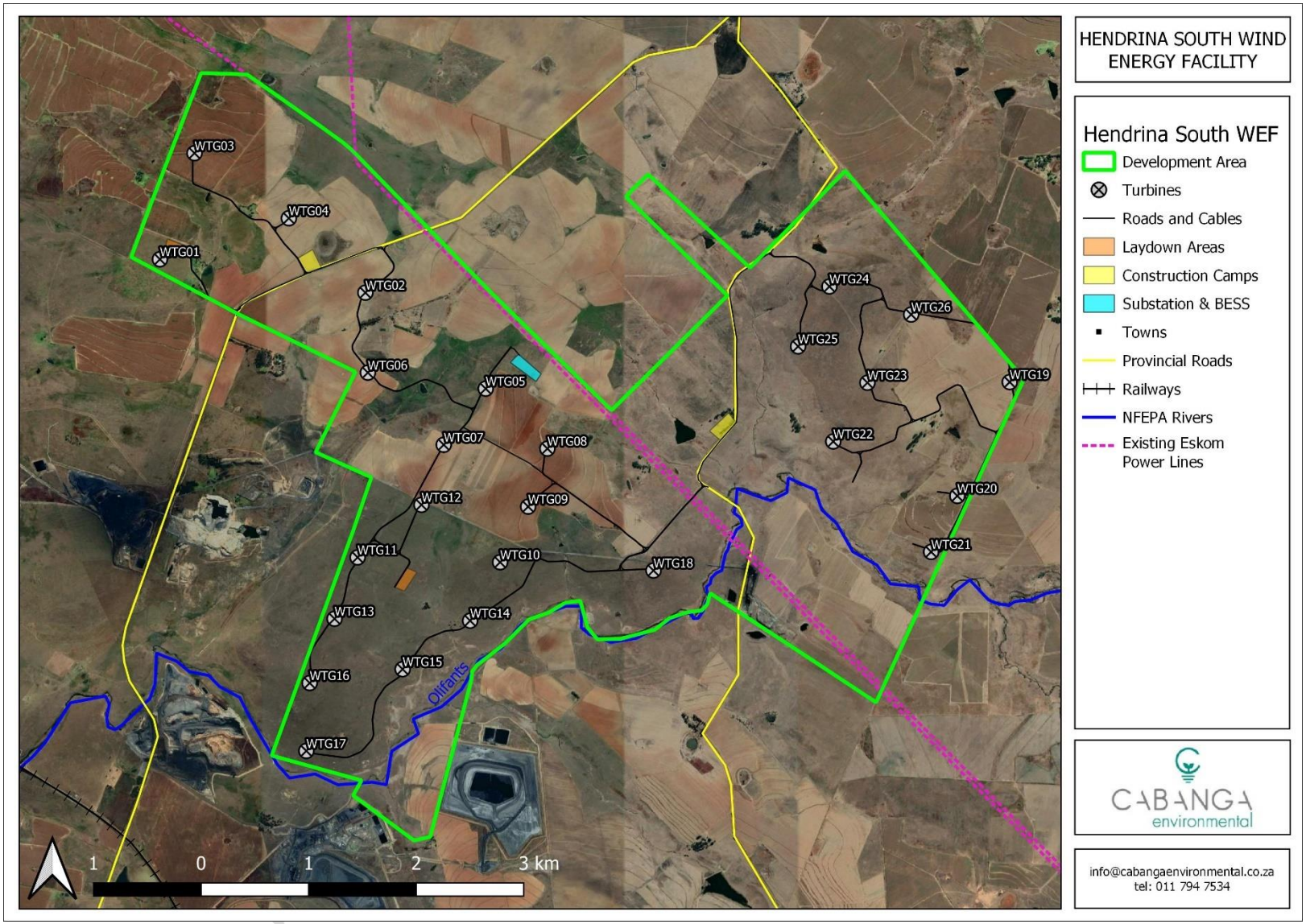
3.3 Project Components

The project components are summarised in Table 8. The preliminary layout is shown in Plan 1.

Table 8: Project Components and technical details

Facility Name:	Hendrina South Wind Energy Facility and Associated Infrastructure
Applicant:	Hendrina South Wind Energy Facility (RF) Pty Ltd
Municipalities:	Steve Tshwete Local Municipality of the Nkangala District Municipality, Govan Mbeki Local Municipality of the Gert Sibande District Municipality
Extent:	2,900 ha
Buildable area:	Approximately 200 ha
Capacity:	Up to 200MW
Number of turbines:	Up to 26
Turbine hub height:	Up to 200m
Rotor Diameter:	Up to 200m
Foundation:	Approximately 25m^2 diameter x 3m deep – 500 m^3 – 650m^3 concrete. Excavation approximately 1000m^2, in sandy soils due to access requirements and safe slope stability requirements.

Operations and Maintenance (O&M) building footprint:	Located in close proximity to the substation. Conservancy tanks with portable toilets. Typical areas include: - Operations building – 20m x 10m = 200m^2 - Workshop – 15m x 10m = 150m^2 - Stores - 15m x 10m = 150m^2
Construction camps:	Typical area 100m x 50m = 5000m^2. Sewage: Conservancy tanks and portable toilets.
Temporary laydown or staging areas:	Typical area 220m x 100m = 22000m^2. Laydown area could increase to 30 000m^2 for concrete towers, should they be required. Will include diesel, cement and chemical storage, as well as a small workshop area.
Cement batching plants (temporary):	Gravel and sand will be stored in separate heaps whilst the cement will be contained in a silo. The footprint will be up to 0.5ha. Maximum height of the silo will be 20m.
Internal Roads:	Internal roads will have a width of 8 - 10m, increasing up to 15m for turning circle/bypass areas to allow for larger component transport. Length of internal road – Up to 40km.
Cables:	The medium voltage collector system will comprise of cables up to and including 33kV that run underground, except where a technical assessment suggests that overhead lines are required, connecting the turbines to the onsite substation (IPP Portion).
On-site substation and battery energy storage system (BESS):	Total footprint will be up to 3ha in extent. The up to 275kV substation will consist of feeder bays, transformers, switching station electrical equipment (bus bars, metering equipment, switchgear, etc), control building, workshop, telecommunication infrastructure, and access roads. The substation will include an area with a subterranean earthing mat onto which a concrete plinth will be constructed. The associated BESS storage capacity will be up to 100MW/400MWh with up to four hours of storage. It is proposed that solid state batteries will be used. Solid state batteries consist of multiple battery cells that collectively form modules. Modules are assembled within shipping containers and delivered to the Project site. The main components of the BESS include the batteries, power conversion system and transformer which will all be stored in various rows of containers.



Plan 1: Hendrina South WEF Layout Map

3.3.1 Electrical Components and Connection to Grid

3.3.1.1 Battery Energy Storage System (BESS)

The BESS is required to store and dispatch stored electricity, to ensure contribution to the Grid can continue, even in times of intermittent wind (and resultant reduced electricity generation at the Project).

The BESS will be up to 3ha in extent with a capacity of up to 100MW/400MWh, with up to four hours of storage. The BESS technology (to be confirmed during the detailed design phase) will most likely involve solid state batteries comprising multiple battery cells, collectively forming modules, pre-assembled (off site) in shipping containers and delivered to site.

Lithium Solid State Batteries are the most likely technology (to be confirmed during the detailed design phase).

3.3.1.2 Onsite Substation

The on-site substation (IPP Portion), adjacent to the BESS, will have a capacity up to 275kV (to facilitate the LILO-connection to the existing Eskom 275kV powerline that traverses the site, should Eskom approve this alternative). The substation will include an area with a subterranean earthing mat onto which a concrete plinth will be constructed. Further, the substation will consist of feeder bays, transformers, switching station electrical equipment (bus bars, metering equipment, switchgear, etc), control building, workshop, telecommunication infrastructure, and access roads. Oil-filled transformers will be located in a bund wall. The Bund wall around the transformer will cater for 110% of the transformer oil volume and comply to the requirements set out in SANS 10089-1:2008.

3.3.1.3 Transmission and Distribution

The proposed Project is closely associated with the Hendrina South Grid Infrastructure Project, which is subject to a separate EIA Process to facilitate hand-over of the Grid Infrastructure to Eskom in the operational phase.

The South Grid Infrastructure Project will connect this Project to the National Grid, via the existing substations at the Komati Power Station, approximately 16km from the site.

3.3.2 Associated Infrastructure

3.3.2.1 Site Access and Internal Service Roads

The Project site will be accessed via the R542, which runs north of the site, between the towns of Hendrina and Komati. From here, The Provincial Halfgewonnen Road (D622) traverses the Site.

Provincial and Local roads, including existing farm roads will be utilised, to access the Project components as far as possible. Where required, the roads will be upgraded to meet the Project requirements. New internal access roads will be required to access certain project components. Internal roads will be between of 8 - 10m wide, increasing to 15m in places for turning circle/bypass areas to allow for larger component transport. The length of the internal road network will be up to 40km.

3.3.2.2 *Temporary Construction Camps and Laydown Areas*

During the construction phase, two construction camps (including concrete batching plants) and two temporary laydown areas will be required. The Construction camps each comprise up to 3Ha, while the laydown areas each will be up to 2Ha.

Each construction camp will be fenced off and access-controlled (security office and boom gate), and will contain a site office (containerised), canteen / eating area, ablutions, change room and storage areas for equipment, construction materials, fuel, oil, machinery etc. a small workshop and concrete batching plant.

In this area, the following specifications are important:

- Cement storage must be on an impervious surface and under a roof, preferably inside a container or similar facility to prevent wind-blown cement loss and water damage to cement being stored on site;
- Empty cement bags must be contained in a designated area, where they are prevented from blowing away, for disposal by the EPC contractor as hazardous waste, or may be re-used if the EPC can guarantee no cement-residues will be dispersed.
- All hazardous chemical substances (HCS) must be labelled, packaged, transported and stored as per the OHSA: Regulations for Hazardous Chemical Substances. Only authorised personnel who are trained to work with HCS are able to do so and access and/or dispense HCS.
- Diesel fuel storage tanks should be above ground on an impermeable surface in a bunded area in accordance to SANS 10131: Above-ground storage tanks for petroleum products.

The laydown areas will similarly be fenced for security purposes but will not contain significant other infrastructure (except chemical toilets and small security office / guard huts where necessary), as these areas are primarily used for the storage of materials, equipment, machinery and components as they are delivered to site.

3.3.2.3 *Hardstand areas*

Each turbine will require a hardstand area including a crane platform, storage area and crane boom area, to enable offloading and storage of parts and construction materials during the construction phase, and the cranes to assemble the turbine components. The hardstand areas will be approximately 1Ha each for the construction phase, reduced to 0.5ha for the operational phase of the Project.

3.3.2.4 *Security and Fencing*

Fencing will be installed at the construction lay down area, O&M building and onsite substation.

Security personnel will work in shifts to ensure 24-hour safeguarding of the Project. Security during construction will be the responsibility of the EPC.

3.3.2.5 *Operations and Maintenance (O&M) Buildings*

The O&M building is required to support the operational phase of the Project, to accommodate the personnel and activities associated with daily operations and

maintenance of the WEF. The O&M Building will be in close proximity to the substation and comprise an operations building (200m²), workshop (150m²) and stores (150m²). The O&M area will be fenced and access-controlled.

3.3.3 Provision of Services

During both construction and operational phases, a number of supporting services will be required, as described below:

3.3.3.1 Power Supply

During construction diesel-powered generators will be used to supply electricity to the construction camps. Vehicles used for the construction phase will be petrol/diesel powered.

Once in operation the O&M buildings will receive power from the National Grid.

The Project will be connected to the National Grid through the proposed South Grid Infrastructure (which is the subject of a separate EA) via the existing substation at the Komati Power Station.

3.3.3.2 Water Requirements

The Project will use approximately 80,000m³ of water per year in the construction phase (24 months) and 250m³ of water per year during the Operational phase (20+ years).

During construction, water is required for the ablutions, establishment of access roads, concrete foundations and dust suppression, as well as for potable water supply to construction-phase personnel.

During the operational phase, water is required for domestic and potable use, and possibly for dust suppression on internal roads. Quantities are thus minimal.

Exact water supply options will be confirmed by the EPC during the detailed design phase.

3.3.3.3 Waste Management

During construction various waste streams will be generated; this may include hazardous and general waste. A designated waste management area for the temporary storage of waste will be located at the laydown area during the construction phase, and at the O&M building during operations. Sufficient number of lidded bins and covered skips to ensure separation of general and hazardous wastes will be provided on site for the duration of the Project. Recycling will be encouraged where possible. Waste will be removed off-site by licensed waste management companies. The EPC and O&M Contractor will be required to maintain all required waste management documentation, (waste register, waste manifests for all waste streams, and certificate of issue or safe disposal for hazardous waste removed from site).

Sewage waste will be managed in portable chemical toilets during the construction phase and in conservancy tanks during operations. The chemical toilets will be placed at the construction camps and temporary laydown areas during the construction phase, while it is proposed that conservancy tanks be installed at the O&M building for use during in the operational phase. Conservancy tanks and chemical toilets will be serviced by a licensed contracted waste management company on a regular basis. The EPC and O&M Contractor

will be required to retain proof of safe and lawful disposal of sewage for the duration of the Project.

3.3.4 Transportation of Project Components to Site

Wind turbine components can be transported in a number of ways with different truck / trailer combinations and configurations (JG Afrika, April 2022). The exact number and types of trucks and trailers to be used will depend on the transport contractor appointed and can only be confirmed during the detailed design phase, and when the transport contractor applies for the necessary permits for abnormal vehicles and loads.

It is assumed at this stage that the wind turbine components will be imported to South Africa via the Port of Richards Bay, in KwaZulu Natal, some 543km travel distance from the Site.

For abnormal vehicles, the preferred route from the Port travels north on the N2 to Ermelo, then north-east on the N11 to Hendrina, and the R542 via the R38 to the site. This route makes use of higher-order roads (i.e. National Routes) and is this the preferred transport route.

Despite the higher-order roads being used for much of the transport route, it is anticipated that some road modifications may be required to enable the abnormal load vehicles to reach the site. It is critical that the transport contractor undertake a "dry-run" prior to the transport of any turbine components, to ensure the vehicles will be able to move safely and without obstruction.

In addition to transporting the specialised lifting equipment, the normal civil engineering construction materials, plant and equipment will need to be brought to the site (e.g. sand, stone, cement, concrete batching plant, gravel for road building purposes, excavators, trucks, graders, compaction equipment, cement mixers, transformers in the sub-station, cabling, transmission pylons etc.). Other components, such as electrical cables, pylons and substation transformers, will also be transported to site during construction. The transportation of these items will generally be undertaken with normal heavy load vehicles (JG Afrika, April 2022).

3.3.5 Employment and Operating Hours

The construction of the Project will create an estimated 300 project-specific full time equivalent (FTE) employment positions, (including foreign FTE positions) over the period of construction (estimated at 24 months). These positions will become redundant after construction is complete.

The operation of the Project will create an estimated 25 FTE employment (including foreign FTE positions) positions annually (for 20 years) for the lifetime of the operation of the Project (20+ years). The operational phase is associated with far fewer employment opportunities than the construction phase, but these are considered permanent positions.

Construction will be scheduled to take place during daylight hours; however, activities like pouring of cement or raising of the nacelle and blades must be concluded once commenced and such activities may extend into the night.

Once operational, Turbines will be operational 24/7 except in extreme weather conditions, during maintenance activities or if a mechanical breakdown occurs, in which case repairs must be implemented timeously.

Employees (except for security personnel and emergency night-shift personnel) will work during daylight hours unless there has been an emergency and work runs into night time.

3.4 Time-frames for implementation of the Activity

3.4.1 Pre-construction Phase

The pre-construction phase is associated with the necessary pre-feasibility and feasibility studies undertaken by the Developer, and applying for the necessary permits and authorisations, including EA, by the Applicant.

Before construction can commence (if all necessary authorisations including EA are obtained), it is the Applicant's intention to bid the Project into future REIPPP Rounds. If the Applicant's bid is successful, construction of the project could commence.

A detailed Geotechnical survey will be undertaken based on the EIA-Phase approved layout, prior to finalising the exact footprints and locations of infrastructure. Additionally, final site walk-downs by the specialist team must be undertaken to ensure the construction of the Project does not affect sensitive or protected plant or animal species within the footprints of the proposed development.

3.4.2 Construction Phase

The construction phase is anticipated to last up to 24 months (2 years).

Commencement of the construction phase is highly dependent on the outcome of the REIPPP bidding process, and/or the processes to obtain funding and all of the required approvals for the Project.

3.4.3 Operational Phase

The Project will have an operational life of a minimum of 20 years.

3.4.4 Decommissioning Phase

Following the operational phase, the Applicant will consider the continued economic viability of the Project and re-furbish project components rather than decommissioning, to extend the life of the Project. Detailed legal review will have to be undertaken at the time to identify (and comply with) environmental permitting requirements for such refurbishing (or decommissioning) at the time.

The decommissioning phase is expected to be comparable to the construction phase in length, though this phase is often associated with less urgency and may thus be extended somewhat.

4 Existing Site Attributes

Just as a project is associated with certain impacts on the environment where it is undertaken, the existing environment can also influence a proposed development in terms of design, location, technology and layout. It is therefore important to define the environmental baseline conditions (status quo) or context of a proposed development project.

The Baseline Environment is defined in detail in the EIA Report which was compiled for the application for Environmental Authorisation. Table 9 provides a summary of environmental aspects of the Project.

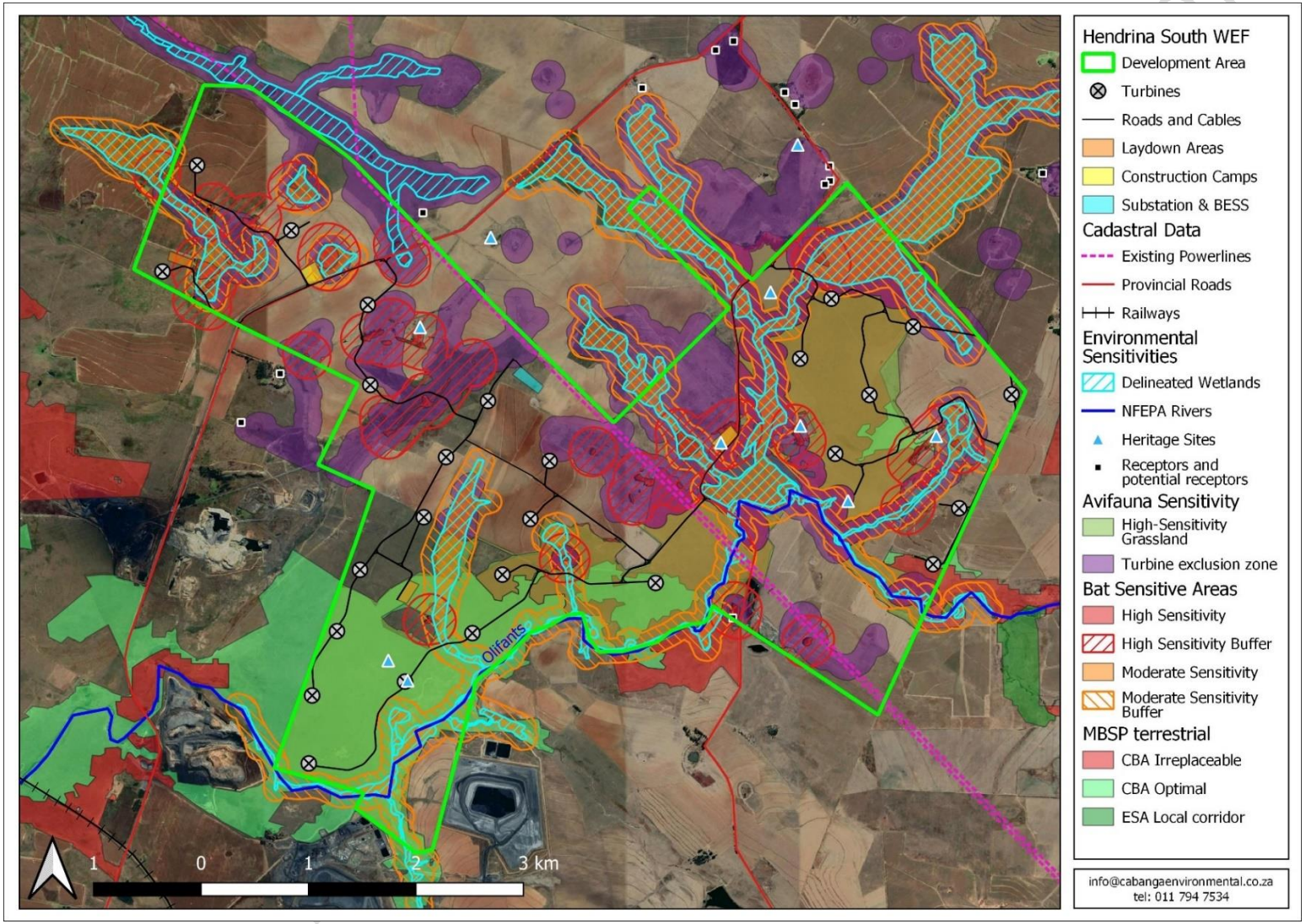
Table 9: Summary of the Baseline Environment

Aspect	Description
Geology, physiography and topography	The site is underlain by stratigraphic units of the Ecca Group, Karoo Supergroup; Rooiberg Group of the Transvaal Supergroup and the Lebowa Granite Suite of the Bushveld Complex (SLR, 2022). The project area ranges from 1592- 1677 metres above mean sea level (mamsl) and is largely located on a plateau where relatively flat to undulating terrain prevails. Slopes across the study area are relatively gentle to moderate, with steeper slopes being largely associated with the more incised river valleys (SiVEST, April 2022). The southern portion of the Development Area contains a topographical high point known locally as "Ysterkop".
Climate and Meteorology	The regional climate is characterised by strong seasonal summer rainfall with dry winters typical of the highveld region. Average rainfall is approximately 570mm per annum. Summer temperatures average 19.5°C and winter temperatures average 11.1°C. Light to strong easterly winds prevail in the region, especially in the spring, summer and autumn. Higher directional variability is experienced in winter. Seasonal peak (10.4 m/s) wind speeds occur during spring and highest average (1.6 m/s) wind speeds occur during summer and spring.
Soils, Land Use and Capability	The site falls within the Central Mpumalanga Protected Agricultural Area (Type: Rainfed; Rating B). Agriculture is a dominant land use in the area (mainly maize and soya beans). Land owners generally use all suitable soil as cropland, with the remaining areas used for grazing. Crop yields and grazing capacity are considered fairly high. Infrastructure on the site is typically associated with farming operations (homesteads, fences, roads) but also include electricity distribution infrastructure (The development area is bisected by two high voltage powerlines, namely the Camden Duvha 1 400kV line and the Camden Komati 1 275kV transmission lines). The prevalence of coal mining in the immediate vicinity of the project is another important land use in the region.
Hydrogeology	Three aquifers have been identified in the Project area: the perched aquifer, weathered aquifer and fractured aquifer. The boreholes in this region have a yield of 0.1- 0.5 litres a second. Groundwater levels range between artesian and about 50 metres below surface (mbs), with an average water level of 13.17mbs (Shangoni AquiScience, May 2022).
Hydrology	The Site falls within the Water Management Area 2: Olifants and in the B11A quaternary catchment. There are numerous surface water resources associated with the study area, the Olifants River forms the southern boundary of the Development Area. The Present Ecological Status (PES) of Olifants River is Class C: Moderately Modified.
Freshwater Ecology	The wetland delineation undertaken on the Project Site (Burton, May 2022) identified 36 Hydro-Geomorphic (HGM) Units on the site, and further grouped these into seven HGM Units based on similarity of land uses and impacts. The delineated Channelled Valley Bottom (CVB) wetlands, Fragmented CVBs and Fragmented Hillslope Seeps were assigned a Present Ecological State (PES) Category of D, while the Unchanneled Valley Bottoms (UVB), Fragmented UVBs, Hillslope Seep Agriculture and Unimpacted Hillslope Seeps were assigned a PES of C.
Terrestrial Biodiversity	The Regional Vegetation Type is classified by Mucina & Rutherford (2006) as Eastern Highveld Grassland, which is listed as Vulnerable in the National List of Ecosystems that are Threatened and need of protection (GN1002 of 2011). The Mpumalanga Biodiversity Sector Plan (MBSP) (MTPA, 2014) identifies Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) on the Site. Areas

Aspect	Description
	classed as "other natural areas" are also present and affected by project infrastructure. Grasslands, wetlands and pans are considered to have the highest value in terms of terrestrial biodiversity. Cultivated areas, alien trees and disturbed areas were also delineated. Several Species of Conservation Concern (SCC) that could occur on the site were identified in the Plant Species and Animal Species Assessments (Hoare, May 2022).
Bats	Various bat species have been confirmed on site, were previously recorded in the area, or were identified as potentially occurring on site. Likelihood of bat occurrence was evaluated based on habitat for roosting, and foraging habitat in the area, as well as migration patterns to some extent (as this is very difficult to predict). Sensitive bats habitats (i.e. turbine exclusion zones) and moderate sensitivity areas have been identified and delineated by the Specialist, based on the pre-construction bat monitoring that was undertaken (Animalia, April 2022).
Avifauna	The South African Bird Atlas Project (SABAP2) found that a total of 173 bird species could potentially occur within the broader area. Of these, 25 species are classified as priority species according to the updated list of priority species for wind farms compiled for the Avian Wind Farm Sensitivity Map and 11 of these are South African Red List species. Of the priority species, 16 are likely to occur regularly in the development area. Wetlands and pan/dam edges are important breeding, roosting and foraging habitat for a variety of Red List priority species, most notably for African Grass Owl (SA status Vulnerable), and Grey Crowned Crane (SA status Endangered) (Van Rooyen & Froneman, April 2022).
Air Quality and Noise	The site is within the Highveld Priority Area. Existing land use activities that could have significant impacts on air quality in the region, include power generation, coal mining, coal transport and coal processing, vehicle movement on unpaved roads and dust from agricultural activities. Based on the measured sound levels (measured over a period of a week from in accordance with SANS 10103:2008 at two locations in the study area), ambient sound levels in the area are generally low, with the exception of locations closer to existing roads. Ambient sound levels are typical of a rural noise district.
Visual Resources	Visual sensitivity is based on the physical characteristics of the area (i.e. topography, landform and land cover), the spatial distribution of potential receptors, and the likely value judgements of these receptors towards a new development (SiVEST, April 2022). Broadly speaking, the visual character in much of the area has been significantly transformed and degraded by mining and infrastructural development, though the area still retains a rural character due to the prevalence of agricultural activities.
Socio-Economic	The Project falls primarily in the Steve Tshwete Local Municipality (STLM) of the Nkangala District Municipality (DM). Population growth between 2009 and 2019 was 2,7% year-on-year for the STLM which compared favourably to the DM (2,3%) and Mpumalanga (1,6%) over the same period. The disposable average monthly income of households in the STLM was R13,297 which was 57% higher than the average for the DM (R8,425) and 95% higher than the average for Mpumalanga. Review of the employment profile of the STLM indicates that 22% of the economically active population in the municipality is formally unemployed. The unemployment rate and labour force participation rate in the STLM were notably better than that of the DM (Unemployment rate: 33,3%; Labour force participation rate: 39,3%). The growth of the local municipality over the last few years was largely due to the strong performance of the mining, quarrying and manufacturing sectors (Urban-Econ, April 2022). On the site itself, commercial farming is prevalent: Beef is the largest portion of livestock, approximately 1,150 cattle, followed by sheep, with approximately 30 sheep. One of the farmers indicated that they farm with pigs (10 pigs).

Aspect	Description
Heritage and Archaeology	Heritage finds on the Site were limited to burial sites and the demolished remains of residential dwellings. The Graves are of High Cultural Significance. The Ruins, generally, have no potential to contribute to aesthetic, historic, scientific or social aspects, and are therefore of low heritage significance, although still protected in terms of the NHRA (Generally Protected C) (Beyond Heritage, April 2022).
Paleontology	The site lies on non-fossiliferous dolerite and on potentially very highly fossiliferous shales of the Vryheid Formation (Ecca Group, Karoo Supergroup) that could have fossil plants of the *Glossopteris* flora above or below the coal seams. Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the loose soils and sands of the Quaternary. There is a very small chance that fossils may occur in the shales and siltstones of the early Permian Vryheid Formation, but only more than 5m below the surface (Bamford, May 2022).
Traffic	The R542 between Komati and Hendrina runs north of the development site. The R38 (Hendrina to Bethal) runs south-east of the site. The R35 (Komati to Bethal) runs west of the site. The R38 and R35 are National Roads. The R542 is a Provincial Road (P182) and is classified as a Class 3 District Distributor. The Mpumalanga Road Asset Management System (RAMS) (http://mp-rams.co.za/rams/rams.html) rate the Annual Average Daily Traffic (AADT) of the R542 as Medium (between 1 000and 2 000 vehicles per day) and rates the percentage of heavy vehicles on the road as Medium (between 20% and 50%) (JG Afrika, April 2022).

5 Environmental Sensitivity in Relation to the Project



6 Findings of the Impact Assessment

Based on the impact assessment that has been undertaken, the following potential negative impacts were rated as **High or Significant**, before the implementation of mitigation measures:

- (3A): **Wetland destruction** due to placement of infrastructure. The impact significance is reduced to Low with the implementation of mitigation measures.
- (4A): Loss and/or fragmentation of **indigenous natural vegetation** due to clearing for construction. The impact significance is reduced to Moderate with the implementation of mitigation measures. The sensitivity of the vegetation on site should be verified during pre-construction site walk-downs prior to vegetation clearance commencing.
- (4B): Impact on **integrity of CBAs** due to development in CBAs. The impact significance is reduced to Moderate with the implementation of mitigation measures. The vegetation on site is not pristine and already fragmented due to the presence of mining and farming infrastructure, which should be considered when designating areas as CBAs. The sensitivity of the vegetation on site should be verified during pre-construction site walk-downs prior to vegetation clearance commencing.
- (6C): **Bat mortalities** due to collisions with Turbine Blades or due to Barotrauma during the operational Phase. Before Mitigation the impact is considered significant. With mitigation, impact significance is reduced to Moderate. Further operational monitoring will be required.
- (6D): **Bat mortalities** during migration, and subsequent effect on cave ecosystems and biota. The impact significance is reduced to Low with the implementation of mitigation measures.
- (6E): Increased risk of impacts to **bats**, due to lighting and habitat creation. The impact significance is reduced to Low with the implementation of mitigation measures.
- (7A): Displacement of priority **avifauna** due to disturbance associated with the construction. The impact significance is High, and reduced to Moderate with the implementation of mitigation measures.
- (7C): **Avifauna** mortalities due to collision with wind turbines. With mitigation, impact significance is reduced to Moderate.
- (7D and 7E): **Avifauna** Electrocution mortality and/or collision mortality from medium voltage reticulation lines. The impact significance is reduced to Low with the implementation of mitigation measures.
- (7F): Displacement of priority **avifauna** due to disturbance associated with the dismantling of the wind turbines and associated infrastructure. The impact significance is reduced to Moderate with the implementation of mitigation measures.
- (12B): Destruction of **heritage resources**: ruins at 073 to 080. The impact significance is reduced to Insignificant with the implementation of mitigation measures (permitted destruction or avoidance).
- (12C): Destruction of **heritage resources**: graves at 081. Impact significance is reduced to insignificant with mitigation measures (in-situ conservation of the site).
- (12D): Destruction of **heritage resources**: graves at 072A. Impact Significance is reduced to Insignificant if the location of WTG15 is moved to avoid the graves.

- (13B): Increased risk of **road safety incidents** due to transport of equipment, staff. Material etc to the site. The impact significance is reduced to Low with the implementation of mitigation measures.
- (15A): Incorrect storage and Use of **Dangerous Goods / Hazardous Substances** leading to environmental pollution. The impact significance is reduced to Low with the implementation of mitigation measures.

The Table overleaf presents a summary of the findings of the Impact Assessment.

Table 10: Summary of the findings of the Impact Assessment

No	Activity	Aspect	Impact / Risk Description	Phase	Nature of Impact	Significance (without Mitigation)		Significance (with Mitigation)	
1A	Presence of the Turbine hardstands, substation, BESS etc. on land that could otherwise have been used for agricultural production.	Soils	Loss of agricultural potential by occupation of land	Construction	Negative	50	Moderate	35	Low
1B	Presence of the construction camps and laydown areas on land that could otherwise have been used for agricultural production.	Soils	Loss of agricultural potential by occupation of land	Construction	Negative	35	Low	35	Low
1C	Construction causing altered surface run-off (including vegetation clearance, increase in impermeable surfaces)	Soils	Loss of agricultural potential by Soil Degradation	Construction	Negative	52	Moderate	18	Insignificant
1D	Construction activity and presence of personnel	Soils	Nuisance impacts to farmers and farming operations	Construction	Negative	16	Insignificant	16	Insignificant
1E	Lease Agreements with affected land owners	Soils	Increased financial security for farming operations as a result of reliable diversified income	Operation	Positive	16	Insignificant	16	Insignificant
1F	Presence of security infrastructure and personnel associated with the Project	Soils	Improved security at affected farms	Operation	Positive	16	Insignificant	16	Insignificant
2A	As part of the construction phase, numerous sites will be graded, vegetation will	Water Resources	Deterioration in surface water quality if any surface water runoff comes into contact with dust, eroded soil, or other pollutants generated during	Construction	Negative	55	Moderate	30	Low

No	Activity	Aspect	Impact / Risk Description	Phase	Nature of Impact	Significance (without Mitigation)		Significance (with Mitigation)	
	be cleared, and soil will be stripped.		construction. Potential spillages of Hazardous materials (i.e., sewage, cement, oil, fuel and / or grease) may negatively impact on the surrounding clean water environment if not prevented or mitigated.						
2B	Presence of compacted and/or concreted areas (roads, hardstands etc.).	Water Resources	Increase in erosion occurring along all concrete and / or heavily compacted surface areas where runoff is concentrated, and flow velocity is increased. Increased erosion rates will elevate the sediment load contained in surface water runoff leading to a deterioration in quality.	Construction	Negative	39	Low	24	Low
2C	Water use/abstraction of groundwater during the construction phase.	Water Resources	Over abstraction of groundwater for construction needs can result in aquifer depletion and loss of resource for farmers.	Construction	Negative	42	Moderate	24	Low
2D	Presence and use of hazardous chemicals during the operational phase.	Water Resources	Storage and use of greases, lubricants etc. for maintenance purposes could lead to chemical contamination (pollution) of water resources.	Operation	Negative	42	Moderate	26	Low
2E	As part of decommissioning, infrastructure will be removed and previously compacted areas ripped.	Water Resources	There may be a deterioration in surface water quality when any surface water runoff comes into contact with dust, eroded soil, or other pollutants. The sediment load within	Decommissioning	Negative	55	Moderate	16	Insignificant

No	Activity	Aspect	Impact / Risk Description	Phase	Nature of Impact	Significance (without Mitigation)		Significance (with Mitigation)	
	Decommissioning activities are also associated with the presence of hydrocarbons and other chemicals on site.		surface water runoff may increase or the chemistry of surface water may be altered.						
3A	Construction of roads, pipelines and power cables will result in destruction of wetlands where these overlap the development footprint.	Aquatic Ecology	Wetland Destruction: Head cut erosion and channel forming from the roads (culverts); Increased erosion and consequently sedimentation potential into wetlands; and Loss of vegetation and habitat.	Construction	Negative	60	High	36	Low
3B	Construction activity and the use and storage of potentially hazardous / polluting substances (lubricants, oils, explosives, fuels, etc.) and the presence of sanitation facilities during construction.	Aquatic Ecology	Wetland degradation by pollution: Contamination from hydrocarbons and chemicals (lubricants, oils, explosives, and fuels); Contamination from waste, sewage and wastewater; and Changes to wetland health and biodiversity.	Construction	Negative	45	Moderate	26	Low
3C	Use of existing haul roads and vehicle movement	Aquatic Ecology	Head cut erosion and channel forming from the roads (culverts); Increased erosion and consequently sedimentation potential into wetlands; Loss of vegetation and habitat; and Wetland fragmentation.	Operation	Negative	48	Moderate	33	Low
3D	Hydrocarbon and Waste Spills	Aquatic Ecology	Contamination from hydrocarbons and chemicals (lubricants, oils explosives, and fuels); Contamination from waste, sewage and	Operation	Negative	45	Moderate	26	Low

No	Activity	Aspect	Impact / Risk Description	Phase	Nature of Impact	Significance (without Mitigation)		Significance (with Mitigation)	
			wastewater; and Changes to wetland health and biodiversity.						
3E	Rehabilitation – rehabilitation mainly consists of profiling and landscaping (re-vegetation) of the affected land.	Aquatic Ecology	Uneven surfaces and topographies, causing water ponding and changes to the hydrogeomorphology of the wetlands; The proliferation of alien invasive plant species (AIPs); Exposure of soils and subsequent compaction, erosion, and sedimentation into the wetlands; Deterioration of water quality; and Potential spillage of hydrocarbons such as oils, fuels, and grease, and other pollutants thus contamination of wetlands.	Decommissioning	Negative	56	Moderate	39	Low
3F	Monitoring and rehabilitation.	Aquatic Ecology	Minimal negative impacts on the environment; and Wetland and AIPs Monitoring Plan.	Decommissioning	Negative	33	Low	20	Low
4A	Clearing of natural habitat for construction	Terrestrial Biodiversity	Loss and/or fragmentation of indigenous natural vegetation.	Construction	Negative	60	High	50	Moderate
4B	Development within Critical Biodiversity Areas (CBAs)	Terrestrial Biodiversity	Impact on integrity of Critical Biodiversity Areas	Construction	Negative	60	High	55	Moderate
4C	General disturbance associated with construction activities, vegetation clearance, earthworks etc.	Terrestrial Biodiversity	Establishment and spread of declared weeds and alien invader plants.	Construction	Negative	21	Low	8	Insignificant

No	Activity	Aspect	Impact / Risk Description	Phase	Nature of Impact	Significance (without Mitigation)		Significance (with Mitigation)	
4D	Clearing of vegetation, construction of hard surfaces and compaction of surfaces.	Terrestrial Biodiversity	Increased runoff and erosion	Construction	Negative	24	Low	12	Insignificant
4E	General operational activities, scheduled and emergency maintenance activities.	Terrestrial Biodiversity	Sporadic unforeseen disturbance to natural habitats e.g. accidental fires, driving off-road, dumping etc.	Operation	Negative	55	Moderate	27	Low
4F	The presence of disturbed surfaces on site creates ecological edges and corridors along which alien species can travel and become established.	Terrestrial Biodiversity	Establishment and spread of declared weeds and alien invader plants.	Operation	Negative	48	Moderate	16	Insignificant
4G	Cleared areas, presence of hard compacted and constructed surfaces.	Terrestrial Biodiversity	Increased runoff volumes and velocity, resulting in erosion, and subsequent siltation of downstream areas, loss of soil.	Operation	Negative	33	Low	30	Low
4H	Removal of infrastructure	Terrestrial Biodiversity	Disturbance of natural habitat during infrastructure removal	Decommissioning	Negative	24	Low	16	Insignificant
4I	The presence of disturbed surfaces on site creates ecological edges and corridors along which alien species can travel and become established.	Terrestrial Biodiversity	Continued establishment and spread of declared weeds and alien invader plants	Decommissioning	Negative	33	Low	18	Insignificant
6A	Vegetation clearance	Bats	Loss of bat foraging habitat by clearing of vegetation.	Construction	Negative	50	Moderate	32	Low
6B	Earthworks, diggings and levelling	Bats	Bat roost destruction during earthworks. Including bat roosts in clumps of trees.	Construction	Negative	48	Moderate	24	Low

No	Activity	Aspect	Impact / Risk Description	Phase	Nature of Impact	Significance (without Mitigation)		Significance (with Mitigation)	
6C	Turbine blades turning	Bats	Foraging bats can be killed by colliding with turbine blades, or by suffering barotrauma.	Operation	Negative	80	Significant	52	Moderate
6D	Turbine blades turning	Bats	Bat mortalities during migration and subsequent effect on cave ecosystems and biota.	Operation	Negative	72	High	34	Low
6E	Artificial lighting or roost creation at nearby buildings and/or turbine bases.	Bats	Floodlights and other lights at turbine bases or nearby buildings, as well as habitat creation in the form of roofs of nearby buildings will attract bats to site, which will increase the likelihood of bats beings impacted on by moving blades.	Operation	Negative	75	High	24	Low
7A	Construction of the turbines and associated infrastructure	Avifauna	Displacement of priority avifauna due to disturbance associated with the construction	Construction	Negative	60	High	44	Moderate
7B	Construction of the turbines and associated infrastructure	Avifauna	Displacement of priority species due to habitat transformation associated with construction	Construction	Negative	52	Moderate	39	Low
7C	Operation of the wind turbines	Avifauna	Collision mortality of priority species	Operation	Negative	75	High	56	Moderate
7D	Medium voltage overhead lines	Avifauna	Electrocution mortality from medium voltage reticulation lines	Operation	Negative	60	High	36	Low
7E	Medium voltage overhead lines	Avifauna	Collision mortality from medium voltage reticulation lines	Operation	Negative	60	High	36	Low
7F	Dismantling of the turbines and associated infrastructure	Avifauna	Displacement of priority avifauna due to disturbance associated with the dismantling of the wind	Decommissioning	Negative	60	High	44	Moderate

No	Activity	Aspect	Impact / Risk Description	Phase	Nature of Impact	Significance (without Mitigation)		Significance (with Mitigation)	
			turbines and associated infrastructure.						
8A	Land clearing, drilling, and blasting, ground excavation, cut and fill operations and the movement of heavy construction vehicles on dirt roads	Air Quality	Dust and emissions	Construction	Negative	55	Moderate	35	Low
8B	Daytime Construction Activities	Noise	Daytime construction activities potentially increasing the existing ambient sound levels by more than 7 dB (All Noise Sensitive Receptors considered in Model).	Construction	Negative	20	Low	20	Low
8C	Night time Construction Activities	Noise	Night time construction activities potentially increasing the existing ambient sound levels by more than 7 dB (All Noise Sensitive Receptors considered in Model, Receptor 28 will experience very high impact magnitude, but this represents the Halfgewonnen Mine offices and not a sensitive receptor.)	Construction	Negative	22	Low	22	Low
8D	Construction and upgrading of access and internal roads	Noise	Increase in ambient noise levels from road construction activities and construction traffic	Construction	Negative	22	Low	22	Low
8E	Operation of the wind turbines	Noise	Increase in ambient noise levels from the wind turbines (modelled at all Noise-sensitive receptors).	Operation	Negative	28	Low	28	Low

No	Activity	Aspect	Impact / Risk Description	Phase	Nature of Impact	Significance (without Mitigation)		Significance (with Mitigation)	
10A	Large construction vehicles, equipment and material stockpiles. Dust emissions and dust plumes from stockpiles, bare areas and increased traffic on the gravel roads. Littering on the construction site.	Visual	Potential alteration of the visual character and sense of place Potential visual impact on receptors in the study area. Potential visual impact on the night time visual environment.	Construction	Negative	55	Moderate	32	Low
10B	Presence of the Wind Turbines and Associated Infrastructure. Security and operational lighting at the WEF at night.	Visual	Potential alteration of the visual character and sense of place Potential visual impact on receptors in the study area. Potential visual impact on the night time visual environment.	Operation	Negative	55	Moderate	55	Moderate
10C	Vehicles and equipment involved in decommissioning. Infrastructure remaining on site after decommissioning.	Visual	Visual intrusion caused by vehicles and equipment, dust, and remaining infrastructure.	Decommissioning	Negative	40	Moderate	32	Low
11A	Construction activities of the Project	Socio-Economic	Temporary increase in the GDP and production of the national and local economies during construction	Construction	Positive	60	High	65	High
11B	Employees need to conduct construction activities	Socio-Economic	Temporary increase employment in the national and local economies	Construction	Positive	44	Moderate	60	High
11C	Skills learned by employees during construction	Socio-Economic	Contribution to skills development in the country and local economy	Construction	Positive	30	Low	44	Moderate

No	Activity	Aspect	Impact / Risk Description	Phase	Nature of Impact	Significance (without Mitigation)		Significance (with Mitigation)	
11D	Employees' salaries	Socio-Economic	Temporary increase in household earnings	Construction	Positive	55	Moderate	60	High
11E	Public spending	Socio-Economic	Temporary increase in government revenue	Construction	Positive	36	Low	36	Low
11F	Construction activities of the Project	Socio-Economic	Negative changes to the sense of place	Construction	Negative	40	Moderate	36	Low
11G	Construction activities on farms	Socio-Economic	Impact on the agriculture operations	Construction	Negative	36	Low	32	Low
11H	Influx of people	Socio-Economic	Temporary increase in social conflicts	Construction	Negative	40	Moderate	18	Insignificant
11I	Increase in local traffic and migration of construction workers	Socio-Economic	Impact on economic and social infrastructure	Construction	Negative	40	Moderate	27	Low
11J	Construction activities on farms	Socio-Economic	Impact on property and land value in the immediately affected area during construction	Construction	Negative	24	Low	14	Insignificant
11K	Operational Expenditure	Socio-Economic	Sustainable increase in the GDP and production of the national and local economies.	Operation	Positive	60	High	64	High
11L	Operational team for facility	Socio-Economic	Creation of sustainable employment positions nationally and locally	Operation	Positive	56	Moderate	60	High
11M	Skills learned by employees during operations	Socio-Economic	Skills development of permanently employed workers	Operation	Positive	33	Low	44	Moderate
11N	Employees' salaries	Socio-Economic	Improved standards of living for benefiting households	Operation	Positive	56	Moderate	60	High
11O	Public spending	Socio-Economic	Sustainable increase in national and local government revenue	Operation	Positive	60	High	60	High
11P	Operational expenditure	Socio-Economic	Local economic and social development benefits derived from the project's operations	Operation	Positive	65	High	70	High

No	Activity	Aspect	Impact / Risk Description	Phase	Nature of Impact	Significance (without Mitigation)		Significance (with Mitigation)	
11Q	Operational expenditure	Socio-Economic	Sustainable rental revenue for farms where the wind farm is located	Operation	Positive	50	Moderate	50	Moderate
11R	Wind Farm operation	Socio-Economic	Sustainable increase in electricity available for the local region and South Africa	Operation	Positive	60	High	60	High
11S	Presence of wind turbines	Socio-Economic	Negative changes to the sense of place	Operation	Negative	55	Moderate	30	Low
11T	Wind Farm operation	Socio-Economic	Impact on the agriculture operations	Operation	Negative	55	Moderate	36	Low
12A	Excavation below 5m	Palaeontology	Disturbance of fossils	Construction	Negative	32	Low	14	Insignificant
12B	Establishment of construction camp 2	Heritage Resources	Destruction of ruins at 073 - 080	Construction	Negative	60	High	14	Insignificant
12C	Establishment of construction camp 2	Heritage Resources	Destruction of graves at 081	Construction	Negative	68	High	12	Insignificant
12D	Construction of WTG15	Heritage Resources	Destruction of graves at 072A	Construction	Negative	90	Significant	18	Insignificant
12E	Fencing of graves for their protection / preservation	Heritage Resources	Access restriction to ancestral burial grounds	Construction	Negative	42	Moderate	13	Insignificant
12F	General construction activity and excavation	Heritage Resources	Destruction of or damage to heritage resources that have not yet been uncovered	Construction	Negative	32	Low	14	Insignificant
13A	Transport of equipment, material and staff to site.	Transport and Traffic	Traffic congestion	Construction	Negative	40	Moderate	27	Low
13B	Transport of equipment, material and staff to site	Transport and Traffic	Increased risk of road safety incidents	Construction	Negative	60	High	39	Low
14A	Generation of general and hazardous waste including sewage waste during construction	Waste Management	Incorrect waste disposal leading to environmental pollution.	Construction	Negative	50	Moderate	14	Insignificant

No	Activity	Aspect	Impact / Risk Description	Phase	Nature of Impact	Significance (without Mitigation)		Significance (with Mitigation)	
14B	Dismantling and disposal of turbine components	Waste Management	Potential failure to adequately transport components off-site and dispose / recycle components legally, resulting in illegal dumping and associated pollution.	Decommissioning	Negative	45	Moderate	8	Insignificant
15A	Storage and Use of Dangerous Goods / Hazardous Substances	Dangerous Goods	Incorrect storage and Use of Dangerous Goods / Hazardous Substances leading to environmental pollution	Construction	Negative	60	High	24	Low

7 Environmental Management Outcomes

The management measures detailed in Section 9 of this report, present specific actions to be undertaken to avoid or minimise the significance of the identified impacts. Alternative management and mitigation measures may exist, that would attain the same goal. Considering the rapidly developing technology associated with Wind Energy, ever-changing legislative frameworks, uncertain economic conditions and the dynamic nature of environmental systems, management measures may be considered fluid to some degree, as long as adaptive management achieves (at least) the same level or a higher level of impact mitigation, in line with the mitigation hierarchy.

"NEMA and the EIA Regulations call for a hierarchical approach to impact management.

- Firstly, alternatives must be investigated to avoid negative impacts altogether.
- Secondly, if it is found that the negative impacts cannot be avoided, alternatives must be investigated to reduce (mitigate and manage) unavoidable negative impact.
- Thirdly, alternatives must be investigated to remediate (rehabilitate and restore).
- Fourthly, unavoidable impact that remain after mitigation and remediation must be compensated for through investigating options to offset the negative impacts.
- Throughout, alternatives must be investigated to optimise positive impact" (DEA, 2017).

Specific environmental management outcomes for the Project include:

- Impact Avoidance – implement measures to prevent the impact from occurring:
    - By the placement of infrastructure outside of identified environmental sensitivities in the pre-construction and detail design phases, impacts to heritage resources, indigenous vegetation, SCC, wetlands and sensitive habitats, can be completely avoided.
    - By implementing proper stormwater management and erosion control, erosion can be avoided, subsequently also avoiding the impacts of sedimentation of downstream water resources and the effects thereof on aquatic ecosystems.
    - By providing adequate training and infrastructure, pollution from chemical spillages and waste can largely be avoided.
- Impact Minimisation – the significance of an impact can be reduced by minimising the likelihood that the impact would occur, minimising the magnitude of the impacting action(s), shortening the duration of the impact or reducing the physical extent of the impact:
    - Minimise the area cleared for construction to that which is absolutely necessary to allow for efficient construction.
    - Minimise the construction time-frame, avoid delays by adequate scheduling of component and material delivery to site, adequate resourcing, scheduling of physical construction activities and minimisation of down-time.
- Remediation of Impacts:
    - Rehabilitate the footprints affected by construction concurrently (i.e., if an area is no longer needed for construction, rehabilitate it immediately and do not wait for construction of the whole project to be completed before implementing rehabilitation measures).

8 Implementation of the EMPr

For an EMPr to be effective, it must make clear who the responsible person(s) are for implementing the stipulated management measures, how and by whom compliance to the specified conditions will be monitored, and how the environmental performance of the Project will be reported on, to whom, and how frequently.

Many of the terms and stipulations below align to the Generic EMPr documents published in terms of the NEMA, to ensure that this EMPr is aligned to the DFFE requirements and uses consistent terminology. The Generic EMPr documents (DEA, 2019) are not referenced individually, but are appended to the EIA Report.

8.1 Roles and Responsibilities

Project-specific requirements will ultimately determine the need for the appointment of specific person(s) to undertake specific tasks at different phases of the Project. The Roles and Responsibilities defined below relate to the typical role-players associated with Wind Farm development.

8.1.1 The Applicant (Holder)

The Holder of the EA (if awarded) will be the Applicant, who is a special-purpose vehicle created by the Developer. The Applicant will be ultimately responsible for ensuring compliance to the EMPr, ESMS and conditions of the EA.

An environmental control officer (ECO) must be contracted by the Applicant to objectively (independently) monitor the implementation of the EMPr according to relevant environmental legislation, and the conditions of the environmental authorisation (EA). The Applicant is further responsible for providing and giving mandate to enable the ECO to perform responsibilities, and he must ensure that the ECO is integrated as part of the project team while remaining independent. The role of the independent ECO is further unpacked in Section 8.1.5.

The Applicant will also appoint the EPC and O&M Contractors (See Section 8.1.2).

The Applicant's responsibilities will include the following:

- Being fully familiar with the EIA Report, EA conditions and the EMPr;
- Notifying the DFFE of changes in the developments that result in significant environmental impacts;
- Notifying the DFFE within 30 days of change of ownership, and/or change of address of the owner/Applicant;
- Ensuring compliance, by all parties, and the imposition of penalties for noncompliance;
- Monitoring the implementation of corrective and preventative actions, by the EPC;
- Monitoring the prevention of pollution and actions that may cause harm to the environment;
- Ensuring the activity does not commence until all relevant approvals are in place;
- Notifying the DFFE within 30 days that construction activity will commence;
- Notifying the DFFE in writing within 24 hours if any condition in the EA cannot be or is not adhered to; and
- Notifying the DFFE 14 days prior to commencement of the operational phase.

8.1.2 The EPC Contractor and O&M Contractor

The EPC Contractor is appointed by the Applicant for the Construction Phase, while the O&M Contractor is appointed for the Operational Phase of the Project. The Contractor shall take all required steps to ensure that the project meets all Environmental legislative requirements as required by the project EA, ESMS EMPr and Equator Principles Action Plan (EPAP), together with all applicable IFC Environmental, Health and Safety Guidelines and Procedures. Guidelines and Procedures as developed and implemented by the Developer /Applicant, and any other relevant standards identified by the lenders or the project sponsor must be implemented as required. These contractors have overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract are in line with above mentioned authorisations, procedures and guidelines and that Method Statements (Section 8.4) are implemented as described.

All contractors must ensure compliance with the ESMS and EMPr while performing the onsite activities as per their contract with the Applicant (Holder). The contractors are required, where specified, to provide Method Statements setting out in detail how the impact management actions contained in the EMPr will be implemented during the construction and operation of the Project.

The following labour, health and safety standards will be relevant:

- The Contractor shall take all required steps to ensure that the project meets all legislative requirements as per the Occupational Health and Safety Act No. 85 of 1993 and the requirements of the IFC Performance Standards (Section 2.1) and the IFC Environmental, Health and Safety Guidelines.
- The Contractor shall develop a site-specific Health and Safety Plan in line with the Health and Safety Specification as a pre-construction requirement.
- The Contractor shall ensure compliance with all relevant Standards and Procedures as developed and implemented by the Developer and Applicant and any other relevant standards identified by the lenders or the project sponsor. Compliance will extend to any direct or indirect employees (including sub-contractors) and any persons required to be on the site.

The Contractor shall appoint a full-time Environmental Officer (See Section 8.1.4 for requirements).

The Contractor shall appoint a full-time certified Construction Health and Safety Officer (CHSO) or Construction Health and Safety Manager (CHSM). See Section 8.1.5 for requirements.

The above appointments cannot be dual roles as appointed by the Contractor. Above appointments must be approved by Applicant

8.1.3 Construction Site Manager

A Construction Site Manager must be appointed by the EPC contractor for the duration of the construction phase. The Construction Site Manager shall:

- Be fully conversant with the EIA Report, the conditions of EA and the EMPr;
- Approve method statements;
- Provide support to the ECO;

- Be fully conversant with all relevant environmental legislation and ensure compliance thereto;
- 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 EA;
- 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 on site;
- Confine construction activities to demarcated areas

8.1.4 The Contractor's EO

The Contractor shall appoint a full-time Environmental Officer (EO), with a qualification in environmental management and a minimum of 5 years' experience in onsite environmental management specifically in the implementation of EMPrs and ESMS. The EO must be based onsite full time and ensure that the project, the Contractor, and sub-contractors meet the requirements and standards listed in this document. The EO will also be responsible for reporting to the Applicant on the environmental performance of the project, within the Construction monthly report.

Each Contractor affected by the ESMS and EMPr should appoint an EO who will be responsible for the on-site implementation of the EMPr and ESMS. The Contractor's EO can be a dedicated environmental officer; or an independent consultant.

The Applicant must ensure that the Contractor's EO (or another party appointed to assume the role and responsibilities of the EO) is suitably qualified and has adequate resources and capacity to perform the necessary tasks and is appointed at a level such that she/he can interact effectively with other site Contractors, labourers, the independent ECO and the public. The Applicant must approve the appointment of the EO by the Contractor. As a minimum the EO shall:

- Be on site throughout the duration of the project and be dedicated to the project;
- Implement and Maintain the ESMS on site, throughout the construction, operation and decommissioning phases.
- Ensure the employees, contractors and visitors on site are aware of the environmental requirements, conditions and constraints with respect to all of their activities on site;
- Communicate the requirements of the ESMS, EMPr and conditions of the EA to all relevant persons, and advise them on implementing the environmental conditions, guidelines and requirements as stipulated within the EA.
- Keep comprehensive records of environmental training, environmental performance, non-compliances to the ESMS, EMPr and EA conditions, environmental incidents and accidents.
- Undertake regular auditing (monthly) of compliance to the EMPr and conditions of the EA, and report on compliance to the EPC/O&M, Holder and CA (See Table 11 for auditing and reporting frequencies in different phases of the Project).

- Manage and report on environmental incidents and emergency situations in accordance with Section 30 and 30A of NEMA.
- Provide all internal compliance inspection records, training records, incident reports and reports on corrective actions to the independent ECO (see Section 8.1.6) to assist in the completion of independent compliance audits.

The Contractor's EO shall monitor and maintain records of (at least) the following, and make such records available to all relevant parties on request, and specifically to the independent ECO for independent verification purposes.

- Waste records
- Water monitoring
- Training records
- Method statements/risk assessments
- EO Weekly checklist
- Record of complaints;
- Record of emergencies and incidents.
- Environmental incidents involving contractor/ employees and/or the public;
- Complaints and correspondence received from the public; and Incidents that cause harm or may cause harm to the environment.

8.1.5 Construction Health and Safety Officer (CHSO) or Construction Health and Safety Manager (CHSM)

The Contractor shall appoint a full-time certified Construction Health and Safety Officer (CHSO) or Construction Health and Safety Manager (CHSM) with a minimum of 5 years of experience in onsite health and safety management. The CHSO/CHSM must be based onsite to ensure that the project complies with all legislative requirements and the requirements of the Labour, Health and Safety Standards. The CHSO/CHSM Occupational Health and Safety Officer will also be responsible for reporting to the Project on the health and safety performance of the project within the Construction monthly report.

The above CHSO/CHSM and EO appointments cannot be dual roles as appointed by the Contractor. Above appointments must be approved by Applicant.

8.1.6 Independent ECO

A suitably qualified ECO must be appointed by the Applicant on a full-time basis for the duration of the construction phase to monitor the project compliance with the EMPr and conditions of the EA. The costs of the ECO shall be borne by the Applicant (proof of appointment must be maintained onsite).

The primary role of the ECO, in summary, is to act as an independent monitoring agent regarding all environmental concerns and associated environmental impacts. As such, the ECO is to conduct periodic site inspections, attend regular site meetings, advise on mitigations to prevent negative impacts and be available to advise on incidental issues that arise. The ECO is also required to conduct compliance audits verifying the monitoring reports submitted by the Contractor's EO (See Section 8.1.4)

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

Responsibilities of the ECO include:

- Be fully conversant with the EIA, the conditions of environmental authorisation and the EMPr;
- Be fully conversant with all relevant environmental legislation and ensure compliance thereof;
- Approve method statements; and
- Report to the Project Manager, including all findings identified onsite.

The Applicant must ensure that a full-time ECO remains employed for the duration of the construction phase. In addition, the ECO will:

- Undertake monthly inspections of the site and surrounding areas during the construction phase 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 report to the Applicant and Authorities any non-compliances to the EA and EMPr; and
- Advise the EPC and/or other parties on legal requirements and report on non-compliances to the EPC (to attempt corrective action), the Applicant, and Authorities where necessary.

8.2 Monitoring and Reporting Requirements

Table 11 provides a summary of the EMPr and EA Compliance Monitoring and Reporting Requirements for different phases of the Project.

Table 11: Monitoring and Reporting Requirements

Name	Project Phase	Person to undertake the Monitoring	Method:	Frequency:	Report to:
Weekly inspection log (diary)	Construction	EPC Contractor's EO	Photographic Records; Checklist completion (signed and dated)	Weekly	Weekly checklists to be appended to Monthly Reports
Environmental Site Meeting Minutes	Construction	EPC Contractor's EO	Minutes & attendance register of meetings	Weekly, or more frequently as required	Minutes distributed to all Attendees
Monthly ECO Audits	Construction	Independent ECO	Monthly ECO Audit Report monitoring compliance against EMPr and Conditions of EA (compliant to EIA Regulations Appendix 7)	Monthly	EPC Contractor; Applicant; and DFFE
Construction completion environmental audit	At the end of the construction phase (once-off)	Independent ECO	Once-off audit report, compliant to EIA Regulations Appendix 7	Once-off	EPC Contractor; Applicant; and DFFE
Internal Environmental Audits	Construction and Decommissioning	EPC Contractor's EO	Internal Report monitoring compliance against EMPr and Conditions of EA	Monthly	Contractor; Applicant
Internal Environmental Audits	Operation	O&M Contractor's EO		Quarterly	Contractor; Applicant; and DFFE
External Environmental Audits	Operation	Operational phase monitoring requirements / protocol will be defined in the ESMS (to be compiled if the Project is a preferred bidder). Operational Monitoring typically involves annual audits by a third-party.			
Groundwater	Construction	EPC Contractor's EO	Record the flow meter readings daily if groundwater is abstracted. Compare to results of pump tests.	Daily and monthly tally	EPC Contractor and DWS
Live-bird monitoring	Operational	Applicant/Avifauna Specialist	As per the most recent edition of the Best Practice Guidelines at the time to compare the abundance of avifauna during the pre-construction monitoring with the abundance post-construction	Minimum of 2 years, (year 1 and year 2), then again in year 5, and every 5th year thereafter	Applicant BirdLife, South Africa and MTPA
Carcass searches	Operational	Applicant/O&M Contractor with the the Avifaunal Specialist	Carcass searches at overhead sections of the internal reticulation network	At least once every 2 months	Annual report to Applicant, BirdLife South Africa and MTPA

Name	Project Phase	Person to undertake the Monitoring	Method:	Frequency:	Report to:
Wetland Functionality	At the end of construction, and at the end of decommissioning	Wetland Specialist to be appointed by Contractor/ Applicant	A basic level 1 health assessment to detect changes to the health of vegetation, hydrology, and geomorphology of the wetlands (determine PES and EIS of the wetlands)	Once-off at the end of construction Once-off at the end of decommissioning	Contractor, Applicant; DFFE Biodiversity directorate and DWS (subject to WUL Conditions)
Operational bat mortality monitoring	Operational phase for minimum 2 years	Bat Specialist to be appointed by Contractor/ Applicant	Active and Passive monitoring as per bat specialist recommendations	Operational phase for minimum 2 years, once-off report.	Contractor, DFFE Biodiversity directorate
Erosion monitoring (as per management plan, Appendix H 1)	All phases	Contractor's EO	Photographic records of problem areas, report on success of interventions and areas where additional intervention is required.	Weekly during construction and decommissioning phases, quarterly during operational phase.	Contractor, ECO, Applicant
Rescued Plants (as per management plan, Appendix H 2)	Post-construction and operational	Contractor's EO or botanist appointed by the Contractor	Record the location and condition of transplanted (rescued) plants. As a scientific control, an equal number of non-transplanted individuals of the same species, within similar habitats, should be monitored in the same way as the transplanted specimens.	Annually for minimum 3 years	Contractor, Applicant, ECO and DFFE Biodiversity directorate
Alien invasive plant monitoring (as per management plan, Appendix H 3)	All phases	Contractor's EO or botanist appointed by the Contractor	Monitor for new growth of previously managed species, new species establishment and success of management measures implemented	Annually during construction, every 3 years during operations, once-off after decommissioning.	Contractor, Applicant, ECO and DFFE Biodiversity directorate
Rehabilitation monitoring (as per management plan in Appendix H 4)	After construction, annually for 3 years	Contractor's EO or Ecologist appointed by the Contractor	Monitor the success of rehabilitation at each area affected by construction activities	After construction, annually for 3 years	Contractor, ECO, Applicant and DFFE Biodiversity directorate

8.2.1 Weekly Inspection Log (Diary)

The EOs are required to maintain an up-to-date and current Environmental inspection Log. The Environmental inspection Log is a means to record environmental 'incidents', which is defined as (DEA, 2019):

- Any deviation from the listed impact management actions (Section 9) that is *addressed immediately* by the EO or contractor or his staff on site. (For example, a contractor's staff member is seen littering by the EO, addressed by the EO or Contractor immediately, and seen picking up the litter and disposing of it in the appropriate bin; another example: the EO observes a drip tray that has not been emptied, and the contractor or a staff member immediately empties it in the correct manner);
- An observed deviation from the environmental specifications which is short-term, and could result in impacts if left unattended, but has not resulted in an impact yet. For example, (DEA, 2019), if the EO observes during inspection that there is no toilet paper in one of the ablutions, and informs the Contractor thereof immediately, but the contractor cannot rectify the situation immediately, but can rectify the situation within a few hours); and
- General environmental information such as road kills or injured wildlife.

The EOs are to record all environmental inspection observations in the Environmental Diary. All observations of deviation from the EMPr or EA, regardless of severity, must be reported to the Applicant. The Log is to be kept in the on-site environmental file. As a minimum the following will be recorded:

- The date and time of the observation;
- Description of the deviation from the EMPr, EA or method statement;
- The name/ area of the Contractor responsible;
- The situation must be listed as significant or minor;
- If significant, a non-compliance notice must be issued, and recorded;
- Remedial or corrective action taken to mitigate the incident; and
- Record of repeat minor offences by the same contractor or staff member.

The Environmental Inspection Log (diary) must be maintained in the on-site environmental file, and form part of the monthly internal environmental audits.

8.2.2 Environmental Audits

The ECO will compile monthly audits during the construction phase, to report on environmental performance of the Project, and the levels of compliance to the conditions of the EA and EMPr. Further, the reports must highlight any material non-compliances to the Applicant, and propose measures to rectify potential non-compliances, and prevent environmental risk.

Compliance auditing frequencies are proposed in Table 11. Formal audits must be undertaken in accordance with Appendix 7 of the EIA Regulations, 2014 (as amended) or the latest amendment(s) thereto at the time of initiating an audit. The scoring system will be determined by the appointed ECO for the project and approved by the Applicant.

External compliance audit reports are to be submitted to the DFFE compliance and enforcement directorate, as per their requirements (if stipulated).

8.2.3 Reporting on Non-compliances and Corrective Actions

Where the Contractor's EO, or the independent ECO identifies a non-compliance with the conditions of the EA or a stipulation in the EMPr, such non-compliance must be reported to the Contractor and Applicant as soon as is reasonably possible.

The EO or ECO will prepare a non-compliance notice, in writing, whenever a non-compliance is identified, and issue the non-compliance notice to the Contractor responsible (the Applicant will be copied on the notice). A copy of the non-compliance notice must be kept in the on-site environmental file. The non-compliance notice must contain the following information:

- Date and time the non-compliance was observed / detected;
- Name of the contractor responsible, and/or area of the site;
- Description of the non-compliance, with photographic evidence where relevant; and
- Recommended action to rectify the non-compliance, with an indication of the acceptable time-frame to rectify the non-compliance.

On receipt of a non-compliance notice, the responsible contractor shall:

- Immediately acknowledge receipt of the non-compliance notice;
- As soon as reasonably possible, address the non-compliance, wither by implementing the action(s) recommended in the non-compliance notice, or by implementing an alternative action after receiving approval of the alternative action from the EO.
- Communicating (in writing) to the Applicant (Holder) and EO when corrective action has been taken.

Following communication from a contractor that corrective action has been taken, the EO and ECO must undertake an inspection and sign off on the corrective action report, including photographic evidence of the intervention, when relevant. The corrective action report must be appended to the original non-compliance notice and kept in the on-site environmental file by the EO.

8.2.4 Environmental Incidents

The NEMA defines "incident" as "an unexpected, sudden and uncontrolled release of a hazardous substance, including from a major emission, fire or explosion, that causes, has caused or may cause significant harm to the environment, human life or property".

Incident reporting requirements are contained in Section 30 of NEMA, and stipulates that:

"The responsible person or, where the incident occurred in the course of that person's employment, his or her employer must forthwith after knowledge of the incident, report through the most effective means reasonably available-

(a) the nature of the incident;
(b) any risks posed by the incident to public health, safety and property;
(c) the toxicity of substances or by-products released by the incident; and
(d) any steps that should be taken in order to avoid or minimise the effects of the incident on public health and the environment to-

i) the Director-General;
ii) the South African Police Services and the relevant fire prevention service;
iii) the relevant provincial head of department or municipality; and
iv) all persons whose health may be affected by the incident."

Further to the above, all reasonable measures must be taken by the responsible person to contain and minimise the effect of the incident, undertake clean-up procedures, remedy the effects of the incidents and assess the immediate and long-term effects of the incident on the environment and public health.

In the event of an above defined incident in the construction or decommissioning phases, the EPC Contractor is to report the incident to the ECO and Applicant verbally immediately after the incident and in writing to the relevant authority within 24hrs of the incident. In the event of an above defined incident in the operational phase, the O&M Contractor is to report the incident to the Applicant verbally immediately after the incident and in writing to the relevant authority within 24hrs of the incident.

"Relevant Authority" is defined in Section 30 of NEMA as: "a municipality with jurisdiction over the area in which an incident occurs; (ii) a provincial head of department or any other provincial official designated for that purpose by the MEC in a province in which an incident occurs; (iii) the Director-General; (iv) any other Director-General of a national department

Within 14 days of the incidents the responsible contractor (or his EO) must report to the Director-General, provincial head of department and municipality such information as is available to enable an initial evaluation of the incident, including-

(a) the nature of the incident;
(b) the substances involved and an estimation of the quantity released and their possible acute effect on persons and the environment and data needed to assess these effects;
(c) initial measures taken to minimise impacts;
(d) causes of the incident, whether direct or indirect, including equipment, technology, system, or management failure; and
(e) measures taken and to be taken to avoid a recurrence of such incident.

This incident report must be reviewed and approved by the ECO and Applicant, during the construction or decommissioning phases, and by the Applicant in the Operational Phase, before submission to the to the Director-General, provincial head of department and municipality.

8.3 Environmental Awareness Training

All onsite staff and contractors must be aware of and understand their responsibilities in terms of the ESMS, EMPr and conditions of the EA. To ensure this awareness and understanding is achieved and maintained, Environmental Awareness Training must be provided to all contractors and on-site personnel by the Contractors EO with assistance from the ECO , prior to the activities commencing on site.

- The EPC Contractor must allow for sufficient sessions to train all personnel with no more than 20 personnel attending each training session;

- Refresher environmental awareness training must available as and when required;
- All staff must be made aware of the conditions and controls linked to the EA and in the ESMS, EMPr and made aware of their individual roles and responsibilities in achieving compliance with the EA, ESMS and EMPr;
- The training must include, as a minimum:
    - Description of the most significant environmental impacts identified in the EIA, and the management / mitigation measures relevant to each;
    - The heritage sites found in the surroundings of the site, and the importance of preserving them;
    - The rules and conduct regarding access to areas outside of the approved construction and operational areas;
    - The importance of proper waste management, and prevention of littering;
    - The importance of adequate sanitation, and not using the veld as a toilet;
    - Disease prevention; and
    - The process to follow to report grievances, environmental incidents or accidents (including fire, spills, access to sensitive areas etc.).
- The EO must maintain written records of the staff who attended the environmental awareness training in the on-site environmental file. Course content should also be kept on file. The training presented must be audience-specific in content and language.

The EPC Contractor must additionally erect and maintain information posters at key locations on site, to ensure continuous awareness-raising of environmental matters relevant to this Project. The posters must include the following information as a minimum:

- Safety notifications;
- No littering;
- No fires (outside of designated areas);
- Demarcation of environmentally sensitive areas; no-go areas
- Emergency contact numbers; and
- Speed limits.

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);

- General Awareness (e.g. World Environment Day, National Arbour Day); and
- Grievance Mechanisms.

8.4 Method Statements

Prior to the commencement of construction, each contractor shall submit a method statement that sets out the equipment, materials, labour and method(s) the Contractor proposes using to carry out a specific activity.

Method statements must be submitted to the Applicant (Holder) and their ECO, for them to confirm that the Method Statements are in accordance with the specifications of the EMPr.

The method statement must cover applicable details with regard to:

- development procedures;
- materials and equipment to be used;
- getting the equipment to and from site;
- how the equipment/ material will be moved while on site;
- how and where material will be stored;
- the containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
- timing and location of activities; and
- compliance/ non-compliance with the EMPr;

The Contractor shall provide the following method statements to the Applicant (Holder) no less than 14 days prior to the commencement date of the activity:

- Access management – Roads, gates, crossings, access to properties etc.;
- Vegetation management – clearing, aliens, felling
- Search Rescue and Relocation,
- Site establishment – Camps, Lay-down or storage areas, satellite camps, infrastructure;
- Batch plants;
- Workshop or plant servicing;
- Transportation Plan: Equipment, Plant, Labour
- Handling, transport and storage of Hazardous Chemical Substances;
- Waste management – transport, storage, segregation, classification, disposal (all waste streams);
- Internal and External Grievance mechanism;
- Water – use (source, abstraction and disposal), access and all related information, crossings and mitigation; usage and water efficiency
- Emergency preparedness – Spills, Fire, Bomb threats, Labour Strikes, COVID-19 and, other environmental and safety emergencies;
- Dust and noise management methodologies;
- Fauna interaction and risk management (including wildlife and livestock);
- Heritage and palaeontology management: Chance find Procedure.

The EOs shall undertake weekly monitoring and ensure that the contractors perform in accordance with these method statements. Method statements must be kept in the on-site environmental file. Non-compliance with an approved method statement shall be regarded as a non-compliance and will result in the issuance of a non-compliance notice and reporting

to the Applicant, according to Section 8.2.2, unless it can be rectified immediately, in accordance with Section 8.2.1.

8.5 Management Plans

Various high-level, conceptual management plans are included as Appendices to this EMPr. These include:

- High-Level Stormwater Management and Erosion Control Plan;
- Preliminary Plant Rescue and Relocation Plan;
- High Level Alien Invasive Management Plan;
- Preliminary Rehabilitation and Revegetation Plan;
- Preliminary Traffic Management Plan;
- Chance Find Protocol;
- Emergency Response Plan;
- Grievance Procedure (internal and external);
- Waste Management Procedure.

The EPC must refine and formalise these plans, to be approved by the Applicant, prior to construction commencing on site. Additionally, the EPC must formulate the following management plans, for approval by the Applicant, and implement them throughout the Construction Phase. These plans will then be refined by the O&M Contractor (for approval by the Applicant) for implementation during the operational phase.

- Hazardous chemical substances management plan;
- Procedure for the management of all hydrocarbon spillages;
- Access protocol to graves that are located on the site;
- Incident classification and reporting management procedure;
- Occupational health and safety plan; and
- Health and safety protocol

8.6 Environmental Social Management System (ESMS) /Document Control and Record Keeping

An on-site environmental file must be maintained throughout all phases of the Project. Digital copies of relevant documentation may be kept in addition to hard-copy documents, but the hard-copy documents must be available on site.

IFC 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 Applicant, EPC, O&M, their workers, and local communities directly affected by the project (the Affected Communities) and, where appropriate, other stakeholders. The ESMS is a set of management processes and procedures that allows a Project to analyse, control and reduce the environmental and social impact of its activities, products and services, and operate with a greater efficiency and control.

The ESMS must be developed by the EPC Contractor prior to the commencement of Construction. The structure of the ESMS must comprise of the following (but not limited to):

- Policy
  - Sustainability Policy
  - HSE Policy
- Identification of Risk & Permits
  - Risk Assessments
  - Full copy of the EIA Report and all appendices
  - EA
  - Construction Permit
  - Environmental Permits
- Management Programmes
  - EMPrs (including copy of the Generic EMPr)
  - Method Statements (as per section 8.4)
  - Management Plans (See section 8.5)
- Organisational Capacity Competency
  - Organogram
  - Appointments
  - Training
  - Medicals
- Monitoring and review
  - Completed (dated and signed) weekly environmental checklists (inspection log / diary) completed by the Contractor's EO for the duration of the construction phase (Section 8.2.1);
  - ECO Monthly Reports (Section 8.2.2);
  - Audit reports (internal and external)
  - Waste Disposal Certificates/manifests/register (See Appendix H 9);
  - Resource Consumption data and analysis (water and electricity);
  - Material Safety Data Sheets; and
  - Non-compliance record, with associated records of corrective actions taken and the current status of each non-compliance recorded (Section 8.2.2);
- Stakeholder Engagement
  - Meeting Minutes
  - Procedures
- Grievance Mechanism
  - Complaints register (record of all complaints received, and notation on how each complaint has been addressed, the person responsible, and the current status of the complaint). See Appendix H 8.
- ESMS Review
  - shall take the form of a formal, documented meeting and chaired by the Project Manager in case of the EPC Contractor.
  - Management reviews should be conducted at regular intervals or at least annually to evaluate overall ESMS performance in order to ensure its effectiveness and continual improvement.

An on-site environmental file must be maintained throughout all phases of the Project. Digital copies of relevant documentation may be kept in addition to hard-copy documents. This file is to be made available at the request of the auditor, ECO, Applicant or similar monitoring

body. A digital photographic record will be kept by the EO, to show before, during and post rehabilitation evidence of the project. The photographic record can also be used in cases of damages claims if they arise. Each image must be dated and a brief description note attached. The photographic record and weekly inspection log may be combined.

8.7 Complaints Register

The EO shall keep a current and up-to-date complaints register. The complaints register is to be a record of all complaints received from communities, stakeholders and individuals.

The Complaints Record shall:

- Record the name and contact details of the complainant;
- Record the time and date of the complaint;
- Contain a detailed description of the complaint;
- Where relevant and appropriate, contain photographic evidence of the subject of the complaint or damage;
- Contain a description of how the complaint has been / will be addressed, the responsible party and the current status of the complaint.

It is recommended that a book and pen/pencil be maintained at the site security offices during the construction phase, and at the O&M Building during the operational phase, to enable parties to lodge complaints in person, but also to maintain the complaints log digitally, and record e-mail or telephonically lodged complaints therein.

Appendix H 8 contains grievance mechanisms for employees and for third parties respectively.

9 Environmental Management Programme

This section details the specific actions that must be undertaken to prevent or minimise (as relevant) the identified environmental impacts of the Project, summarised in Section 6.

In each case, the impact management action is described, and the party responsible for undertaking the action is identified along with the time-period for the implementation of the measure(s). Further, the monitoring requirements, frequency and responsible parties are identified.

Management measures are presented per phase of the Project, and grouped according to specific environmental aspects. The following phases apply:

- Pre-Construction Phase: This phase encompasses all activities that are required to be concluded before on-site activities can commence (including planning, permitting).
- Construction Phase: This phase commences with site preparation, and is considered complete once all post-construction rehabilitation has been implemented and signed-off by the Applicant (Holder) and ECO.
- Operational Phase: The operational phase will span a minimum of 20 years. This phase commences on the commercial operation date (COD), and includes decommissioning planning.

- Decommissioning Phase: This phase will commence once the Project is no longer operational, and the dismantling of project infrastructure commences. As this phase is more than 20 years in future, it is expected that improved technology and best practice will be available at the time of decommissioning, and must be incorporated into decommissioning planning.

9.1 Pre-construction phase

The pre-construction phase of the project serves to lay out the project's entire scope and schedule for the Construction team and Applicant prior to any activities commencing onsite. The following section details all the conditions of the EMPr to be achieved before Construction can commence. Failure to undertake certain activities during the pre-construction phase, can cause or exacerbate the significance of impacts during the construction or operational phases.

Table 12 details the actions that must be undertaken prior to construction commencing, the responsible person(s), and monitoring requirements, to minimise impacts in subsequent project phases.

Table 12: Management measures: pre-construction

No	Management Action	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
0A	Ensure that all the necessary permits, authorisations and permissions are in place.	Applicant	Once-off, prior to construction	Check that all authorisations have been issued. This will include (but is not limited to): - EA in terms of NEMA; - Permit for relocation of SCC / protected plant species; - SAHRA permit for destruction of ruins at Construction Camp 2; - Water Use License /General Authorisation in terms of the National Water Act (Act 36 of 1998); - Approvals from Air Traffic Navigational Services (ATNS) (obstacle application for wind farms); - Land use agreements with affected land owners; and - All necessary permissions from Eskom and the National Energy Regulator (NERSA).
	The BESS design will be subject to a full Hazard and Operability Study (HAZOP) prior to commencement of procurement.	Applicant	Once-off in detailed design phase, prior to procurement	-
0B	Ensure that all the necessary permits, authorisations and permissions are in place.	EPC	Once-off, prior to construction	Ensure that all authorisations have been issued. This will include (but is not limited to):

No	Management Action	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
				- Abnormal load permits, (Section 81 of the National Road Traffic Act (Act 93 of 1996) and National Road Traffic Regulations, 2000); - Port permit (Guidelines for Agreements, Licenses and Permits in terms of the National Ports Act (Act 12 of 2005)); - Authorisation from Road Authorities to modify the road reserve to accommodate turning movements of abnormal loads at intersections
0C	Ensure that the necessary management plans are drafted, submitted and approved by the Applicant	EPC; Contractors	Once-off prior to commencement of construction.	Check that the required management plans are in place and have been approved. These may include but not be limited to: - Stormwater management plans (for construction and operational phases) (based on principles outlined in Appendix H 1); - Search, Rescue and Relocation Plan for protected plants (based on principles outlined in Appendix H 2); - Preliminary Post-construction rehabilitation plan (by EPC, based on principles outlined in Appendix H 4) (to be refined during construction); - Heritage (graves) management plan and access protocol; - Waste management plan; - Hazardous chemical substances management plan; - Contractors' method statements (see Section8.4)
0D	Implement the Search, Rescue and relocation Plan for protected plants.	EPC	Once-off prior to commencement of construction. Monitoring as per management plan.	Monitoring of success of establishment of relocated species, as per management plan and permit conditions.

No	Management Action	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
0E	Micro-siting of infrastructure to ensure no turbines, or turbine blades impose on the high-sensitivity bat habitat.	Applicant and bat specialist	Once-off during micro-siting and pre-construction walk-down	Final design approval from bat specialist
0F	Conduct a pre-construction inspection to identify Red List Avifauna species that may be breeding within the project footprint to ensure that the impacts to breeding species (if any) are adequately managed.	Applicant and avifauna specialist	Once-off during micro-siting and pre-construction walk-down	Final design approval from avifauna specialist
0G	Micro-siting during the detailed design phase must ensure a 100m turbine exclusion zone around wetlands, dams and pans. Other infrastructure must be limited as far as possible to prevent displacement of African Grass Owl.	Applicant and appointed specialist	Pre-construction	Avifauna Specialist to approve (written report) micro-siting
0H	A 200m turbine exclusion zone must be implemented around selected wetlands. Other infrastructure must be limited as far as possible to prevent displacement of African Grass Owl and Grey Crowned Crane.	Applicant and appointed specialist	Pre-construction	Avifauna Specialist to approve (written report) micro-siting
7D	The 33kV medium voltage cable should be buried as far as possible. Overhead lines should only be considered if technical constraints to trenching are present.	EPC	Pre-construction and throughout construction of the internal cable network.	EO to record positions of overhead lines.
	A bird-friendly pole design must be employed for all 33kV overhead lines. The avifaunal specialist must approve the final design.	O&M and avifauna specialist	Prior to establishment or poles.	Written approval from avifauna specialist on pole design.
10B	Turbine colours should adhere to CAA requirements.	Applicant & EPC	Pre-Construction, maintained for Project Life	CAA/ATNS Approval(s) as necessary
10B	Where possible, the operation and maintenance buildings should be consolidated to reduce visual clutter.	Applicant & EPC	Detailed design phase and construction.	-

No	Management Action	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
0I	Conduct a pre-construction walk-down to confirm wetland boundaries and their buffer zones on site	Applicant and wetland specialist	Once-off during micro-siting and pre-construction walk-down	Final design approval from wetland specialist
0J	Areas not approved for the development must be demarcated as no-go areas.	EPC EO/ECO	Once-off prior to construction. Demarcations to be maintained throughout construction.	ECO to verify demarcations prior to construction commencing. EO to check demarcations in weekly inspections (including photographic records) during construction phase.
0K	Carefully plan to minimize the construction period and avoid construction delays.	EPC	Once-off planning, continuous monitoring	No delays in construction programme, where delays are experienced, the EPC must provide reasons for the delay, a plan to shorten the delay, and may be subject to penalties.
12D	Avoid the graves located close to WTG15 (with 50m buffer). i.e. micro-siting in detailed design phase must ensure avoidance of the graves and a 50m buffer.	Applicant	Once-off during detailed design phase.	Final layouts will be subject to walk-downs by heritage specialist – approval of final layout (confirmation that heritage resources have been avoided, or destruction has been permitted by SAHRA).

9.2 Construction phase

The construction phase commences with site preparation, and is considered complete once all post-construction rehabilitation has been implemented and signed-off by the Applicant (Holder) and ECO.

The Tables that follow detail the impact management actions relevant to the construction phase, the party responsible for implementation, relevant timeframes and monitoring specifications.

9.2.1 Land Use, Soils and Agricultural Potential: Construction Phase Management measures

Objective: To prevent any disturbance, erosion or contamination of soil resources.

Indicators and/or Compliance Mechanism are as follows:

- Induction training and records;
- Waste Management Procedure (to be developed by EPC);

- Incident Classification and Reporting Management Procedure (to be developed by EPC, see Section 8.2.4);
- Health, safety, environmental and community incident and complaints management system register (See Appendix H 8);
- Monitoring and audit reports; and
- Stormwater Management Plan (Appendix H 1).

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
1A	Minimise and restrict site clearing to areas required for construction purposes only and prevent disturbance to adjacent undisturbed vegetation.	EPC	Demarcations to be established before clearance of vegetation is initiated. Demarcations to be maintained throughout construction phase.	EO to check demarcations in weekly inspections (including photographic records).
1B	Vegetation clearing should occur in parallel with the construction progress to minimise erosion and/or run-off.	EPC	Throughout construction phase	EO to monitor vegetation clearance weekly.
	Implement adequate waste management procedures, burning or burying of waste will not be permitted on site.	EPC	Throughout construction phase	EO to check bins weekly.
	Implement an effective system of storm water run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential downslope erosion.	EPC	Stormwater management plan to be established at the onset of the construction in any given area, and maintained throughout construction phase	EO to monitor the site for signs of erosion weekly, and after rainfall events.
1C	Any occurrences of erosion must be attended to immediately and the integrity of the erosion control system at that point must be amended to prevent further erosion from occurring there.	EPC	Erosion to be remedied upon detection, remedial measures to be implemented as required.	EO to monitor the site for signs of erosion weekly, and after rainfall events. ECO to report on the recurrence of erosion (if relevant).
	The stormwater management plan must further prevent contaminated runoff from leaving the site.	EPC	Throughout construction phase	EO to inspect oil traps, silt traps, sumps weekly. EO to check areas downslope of construction areas for signs of contaminated runoff leaving the site, weekly.
	If an activity will mechanically disturb the soil below surface in any way, then any available topsoil must first be stripped (top 30cm) from the entire surface to be disturbed and	EPC	Topsoil stripping and stockpiling prior to disturbance.	EO to monitor the status of topsoil stockpiles weekly. EO to monitor rehabilitated

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
	stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface, and then stabilised by facilitating vegetation cover.		Topsoil must only be handled twice, once to strip, and once to enable rehabilitation.	areas as per management plan (and annually).
	Topsoil must only be handled twice, once to strip and stockpile and once for rehabilitation.	EPC	Topsoil stripping and stockpiling prior to disturbance. Topsoil must only be handled twice, once to strip, and once to enable rehabilitation.	EO to monitor the status of topsoil stockpiles weekly. EO to monitor rehabilitated areas as per management plan (and annually).
	Topsoil must be stored separately from other soils until construction in an area is complete. Ideally, removed topsoil should be re-applied immediately. The next best option is to minimise the duration of topsoil storage as the storing of topsoil for long periods (> 3 months) leads to seed bank depletion. Therefore, stripping of construction areas must be phased.	EPC	Phased, throughout construction phase.	EO to monitor the status of topsoil stockpiles weekly. EO to monitor rehabilitated areas as per management plan (and annually).
	Topsoil stockpiles should not exceed a height of 2m	EPC	Throughout construction phase	EO to monitor the status of topsoil stockpiles weekly.
	All stockpiles must be positioned away from drainage lines.	EPC	Throughout construction phase	EO to monitor the status of topsoil stockpiles weekly.
	Sediment fencing should be erected downslope of all stockpiles to intercept any sediment runoff from the stockpiles.	EPC	Throughout construction phase	EO to monitor the status of topsoil stockpiles weekly.
	Sediment fencing should be erected upslope of topsoil stockpiles to prevent upslope runoff from eroding the topsoil stockpiles.	EPC	Throughout construction phase	EO to monitor the status of topsoil stockpiles weekly.
1D	EPC Contractor to provide a rehabilitation plan, to ensure the rehabilitation of affected areas immediately following construction in a specific area. As a minimum, post-construction rehabilitation will involve the following: - Stockpiled topsoil must be evenly spread over disturbed areas (150 – 200 mm thick) just prior to planting/seeding.	EPC	Rehabilitation to be undertaken as soon as construction in each specific area is concluded (i.e. phased, throughout the construction phase).	EO to monitor the rehabilitation areas weekly (including photographic records).

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
	- Organic fertilizers or compost shall be used if site conditions require it and can be applied as part of hydro-seeding applications (if required). - Seed must be sown into weed-free topsoil that has been stockpiled (i.e. original topsoil).			

9.2.2 Water Resources: Construction Phase Management Measures

Objectives:

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

Indicators and/or Compliance Mechanism are as follows:

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

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
2A	Disturbed areas to be limited to the footprint as depicted in the layout plan.	EPC	Throughout construction phase	EO to inspect construction areas and demarcations weekly.
	The laydown areas for the construction site must be kept as small as reasonably possible.	EPC	Throughout construction phase	EO to inspect construction areas and demarcations weekly.
	All vehicle and equipment usage should be limited to designated areas only.	EPC and transport contractors	Throughout construction phase	EO to inspect site roads at least every 2 weeks, including looking for signs of driving outside

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
				approved areas. Complaints register to be maintained.
	Effluent from conservancy tanks is to be removed by a registered company (appointed by the EPC Contractor) and disposed of at the nearest sewage facility in accordance with the relevant national legislation.	EPC and appointed subcontractor	As required (depending on the number of construction phase personnel and the number of toilets provided).	EO to include site toilets (inside and outside) in weekly inspections. EO to maintain certificates of servicing / safe disposal of sewage waste.
	Small temporary diversion berms to be constructed upstream of all construction sites to prevent runoff from draining through these sites and becoming contaminated (such to be undertaken in consideration of any drainage lines or proximity to water courses)	EPC	Before construction commences, to be rehabilitated along with rehabilitation per construction site.	EO to inspect stormwater management infrastructure weekly.
	Once construction is complete, areas where vegetation was cleared, and soil was stripped must be stabilised by shaping and re-vegetating to prevent erosion.	EPC	Once construction per area has been completed (concurrent)	EO to inspect construction and rehabilitation areas weekly.
	Treat all hydrocarbon spills as hazardous waste and dispose of accordingly.	EPC	As/when necessary - whenever a spill has occurred, immediately.	EO to inspect sites for signs of spills, spill kits used, records of waste disposals.
	Emergency spill kits should be available, and spills should be cleaned up quickly with an approved absorbent material.	EPC	Spill kits should be available as soon as any Hazardous Chemical Substances (HCSs) are brought to site, and maintained throughout the construction phase.	Records of environmental training that includes spill response.
	All mixing practices should be conducted on impermeable surfaces/batching boards.	EPC	Throughout construction phase	EO to inspect mixing areas in weekly log
	Regular maintenance should be conducted on all vehicles and equipment used during the construction phase to ensure they are always in a good working order.	EPC / owner of vehicle / equipment	Throughout construction phase, as per each vehicles' maintenance specification.	EPC to maintain a record of vehicles and equipment used on site.
	Store fuel, oil, and other hazardous substances in designated bunded areas able to contain 110% of the storage capacity.	EPC	Throughout construction phase	EO to inspect all storage areas for HCSs and fuels weekly.

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
	Diesel fuel storage tanks must be in accordance to SANS10131: Above-ground storage tanks for petroleum products.	EPC	Throughout construction phase	EO to inspect diesel storage areas weekly
	Refuelling of vehicles to take place on an impermeable surface fitted with a sump to contain any spillages.	EPC	Throughout construction phase	EO to inspect diesel storage areas (including sump) weekly
2C	Identified boreholes for construction-phase water supply should be subject to pump tests overseen by a professional	EPC and professional	Once-off pump test on borehole(s) to be used (prior to use)	Include pump test results in environmental file
	Abstraction from boreholes to be metered, to ensure abstraction does not exceed sustainable yield.	EPC	Continuous flow metering throughout all abstraction phases.	EO to record flow meter readings monthly.
	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. Onsite staff should be made aware and encouraged to use water sparingly to prevent water wastage.	EPC	Throughout construction phase	Weekly Inspections: EO to check availability of potable water for staff. EO to check condition of toilets for staff. Maintain training records.

9.2.3 Aquatic Ecology: Construction Phase Management Measures

Objective: to ensure protection and continued functioning of aquatic ecosystems.

Indicators and/or Compliance Mechanism are as follows:

- Water Use License / GA;
- Post-construction wetland monitoring report;
- On-site erosion and stormwater management plan per the principles outlined in Appendix H 1.

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
3A	Disturbance within wetlands and their regulated zones, outside of approved development areas as per the approved layout (as refined in the pre-construction walk downs) must be minimised by demarcating them as no-go areas on the ground so that workers do not inadvertently damage wetlands by construction, foot traffic of vehicular movement.	EPC	Demarcations to be established before clearance of vegetation is initiated. Demarcations to be maintained throughout construction phase.	EO to check demarcations in weekly inspections (including photographic records).
	Where wetlands are affected by construction (as per the layout), these areas must be rehabilitated immediately following construction.	EPC	Immediately following construction of each wetland crossing.	EO to inspect rehabilitation areas weekly. Once-off wetland functionality monitoring to be undertaken by specialist appointed by the EPC as a construction completion requirement.
	Where new road crossings have been designed, these roads will cross wetland or river features at the narrowest point and a 90-degree angle with suitable drainage designed into the relevant bridge/culvert crossing.	EPC	During the construction of roads where these cross over wetlands.	Once-off wetland functionality monitoring to be undertaken by specialist on completion of the construction phase.
	Design and implement a stormwater management plan that diverts stormwater runoff away from the planed surface infrastructure and back into natural watercourses, to maintain catchment yield as far as possible.	EPC	Throughout construction phase	EO to inspect stormwater management infrastructure weekly.
	Implement effective erosion control at discharge points, to prevent erosion and sedimentation at diversion and discharge points.	EPC	Throughout construction phase	EO to monitor the site for signs of erosion weekly, and after rainfall events.
	No vehicles or heavy machinery will be allowed to drive indiscriminately within any wetland areas or their buffer areas. All vehicles must remain on demarcated roads.	EPC and all subcontractors and visitors	Throughout construction phase	EO to inspect site roads at least every 2 weeks, including looking for signs of driving outside approved areas. Complaints register to be maintained.
	Environmental Compliance Officer (ECO) to be present during vegetation clearing to prevent unnecessary clearing of extensive areas not part of the direct footprint area.	EPC	Whenever vegetation clearance is required throughout construction phase	EO to monitor vegetation clearance weekly.

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
	Bare land surfaces must be vegetated to limit erosion from surface runoff associated with infrastructure areas.	EPC	Rehabilitation to be undertaken as soon as construction in each specific area is concluded (i.e. phased, throughout the construction phase).	EO to monitor the rehabilitation areas weekly (including photographic records).
3B	Revegetate disturbed areas immediately after construction.	EPC	Rehabilitation to be undertaken as soon as construction in each specific area is concluded (i.e. phased, throughout the construction phase).	EO to monitor the rehabilitation areas weekly (including photographic records).
	Stockpiles must be monitored to ensure no runoff, erosion and sedimentation into the adjacent areas, especially the wetlands and freshwater systems.	EPC	EO to monitor the status of topsoil stockpiles weekly.	ECO to include topsoil stockpiles and erosion audits.
	Stockpile wetland soils separately.	EPC	Throughout construction phase, whenever a new area is prepared for construction.	EO to monitor the status of stockpiles weekly.
	All vehicle maintenance must occur within designated areas (scheduled maintenance to be undertaken off-site, emergency maintenance to use drip trays).	EPC / owner of vehicle / equipment	Throughout construction phase, as per each vehicles' maintenance specification.	EPC to maintain a record of vehicles and equipment used on site.
	All vehicles must be regularly maintained and inspected for leaks.	EPC / owner of vehicle / equipment	Throughout construction phase, as per each vehicles' maintenance specification.	EPC to maintain a record of vehicles and equipment used on site.
	All spills must be cleaned up immediately.	EPC	As/when necessary - whenever a spill has occurred, immediately.	EO to inspect sites for signs of spills, spill kits used, records of waste disposals.
	Chemicals, such as paints and hydrocarbons, must be used and stored as per each chemical's specific storage descriptions and health and safety requirements.	EPC	Throughout construction phase	EO to inspect all storage areas for HCSs and fuels weekly.
	Re-fuelling and maintenance of vehicles and machinery must take place on a sealed surface area away from wetlands.	EPC	Throughout construction phase	EO to inspect diesel storage areas (including sump and refuelling surface) weekly
	The edge of the wetlands that are not affected by the approved layout, and a 100m buffer or 1:100 flood line buffer from these wetlands must be	EPC	Demarcations to be established before clearance of vegetation is initiated. Demarcations to be	EO to inspect construction areas and demarcations weekly

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
	demarcated in the field with wooden stakes painted white as no-go zones that will last for the duration of the construction phase.		maintained throughout construction phase.	
	No vehicles or heavy machinery will be allowed to drive indiscriminately within any wetland areas or their buffer areas. All vehicles must remain on demarcated roads	EPC	Ensure staff and visitors to the site are aware of sensitive areas, through environmental awareness training. Maintain the complaints register. Maintain on-site signage.	EO inspection reports

9.2.4 Terrestrial Ecology: Construction Phase Management Measures

Objective: to prevent, wherever possible, impacts to intact terrestrial ecosystems and protected species.

Indicators and/or Compliance Mechanism are as follows:

- Alien invasive plant management plan;
- Plant rescue and relocation plan;
- Rehabilitation and re-vegetation plan.

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
4A	Restrict impact to development footprint only and limit disturbance creeping into surrounding areas.	EPC	Demarcations to be established before clearance of vegetation is initiated. Demarcations to be maintained throughout construction phase.	EO to check demarcations in weekly inspections (including photographic records).
	Compile and implement a Rehabilitation Plan.	EPC	Preliminary Rehabilitation plan to be compiled before construction commences (can be refined in construction phase). To be implemented in each area, as	EO to monitor the rehabilitation areas weekly (including photographic records).

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
			construction per area is completed.	
	Access to sensitive areas should be limited during construction, by demarcating the construction / activity footprint areas, and sensitising workers not to access adjacent areas unnecessarily.	EPC & EO	Demarcations to be established before clearance of vegetation is initiated. Demarcations to be maintained throughout construction phase. Environmental Awareness training to be presented at the onset of construction.	EO to check demarcations in weekly inspections (including photographic records). Maintain training records.
4C	Compile an Alien Plant Management Plan, including monitoring, which highlights control priorities and areas and provides a programme for long-term control.	EPC & EO	Alien Plant Management Plan to be compiled before construction commences, implemented throughout construction phase and adapted according to site-specific monitoring results.	As per the high-level management plan (Appendix H 3)
	Undertake regular monitoring to detect alien invasions early so that they can be controlled.	EO	As per Management Plan (Appendix H 3).	Annual external compliance audit.
4D	Compile and implement a stormwater management plan.	EPC	Stormwater Management Plan (SWMP) to be compiled before construction commences (can be refined in construction phase). To be implemented throughout construction phase.	EO to inspect stormwater management infrastructure weekly. EO to monitor the site for signs of erosion weekly, and after rainfall events.
	Where possible, access roads should be located along existing farm and district roads (as per the current layout design, to be confirmed / optimized in the detailed design phase). - Keep gradients of roads adequately low to minimise erosion. - Align roads to avoid steep slopes and avoid the necessity for significant cuts and fills.	EPC	SWMP to be compiled before construction commences (can be refined in construction phase). To be implemented throughout construction phase.	EO to inspect stormwater management infrastructure weekly. EO to monitor the site for signs of erosion weekly, and after rainfall events.
	Monitor road surfaces for erosion and repair or upgrade, where necessary.	EPC	SWMP to be compiled before construction commences (can be refined in construction phase).	EO to monitor the site for signs of erosion weekly, and after rainfall events.

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
			To be implemented throughout construction phase.	

9.2.5 Bats: Construction Phase Management Measures

Objective: To prevent impacts to bats by the placement of turbines outside of bat-sensitive areas.

Indicators and/or Compliance Mechanism: EO inspection reports

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
6A	Turbine base points must be a blade length away from the high bat sensitivity buffer edge.	EPC	Demarcate approved activity areas before clearance of vegetation is initiated. Demarcations to be maintained throughout construction phase.	EO to check demarcations in weekly inspections (including photographic records).
6B	Turbine base points must be a blade length away from the high bat sensitivity buffer edge.	EPC	Demarcate approved activity areas before clearance of vegetation is initiated. Demarcations to be maintained throughout construction phase.	EO to check demarcations in weekly inspections (including photographic records).

9.2.6 Avifauna: Construction Phase Management Measures

Objective: To prevent impacts to birds by the placement of turbines outside of bird-sensitive areas.

Indicators and/or Compliance Mechanisms:

- Environmental awareness training.
- EO inspection reports.

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
7A	Construction activities must be restricted to the immediate footprint of the infrastructure.	EPC	Demarcations to be established before clearance of vegetation is initiated. Demarcations to be maintained throughout construction phase.	EO to check demarcations in weekly inspections (including photographic records).
7B	Construction activities must be restricted to the immediate footprint of the infrastructure.	EPC	Demarcations to be established before clearance of vegetation is initiated. Demarcations to be maintained throughout construction phase.	EO to check demarcations in weekly inspections (including photographic records).
	Access to the remainder of the site will be strictly controlled to prevent unnecessary disturbance of priority species.	EO and EPC	Ensure staff and visitors to the site are aware of sensitive areas, through environmental awareness training. Maintain the complaints register. Maintain on-site signage.	EO inspection reports
	Maximum use should be made of existing access roads and the construction of new roads are to be kept to a minimum.	EPC	Throughout construction phase	EO to inspect site roads at least every 2 weeks, including looking for signs of driving outside approved areas. Complaints register to be maintained.
7E	All internal medium voltage lines must be marked with Bird Flight Diverters according to the Eskom standard.	O&M	Once-off (and maintained as necessary).	EO to include overhead lines in photographic record.

9.2.7 Air Quality: Construction Phase Management Measures

Objective: To prevent deterioration of air quality from dust and / or emissions.

Indicators and/or Compliance Mechanism are as follows:

- EO inspection reports
- Grievance mechanism and complaints registers

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
8A	Limit the duration of the construction phase to as short a timeframe as possible.	EPC	Throughout construction phase	Report to Applicant on any and all delays
	Where possible, minimise the area under construction.	EPC and EO	Throughout construction phase	EO inspection reports
	Make use of dust suppression techniques to minimise dust entrainment along unpaved roads and during periods of high wind speeds.	EPC	As necessary (dependant on season and on-site conditions) throughout construction.	EO inspection reports
	Restrict speed limits on unpaved areas and roads.	EPC	Throughout construction phase	Photographic records of speed limit signs.
	Where possible, minimise vehicle weights and the number of vehicles using unpaved roads.	EPC and transport contractors	Throughout construction phase	-
	Ensure regular vehicle maintenance is undertaken, as per supplier specification, to prevent the noise and emissions that can be generated by vehicles and machinery in disrepair.	EPC / owner of vehicle	Throughout construction phase, as per each vehicles' maintenance specification.	EPC to maintain a record of vehicles used on site.
	If construction necessitates blasting, inform nearby residences and road users of planned blasting activities ahead of time.	EPC	At least two days prior to blasting.	EO inspection reports and complaints register
	Once construction is complete, initiate rehabilitation (e.g. re-vegetation) procedures to reduce exposed surfaces from where dust could emanate.	EPC	Rehabilitation to be undertaken as soon as construction in each specific area is concluded (i.e. phased, throughout the construction phase).	EO to monitor the rehabilitation areas weekly (including photographic records).

9.2.8 Noise: Construction Phase Management Measures

Objective: To prevent excessive noise, and/or the occurrence of excessively noisy activities for extended periods.

Indicators and/or Compliance Mechanism: Grievance mechanism and complaints registers.

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
8C	When construction activities are required closer than 1,000m from a Noise-sensitive receptor (NSR) at night, only allow construction activities at one Turbine location at a time (where possible), and minimise active equipment at night, planning the completion of noisiest activities (such a pile driving, rock breaking and excavation) during the daytime period.	EPC	If / when construction is required closer than 1km from a NSR at night.	EO to maintain complains register and record of communication with receptors

9.2.9 Visual: Construction Phase Management Measures

Objective: To maintain the construction areas to be as visually unobtrusive as possible.

Indicators and/or Compliance Mechanisms:

- Grievance mechanism and complaints registers.
- EO inspection reports.

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
10A	Carefully plan to minimise the construction period and avoid construction delays.	EPC	Throughout construction phase	Report to Applicant on any and all delays
	Position laydown areas and related storage/stockpile areas in unobtrusive positions in the landscape, where possible.	EPC and Applicant	Throughout construction phase	EO to maintain complaints register
	Minimise vegetation clearing and rehabilitate cleared areas as soon as possible.	EPC and EO	Whenever construction commences in a new area, and immediately following construction in each area.	EO inspection reports. ECO Audit reports
	Vegetation clearing should take place in a phased manner.	EPC	Whenever construction commences in a new area.	EO inspection reports
	Make use of existing gravel access roads where possible.	EPC	Throughout construction phase.	EO inspection reports

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
	Ensure that dust suppression techniques are implemented on all access roads; in all areas where vegetation clearing has taken place; and on all soil stockpiles.	EPC	As necessary (dependant on season and on-site conditions) throughout construction.	EO inspection reports
	Maintain a neat construction site by removing litter, rubble and waste materials regularly.	EPC	Throughout construction phase	EO inspection reports
	Light fittings for security at night should reflect the light toward the ground (down hooded) and prevent light spill.	EPC	Throughout construction phase	EO to include lights and lighting inspection in inspection reports.
	Lighting fixtures should make use of minimum lumen or wattage.	EPC	Throughout construction phase	EO to include lights and lighting inspection in inspection reports.
	Mounting heights of lighting fixtures must be limited, or alternatively foot-light or bollard level lights could be used.	EPC	Throughout construction phase	EO to include lights and lighting inspection in inspection reports.
	If possible, make use of motion detectors on security lighting.	EPC	Throughout construction phase	EO to include lights and lighting inspection in inspection reports.

9.2.10 Socio-Economic: Construction Phase Management Measures

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:

- 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.

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
11A	Engage with local authorities and business organisations to investigate the possibility of procuring construction materials, goods and products from local suppliers where feasible, to maximise the benefits to the local economies.	EPC	Before construction commences, and throughout construction (when procuring materials, goods and products).	EPC to maintain records of suppliers
11B	Co-ordinate with the local municipality and relevant labour unions to inform the local labour force about the project that is planned to be established and the jobs that can potentially be applied for.	EPC	Before construction commences, and throughout construction (whenever recruiting personnel).	EPC to maintain records of employees and contractors
	Advertise for positions locally first.	EPC	Whenever advertising vacant positions / contracts.	EPC to maintain records of employees and contractors
	Recruit local labour as far as feasible, through the creation of a local skill database.	EPC	Before construction commences, and throughout construction (whenever recruiting personnel).	EPC to maintain records of employees and contractors
	Employ labour-intensive methods in construction where feasible.	EPC	Throughout construction phase.	-
	Sub-contract to local construction companies particularly SMMEs and BBBEE compliant enterprises where possible.	EPC	Before construction commences, and throughout construction (whenever appointing subcontractors).	EPC to maintain records of employees and contractors
	Use local suppliers where feasible and arrange with the local SMMEs to provide transport, catering and other services to the construction crews.	EPC	Throughout construction phase	EPC to maintain records of employees and contractors
11C	Facilitate knowledge and skills transfer between foreign technical experts and South African professionals during the pre-establishment and construction phases. Facilitate a broader skills development programme as part of socio-economic development commitments.	EPC	Throughout construction phase	Applicant & EPC to maintain records of skills development programme(s) implemented

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
11D	Recruit local labour as far as feasible to increase the benefits to the local households. Employ labour intensive methods in construction where feasible. Sub-contract to local construction companies where possible.	EPC	Throughout construction phase	EPC to maintain records of employees and contractors
11F	Natural areas that are not affected by the footprint should remain as such. Efforts should also be made to avoid disturbing such sites during construction.	EPC	Demarcations to be established before clearance of vegetation is initiated. Demarcations to be maintained throughout construction phase.	EO to check demarcations in weekly inspections (including photographic records).
	Public relations (PR) campaign prior to commencement of construction to communicate to community members the construction programme, inclusive of regular updates to generate excitement in the community.	Applicant & EPC	Before construction commences, and throughout construction phase.	EO to maintain complaints register
	Controlling dust and noise at source by ensuring equipment is well-maintained to prevent noise they would make if in disrepair.	EPC	Throughout construction phase, as necessary.	EO to maintain complaints register
11G	Ensure that the farm owners are aware of construction activities that will take place on their premisses.	EPC	Before construction commences, and throughout construction phase.	EO to maintain complaints register
	Ensure that any damages or losses to nearby affected farms that can be linked to the conduct of construction workers are adequately reimbursed.	EPC	Establish photographic record prior to construction commencing, to verify claims.	EO to maintain complaints register
	No open fires permitted on site.	EPC	Environmental training prior to construction commencing, refresher training as needed throughout construction phase.	EO to maintain complaints register, training records.
	Fire extinguishers to be kept on site, and adequate training on the use thereof to be provided.	EPC	Throughout construction phase, training before construction commences and refresher training as necessary.	EO to maintain training records, and fire extinguisher servicing records.
	Assign a dedicated person to deal with complaints and concerns of affected parties.	EPC	Throughout construction phase.	EO to maintain complaints register

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
11H	Employ locals as far as feasible through the creation of a local skills database.	EPC	Before construction commences, and throughout construction (whenever recruiting personnel).	EPC to maintain records of employees and contractors
	Ensure that any damages or losses to nearby affected farms that can be linked to the conduct of construction workers are adequately reimbursed.	EPC	Establish photographic record prior to construction commencing, to verify claims.	EO to maintain complaints register
	Assign a dedicated person to deal with complaints and concerns of affected parties.	EPC	Throughout construction phase	EO to maintain complaints register
11I	Provide adequate signage along the access roads to warn motorists of the construction activities taking place on the site.	EPC	Throughout construction phase	EO to include signage in weekly inspections
	Where feasible, assist the municipality in ensuring that the quality of the local social and economic infrastructure does not deteriorate through the use of social responsibility allocations.	EPC	In consultation with the local authorities, as feasible.	Developer's sustainability reporting
11J	Where possible, local labour should be considered for employment so as to increase the positive impact on the local economy.	EPC	Before construction commences, and throughout construction (whenever recruiting personnel).	EPC to maintain records of employees and contractors

9.2.11 Archaeological and Heritage (including palaeontology): Construction Phase Management Measures

Objective: To prevent any disturbance or damage to heritage resources.

Indicators and/or Compliance Mechanism are as follows:

- Induction training and records;

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
12A	Implement the fossil chance-find procedure during construction (see Appendix H 6).	EPC and EO	Upon any chance finds or suspected discoveries of fossils. Include procedure in training before excavations deeper than 5m commence.	EO to maintain training records and include deep (5m+) excavations in weekly inspections

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
12B	Ensure that destruction permit for the ruins at 073 – 80 is in place before any impacts occur. Any management measures stipulated in the destruction permit must be implemented.	EPC	Permits to be in place before construction camp 2 can be established. Additional measures as per permit.	As per destruction permit (if any).
12C	Fence the graves at 081, with a 50m buffer.	EPC	Graves and buffer to be demarcated prior to establishment of construction camp 2. Maintain demarcations throughout construction phase, until after construction camp 2 is rehabilitated.	EO to include graves in awareness training and maintain records. Inspect demarcations weekly, maintain photographic records of graves and demarcations. Maintain register of access in line with access protocol.
12D	Fence the graves at 072A, with a 50m buffer (this will require re-location of WTG15 as mentioned in the pre-construction phase, as part of detailed design).	Applicant and appointed specialist	Graves and buffer to be demarcated prior to construction at WTG15. Maintain demarcations throughout construction phase, until after rehabilitation.	EO to include graves in awareness training and maintain records. Inspect demarcations weekly, maintain photographic records of graves and demarcations. Maintain register of access in line with access protocol.
12E	An access protocol must be developed for the project by the developer.	EPC	Access protocol should be developed before graves are fenced off, and implemented until after decommissioning of the Project.	EO to maintain complaints register, and records of access in line with the access protocol
12F	Implement the chance-find protocol (Appendix H 6) during construction.	EPC and EO	Upon any chance finds or suspected discoveries of heritage resources or graves. Include procedure in training before construction commences.	EO to maintain training records, and inspect construction areas weekly.

9.2.12 Transport and Traffic: Construction Phase Management Measures

Objective: To minimise disruption to existing road network and traffic. To prevent road safety incidents. To prevent construction delays caused by delays in delivery of project components to site.

Indicator and Compliance Mechanisms:

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

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
13A	Abnormal Load trips to be undertaken according to permit specifications (issued by the roads authorities), which would include the route, safety escort(s), warning signs etc. associated with each abnormal vehicle trip to (and returning from) site.	EPC/Transportation contractor	Prior to component delivery to site	As per permit specifications (if any)
	The delivery of wind turbine components to the site must be staggered and trips must be scheduled to occur outside of peak traffic periods.	Transportation contractor and EPC	Prior to component delivery to site	As per permit specifications (if any)
	Any low hanging overhead lines (lower than 5.1 m) e.g. Eskom and Telkom lines, along the proposed routes will have to be moved to accommodate the abnormal load vehicles.	EPC/ Transportation contractor	Prior to component delivery to site	As per permit specifications (if any)
	The preferred route should be surveyed to identify problem areas, e.g. intersections with limited turning radii and sections of the road with sharp horizontal curves or steep gradients, that may require modification.	Transportation contractor and EPC	Prior to component delivery to site	As per permit specifications (if any)
	After the road modifications have been implemented, it is recommended to undertake a "dry-run" with the largest abnormal load vehicle, prior to the transportation of any turbine components, to ensure that the delivery of the turbines will occur without disruptions. This process is to be undertaken by the haulage company	Transportation contractor	Prior to component delivery to site	As per permit specifications (if any)

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
	transporting the components and the contractor, who will modify the road and intersections to accommodate abnormal vehicles.			
	Dust suppression on gravel roads during the construction (and decommissioning) phases, as required.	EPC	As necessary (dependant on season and on-site conditions) throughout construction.	EO inspection reports
	Reduce the construction period as far as possible.	EPC	Throughout construction phase	Report to Applicant on any and all delays
	Use on-site batching plants and licensed quarries in close proximity to the site.	EPC	Throughout construction phase	EPC to maintain record of suppliers. EO to inspect batching plants weekly
	Staff and general trips should occur outside of peak traffic periods as far as possible.	EPC	Throughout construction phase	-
	Regular maintenance of gravel roads by the EPC Contractor during the construction and decommissioning phases.	EPC	Throughout construction phase	EO inspection reports
13B	Use reputable and experienced transport companies with acceptable road safety statistics.	EPC and transport contractors	Throughout construction phase	EPC and contractor will keep record of any and all road safety incidents or accidents and report these in accordance with the law.

9.2.13 Waste Management: Construction Phase Management Measures

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

Indicator and Compliance Mechanisms:

- Induction training and records;
- Material safety data sheets;
- Waste Management Plan (Aligned to Appendix H 9);
- Relevant SANS Codes of Practice;
- Safety disposal certificates and waste manifests (all waste streams);
- Emergency preparedness and response procedure (Aligned to Appendix H 7);
- Incident classification and reporting management procedure (to be developed);

- Waste manifest documentation (refer to procedure/guideline in Appendix H 9);
- Grievance Register (Appendix H 8); and
- Monitoring and audit reports

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
14A	Designated waste area must be established with the placement of skips to contain various waste streams.	EPC	Throughout construction phase	EO to include waste area in weekly inspection reports
	Skips must be covered with a Tarp to prevent windblown litter	EPC	Throughout construction phase	EO to include skips in weekly inspection reports
	A designated and appropriately demarcated and covered hazardous waste storage area or skip must be established on a hard standing area.	EPC	Throughout construction phase	EO to include hazardous waste area/skip in weekly inspection reports
	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	EPC	Throughout construction phase	Per Management Plan (Appendix H 9)
	Provide adequate number of waste bins on site throughout construction. Enable the separation of hazardous and general waste at source by providing separate colour-coded or labelled bins in appropriate areas.	EPC	Bins must be delivered to site at the onset of construction, and maintained throughout the construction phase.	EO to include bins in weekly inspection reports
	Ensure bins are covered to prevent wind-blown litter.	EPC	Throughout construction phase	EO to include bins in weekly inspection reports
	Create awareness among construction personnel on the importance of proper waste handling.	EO	Training to be presented at the onset of construction phase. Refresher training as required.	EO to maintain training records
	Ensure that waste receptacles are regularly collected by reputable service providers for proper recycling or disposal (as appropriate).	EPC (and appointed constrictors)	As necessary (depending on type of bin and volume of waste generated).	EO to maintain records of waste transported off site
	Ensure portable, chemical toilets are regularly serviced by reputable contractors.	EPC (and appointed constrictors)	As necessary (depending on number of toilets and number of personnel on site in any given area).	EO to include toilets in weekly inspection reports

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
	Keep safe disposal certificates on file for all hazardous waste (including sanitation waste) removed from the site.	EO	Whenever hazardous waste is removed off site.	EO to maintain records of waste transported off site

9.2.14 Hazardous Chemical Substances: Construction Phase Management Measures

Objective: To ensure the correct handling, storage, transportation, use and disposal of Hazardous Chemical Substances

Indicator and Compliance Mechanisms:

- Training records;
- Chemical substances Register;
- HCS Management Plan.

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
15A	Ensure that the use of hazardous chemical substances is controlled – only sufficiently trained personnel should be allowed to access and handle such substances.	EPC / CHSO-CHSM	Throughout construction phase	EPC to maintain personnel records and only allow trained personnel access to HCSs
	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	EPC / CHSO-CHSM	Throughout construction phase	CHSO or CHSM to monitor chemicals and dangerous substances on site.
	Develop and implement a procedure for the management of all hydrocarbon spillages.	EPC / CHSO-CHSM	Throughout construction phase	EO/ CHSO / CHSM to monitoring implementation, as specified in procedure.
	Spill kits must be available, and accessible, in strategic locations throughout the construction site. Personnel	EPC and EO/ CHSO-CHSM	Throughout construction phase. Training to be presented at onset of	EO to inspect spill kits as part of weekly inspections. Maintain training records.

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
	must be trained in the use of spill kits, and accidental spills must be cleaned up as soon as it is safe to do so.		construction and refresher training as necessary. Spill kits to be maintained as necessary.	
	All construction personnel must receive training on the dangers associated with hazardous chemical substances on site, including the proper handling and storage and disposal requirements for such substances.	EPC and CHSO-CHSM	Training to be presented at the onset of construction phase. Refresher training as required.	EO to maintain training records
	Develop and implement a procedure for the storage and handling of chemicals, hydrocarbon materials and hazardous substances onsite. The procedure must ensure adherence to Hazardous Substances Act, 1973 (Act No 15 of 1973), and according to the supplier specification.	EPC	Throughout construction phase	As per procedure / Management Plan (to be developed by EPC)
	Indicate the location of the fuel and chemical storage area(s) on the layout plans	EPC	Throughout construction phase	-
	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)	CHSO-CHSM	Throughout construction phase	EO weekly inspection reports
	Maintain oil traps or interceptors on a regular basis and maintain records	CHSO-CHSM	Throughout construction phase	EO weekly inspection reports
	Label all liquids (chemicals and hydrocarbons) stored onsite for easy identification. Material Safety data sheets (MSDS) for onsite chemicals, hydrocarbon materials and hazardous substances must be readily available. MSDSs must include mitigation measures to ameliorate potential environmental impacts which may result from a spill, incorporating health and safety mitigation measures	CHSO-CHSM	Throughout construction phase	EO weekly inspection reports
	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.	CHSO-CHSM	Throughout construction phase	EO weekly inspection reports

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
	Display "no smoking" and "no naked flame" signs in and around the project area, as well as near the hazardous material store	CHSO-CHSM	Throughout construction phase	EO weekly inspection reports
	Strategically place the correct types of fire extinguishers onsite and near the hazardous material store. Train key personnel on basic firefighting skills	CHSO-CHSM	Maintain fire extinguishers throughout construction phase. Training once-off.	EO weekly inspection reports
	Ensure that vehicles and equipment are serviced as per specification (off-site) to prevent leaks that could occur if vehicles and equipment are in disrepair. Supply drip trays in emergency situations to contain leaks.	EPC and vehicle / equipment owner	Throughout construction phase, as per each vehicles' maintenance specification.	EPC to maintain a record of vehicles and equipment used on site.

9.2.15 Post-Construction Rehabilitation Management Measures

The EPC must compile, for approval by the Applicant, a post-construction rehabilitation plan prior to commencement of construction on site, however, it is expected that this plan will be refined during the construction, as site-specific opportunities and constraints are encountered. All amendments to the approved plan must be approved by the ECO and Applicant prior to deviation. The plan must be compiled with cognisance of the principles set out in Appendix H 4.

Objective: To ensure that, post-construction, all areas that do not contain operational infrastructure or serve operational purposes are rehabilitated to a condition that is safe, stable and self-sustaining.

To ensure these areas do not give rise to environmental risks (including pollution, sedimentation) or safety risks, and

To ensure that, where possible, these areas can contribute to continuing ecological processes or productive land uses post-construction.

Indicator and Compliance Mechanisms:

- EPC's rehabilitation and re-vegetation plan;
- EO inspection reports;
- Construction completion sign-off by Applicant and ECO.

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
16	All areas disturbed by construction activities must be subject to rehabilitation when they are no longer needed for construction or housing infrastructure for the operational phase. Rehabilitation will involve at least levelling/shaping, topsoil layering and re-vegetation.	EPC	As construction concludes in each specific area / as an area is no longer required for construction purposes.	EO to advise EPC on areas available for rehabilitation, throughout the construction phase, and monitor progress in weekly reports.
	Spoils that are not in any way contaminated may be used to backfill /shape /level areas as part of rehabilitation, as long as it is covered by a minimum 150mm of topsoil.	EPC	During rehabilitation activities	EO weekly reports.
	Spoils that have been contaminated must be treated as hazardous waste and disposed of at a register hazardous waste disposal site.	EPC	During rehabilitation activities	Waste disposal records and EO weekly reports.
	Steep slopes must be shaped/levelled and stabilised (vegetated, implement reno mattresses or gabions or similar) to prevent erosion.	EPC	During rehabilitation activities	EO to inspect rehabilitated sites for signs of erosion and advise EPC on remediation as required.
	Temporary berms created for stormwater management must be rehabilitated (levelled, ripped and vegetated) once no longer needed for stormwater control in each specific area.	EPC	During rehabilitation activities	EO to inspect rehabilitated sites and advise the EPC on redundant berms to be rehabilitated.
	Berms that will be retained must have slopes not exceeding 1:3 and be vegetated, or other measures like reno mattresses or gabions must be implemented to prevent erosion in these areas.	EPC	During rehabilitation activities	EO to inspect rehabilitated sites for signs of erosion and advise EPC on remediation as required.
	Where new temporary roads have crossed cultivated farmlands, the lands must be rehabilitated by ripping which must be agreed to by the Applicant and the landowners	EPC	During rehabilitation activities	EO to inspect roads and advise the EPC on rehabilitation of redundant roads. Maintain complaints register.
	Where new temporary roads were established over natural areas, rehabilitation must involve the ripping and re-vegetating of affected areas with species resembling the pre-construction condition	EPC	During rehabilitation activities	EO to inspect roads and advise the EPC on rehabilitation of redundant roads. Rehabilitation monitoring as per Management Plan.
	Stockpiled topsoil must be used for rehabilitation. Topsoil must only be handled twice, once when stripped, prior to construction, and once for replacement during rehabilitation.	EPC	During rehabilitation activities	EO weekly inspection reports to include topsoil stockpiles.

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
	Stockpiled topsoil must be evenly spread so as to facilitate seeding and minimise loss of soil due to erosion.	EPC	During rehabilitation activities	EO weekly inspection reports to include topsoil stockpiles, and rehabilitated areas.
	Subsoil must be ripped before topsoil is placed	EPC	During rehabilitation activities	-
	Re-vegetation of denuded areas must involve species that are typical of the Eastern Highveld Grassland vegetation type. A preliminary seed mix is included in Appendix H 4. The EPC should propose a commercially available grass seed mix, the proposed density of seeding, and the identified supplier(s) of the seed mix for use in rehabilitation, in his rehabilitation plan, prior to construction commencing.	EPC	Seed mix and supplier to be specified prior to rehabilitation commencing.	EO weekly inspection reports to include rehabilitated areas.

9.3 Operational Phase

The operational phase will span a minimum of 20 years. It is expected that, during that time, improved technologies and facilities for environmental impact management may become available (for example, recycling technologies). The Operator should be encouraged and allowed to explore and implement the best available technologies that would avoid (preferably) or minimise the identified impact(s).

The Tables that follow detail the management actions, timeframes, responsible persons and monitoring requirements for impacts expected to arise during the operational phase of the Project.

9.3.1 Water Resources: Operational Phase Management Measures

Objectives:

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

Indicators and/or Compliance Mechanism are as follows:

- Water Use License / GA;
- EO Monitoring Reports and audits;
- Waste Management Procedure (to be developed); and
- Stormwater management plan (to be developed).

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
2B	Erosion prevention measures must be implemented along concrete and / or heavily compacted surface areas, culvert inlets / outlets and potential storm water channels. These measures may include gabions, rockery and/or vegetation growth to stabilise the surrounding soils.	EO	As necessary, based on results of erosion monitoring.	O&M EO to monitor for erosion quarterly during operational phase, or after heavy rains.
	Develop and implement a maintenance schedule to ensure the integrity and functionality of all storm water management measures are maintained at all times.	EO	EO to inspect stormwater management measures (monthly or after heavy rains) and report to O&M Contractor.	EO to include stormwater management measures in annual audits.

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
2D	Diesel fuel storage tanks must be in accordance to SANS10131: Above-ground storage tanks for petroleum products.	O&M Contractor	Bund walls and sump to be in place before HCSs are stored	EO to check storage areas during quarterly audits
	Construct bund walls in accordance to SANS10089-1:2008 around all areas where such hazardous are being stored.	O&M Contractor	Bund walls and sump to be in place before HCSs are stored	EO to check storage areas during quarterly audits
	Workshops surfaces must be concrete lined and sloped so that hazardous substances can drain towards the collection sump from where it can be removed by a registered hazardous waste management company and be disposed of in accordance with the relevant national legislation.	O&M Contractor	Surfaces to be established before the workshop is used. Cleaning of collection sump as necessary throughout operational phase.	EO to check surface and sump at workshop(s) during quarterly audits. Maintain safe disposal certificates in environmental file.

9.3.2 Aquatic Ecology: Operational Phase Management Measures

Objective: to ensure protection and continued functioning of aquatic ecosystems.

Indicators and/or Compliance Mechanism are as follows:

- Water Use License / GA;
- Post-construction wetland monitoring report;
- On-site erosion and stormwater management plan per the principles outlined in Appendix H 1.

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
3C	All areas of increased ecological sensitivity outside of the approved development footprints are to be designated as "No-Go" areas and be off-limits to all unauthorised vehicles and personnel. Demarcate these areas in consultation with the Land Owner, where feasible.	O&M Contractor	Maintain demarcations in consultation with land owner. Ensure staff and visitors to the site are aware of sensitive areas, through environmental awareness training. Maintain the complaints register.	EO to inspect training records, wetland areas in annual audits.
	Quarterly (four times a year) inspections by the O&M EO to ensure no unnecessary impact to the	EO	Quarterly for the duration of the operational phase.	EO inspection reports

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
	freshwater resources present, and if so that a remedy is put in place as soon as possible.			
	No vehicles or heavy machinery will be allowed to drive indiscriminately within any wetland areas or their buffer areas. All vehicles must remain on demarcated roads	O&M Contractor	Ensure staff and visitors to the site are aware of sensitive areas, through environmental awareness training. Maintain the complaints register. Maintain on-site signage.	EO inspection reports
3D	All vehicles must be regularly maintained and inspected for leaks.	O&M / owner of vehicle / equipment	Throughout operational phase, as per each vehicles' maintenance specification	O&M to maintain a maintenance record for the vehicles, machinery and equipment on site.
	All vehicle maintenance must occur within designated areas (Scheduled maintenance to occur off-site, emergency maintenance must use appropriate drip trays).	O&M	Throughout operational phase, as per each vehicles' maintenance specification, or as required for emergency maintenance.	EO to check site for the use of drip trays, report on potential risks at least quarterly, or as detected.
	All spills must be cleaned up immediately.	O&M	Immediately if/when a spill occurs.	EO to inspect the site for spills.
	Chemicals, such as paints and hydrocarbons, must be used and stored as per each chemical's specific storage descriptions, health and safety requirements and relevant SANS codes. Material Safety Data Sheets (MSDS) to be kept on site.	O&M	Throughout operational phase	EO to maintain MSDS and include HCSs storage areas in quarterly inspections.
	Re-fuelling and maintenance must take place on an impervious surface area away from wetlands.	O&M	Throughout operational phase	EO to include refuelling area in inspections.
	Culverts, roads and river crossings must be maintained and cleared by the O&M as required. The EO will monitor maintenance requirements monthly and/or after heavy rains.	O&M	As required throughout operational phase (based on monitoring results).	EO to monitor maintenance requirements, report to O&M.

9.3.3 Terrestrial Ecology: Operational Phase Management Measures

Objective: to prevent, wherever possible, impacts to intact terrestrial ecosystems, and remedy where impacts have occurred.

Indicators and/or Compliance Mechanism are as follows:

- Alien invasive plant management plan;

- Plant rescue and relocation monitoring.

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
4E	Restrict impact to development footprint only and limit disturbance from operational and maintenance activities creeping into surrounding areas.	O&M	Maintain demarcations in consultation with land owner. Ensure staff and visitors to the site are aware of sensitive areas, through environmental awareness training. Maintain the complaints register.	EO to inspect training records, wetland areas in annual audits.
	Monitor the success of the rehabilitation plan in areas where construction was undertaken, and surrounding areas, and intervene as necessary.	EO	EO to inspect the rehabilitation areas quarterly (including photographic records), and advise O&M on areas that may require additional intervention.	EO to include rehabilitation areas in annual Audits.
	Access to sensitive areas should be limited during operations and maintenance, by demarcating the activity footprint areas, and sensitising workers not to access adjacent areas unnecessarily.	O&M	Maintain demarcations in consultation with land owner. Ensure staff and visitors to the site are aware of sensitive areas, through environmental awareness training. Maintain the complaints register.	EO to inspect training records, wetland areas in annual audits.
4F	Implement the alien management plan, which must highlight control priorities and areas and provide a programme for long-term control.	O&M	Alien Plant Management Plan to be compiled before construction commences, implemented throughout operational phase and adapted according to site-specific monitoring results.	As per management plan (Appendix H 3)
	Undertake regular monitoring to detect alien invasions early so that they can be controlled.	EO	As per Management Plan (Appendix H 3)	Annual external compliance audit.
	Implement control measures based on monitoring results to enable adaptive management in terms of alien invasive plant control.	O&M	As and when necessary, based on monitoring results.	Annual external compliance audit.
4G	Monitor road surfaces for erosion and repair or upgrade, where necessary.	O&M	As required throughout operational phase (based on monitoring results).	EO to monitor maintenance requirements, report to O&M.

9.3.4 Bats: Operational Phase Management Measures

Objective: To prevent impacts to bats, monitoring impacts to bats and enable adaptive management.

Indicators and/or Compliance Mechanism: Results of operational bat mortality monitoring study, and Environmental Audits

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
6C	Conduct a minimum of 2 years operational bat mortality monitoring study	Specialist (appointed by O&M Contractor or Applicant)	The bat mortality monitoring study should commence at the start of the operation of the facility, on the commercial operation date (COD), and continue for a minimum of 2 years. Auditing of bat mortalities at the facility should continue for the lifetime of the facility.	EO to include bat monitoring results in annual Environmental Audit
	The required and most effective method of mitigation can be determined from pre-construction acoustic bat activity data, climatic data and the results from the operational bat mortality monitoring. The latter monitoring will determine the need for mitigation and if necessary, the specific turbines to be mitigated.	Specialist in consultation with the Applicant	Based on the results of the operational bat monitoring - as stipulated by the bat specialist.	As recommended by bat specialist in operational bat monitoring results.
6D	Turbine base points must be a blade length away from the high bat sensitivity buffer edge.	O&M	Turbine base points will be determined in the detailed design phase, and constructed as such. O&M to ensure no unauthorised activities encroach on adjacent areas.	EO to maintain environmental awareness training records, complaints register.
	Conduct a minimum of 2 years operational bat mortality monitoring study	Specialist (appointed by Applicant)	The bat mortality monitoring study should commence at the start of the operation of the facility, on the COD, and continue for a minimum of 2 years. Auditing of bat mortalities at the facility should continue for the lifetime of the facility.	ECO to include bat monitoring results in annual Environmental Audit.

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
	The required and most effective method of mitigation can be determined from pre-construction acoustic bat activity data, climatic data and the results from the operational bat mortality monitoring. The latter monitoring will determine the need for mitigation and if necessary, the specific turbines to be mitigated.	Specialist in consultation with the O&M/ Applicant	Based on the results of the operational bat monitoring - as stipulated by the bat specialist.	As recommended by bat specialist in operational bat monitoring results.
6E	Only use lights with low sensitivity motion sensors that switch off automatically when no persons are nearby, to prevent the creation of regular insect gathering pools. This will be at turbine bases (if applicable and other infrastructure buildings). For buildings, avoid tin roofs and roof structures that offer entrance holes into the roof cavity.	O&M	Throughout operational phase.	EO to include lights and lighting inspection in quarterly reports.

9.3.5 Avifauna: Operational Phase Management Measures

Objective: To monitor impacts on bird, to enable adaptive management if required

Indicators and/or Compliance Mechanisms: Dependant on results of live-bird monitoring – as per specialist recommendation.

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
7C	Live-bird monitoring to be implemented in the operational phase, as per the most recent edition of the Best Practice Guidelines at the time to compare the abundance of avifauna during the pre-construction monitoring with the abundance post-construction. Operational monitoring to be implemented for a minimum of two years, and then again in Year 5 and every fifth year after that.	Appointed specialist (with assistance from the on-site carcass searchers (team) and supervisor).	Monitoring should take place in Year 1 and 2 of the operational phase, and then repeated in Year 5 and every five years after that.	As specified by Avifauna Specialist

9.3.6 Visual: Operational Phase Management Measures

Objective: To minimise the visual impact of the Project.

Indicators and/or Compliance Mechanisms:

- Grievance mechanism and complaints registers.
- EO inspection reports.

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
10B	Inoperative turbines should be repaired promptly, as they are considered more visually appealing when the blades are rotating (or at work).	O&M	As required throughout operational phase.	EO to maintain complaints register
	If turbines need to be replaced for any reason, they should be replaced with the same model, or one of equal height and scale to lessen the visual impact	O&M	As required throughout operational phase.	EO to maintain complaints register
	Where vegetation must be cleared for maintenance purposes, ensure the minimum required area is cleared.	O&M & EO	If vegetation clearance is required for maintenance purposes.	EO inspection reports
	Ensure that dust suppression techniques are implemented on all gravel access roads.	O&M	As necessary (dependant on season and on-site conditions) throughout operations.	EO inspection reports
	As far as possible, limit the amount of security and operational lighting present on site.	O&M	Throughout operational phase	EO to maintain complaints register
	Light fittings for security at night should reflect the light toward the ground and prevent light spill.	O&M	Throughout operational phase	EO to maintain complaints register
	Lighting fixtures should make use of minimum lumen or wattage.	O&M	Throughout operational phase	EO to maintain complaints register
	Mounting heights of lighting fixtures should be limited, or alternatively foot-light or bollard level lights should be used.	O&M	Throughout operational phase	EO to maintain complaints register
	If possible, make use of motion detectors on security lighting.	O&M	Throughout operational phase	EO to maintain complaints register
	The O&M buildings should be painted in natural tones that fit with the surrounding environment.	EPC & O&M	Once constructed, maintained as necessary throughout operational phase.	EO to maintain complaints register

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
	Non-reflective surfaces should be utilised where possible.	EPC & O&M	Once constructed, maintained as necessary throughout operational phase.	EO to maintain complaints register

9.3.7 Socio-Economic: Operational Phase Management Measures

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:

- Records of suppliers, employees, sub-contractors;
- Records of training, enterprise development initiatives.

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
11K	Procure materials, goods and products required for the operation and maintenance of the facility from local suppliers as far as possible.	O&M	When procuring goods and products for operations and maintenance.	O&M to maintain records of suppliers
11L	Recruit local labour as far as feasible, through the skills database.	O&M	Whenever recruiting personnel or sub-contracting work.	O&M to maintain record of personnel and sub-contractors
11M	The Applicant should establish vocational training programmes for the local labour force to promote the development of skills required by the wind energy facility and thus provide for the opportunities for these people to be employed in other similar facilities elsewhere in the future.	Applicant & O&M	Set up apprenticeship programmes throughout the operational phase to build onto existing skill levels or develop new skills amongst operational workers, especially those from local communities.	O&M, Applicant to keep records of training
11N	Where possible, the local labour supply should be considered for employment opportunities to increase the positive impact on the area's economy.	O&M	Whenever recruiting personnel or sub-contracting work.	O&M to maintain record of personnel and sub-contractors

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
11P	When identifying enterprise development initiatives, the focus should be on creating sustainable and self-sufficient enterprises.	O&M	When identifying enterprise development initiatives.	-
11Q	In devising the programmes to be implemented, the Applicant should take into account the local Integrated Development Plans.	Applicant & O&M	When identifying enterprise development initiatives.	-
11T	Natural areas that are not affected by the footprint should remain as such. Efforts should also be made to avoid disturbing such sites during operations.	O&M	Demarcations to be established before clearance of vegetation is initiated for maintenance purposes.	EO to check areas where vegetation was cleared for maintenance in quarterly reports

9.4 Decommissioning Phase

The Project has an operational life of a minimum of 20 years. Therefore, the legislative requirements, environmental setting and specific technologies will have to be evaluated again as part of decommissioning planning, closer to the time. The management plan provided hereunder is therefore subject to updates and refinement as part of decommissioning planning.

9.4.1 Water Resources: Decommissioning Phase Management Measures

Objectives:

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

Indicators and/or Compliance Mechanism are as follows:

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

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
2E	Affected areas to be kept as small as reasonably possible.	EPC	Throughout decommissioning phase	EO to inspect demarcations weekly.
	All vehicle and equipment usage must be limited to designated areas only.	EPC	Throughout decommissioning phase	EO to inspect demarcations weekly.
	All waste materials including chemical and sewage waste is to be removed by a registered company (appointed by the Contractor) and disposed of at the nearest permitted facility in accordance with the relevant national legislation.	EPC and appointed subcontractor	As required, throughout decommissioning phase.	EO to inspect waste management areas weekly, including records of waste removed off site.
	Rehabilitate areas where decommissioning has been completed concurrently (i.e. do not wait until all infrastructure has been removed before initiating re-vegetation in a given area).	EPC	As infrastructure is removed from an area.	EO to report on progress of rehabilitation weekly.

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
	Emergency spill kits must be available, and spills must be cleaned up quickly with an approved absorbent material.	EPC	Throughout decommissioning phase.	EO to check site for spills weekly.
	Regular maintenance must be conducted on all vehicles and equipment used during the decommissioning phase to ensure they are always in a good working order. Scheduled maintenance to be undertaken off-site in designated facilities. Emergency maintenance on site must use drip trays.	EPC / owner of vehicle / equipment	Throughout decommissioning phase, as per each vehicles' maintenance specification.	EPC to maintain a record of vehicles and equipment used on site.
	Refuelling of vehicles to take place on an impermeable surface fitted with a sump to contain any spillages.	EPC	Throughout decommissioning phase	EO to inspect refuelling areas weekly
	Facilities designed for containment of accidental spills are to be removed from site only once the pollution source has been decommissioned and removed.	EPC (consult with EO)	At the end of the decommissioning phase.	Final external environmental audit.

9.4.2 Aquatic Ecology: Decommissioning Phase Management Measures

Objective: to ensure protection and continued functioning of aquatic ecosystems.

Indicators and/or Compliance Mechanism are as follows:

- Water Use License / GA;
- Post-rehabilitation Wetland monitoring report;
- On-site erosion and stormwater management plan per the principles outlined in Appendix H 1.

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
3E	Decommissioning activities to be undertaken in the dry season to avoid high rainfall events that could lead to increased runoff, erosion, contamination and sedimentation of the wetlands.	EPC & Applicant	If possible, during decommissioning scheduling.	-

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
	Rehabilitated areas to be made free-draining.	EPC	During decommissioning	Close-out report after decommissioning to be compiled by ECO, reported to DFFE.
	Stormwater management measures must remain in place during decommissioning, and be rehabilitated last.	EPC	During and after decommissioning	EO to inspect stormwater management infrastructure weekly.
	All areas of increased ecological sensitivity should be designated as "No-Go" areas and be off-limits to all unauthorised vehicles and personnel.	EPC	Throughout decommissioning phase	EO to ensure awareness, include sensitive areas in weekly inspections.
	Actively landscape and re-vegetate disturbed areas as soon as possible to avoid loss of soil, organic material, and sedimentation into wetland areas.	EPC	As each area infrastructure is decommissioned and the area is rehabilitated.	EO to inspect rehabilitation areas weekly.
	Implement and maintain a Wetland and AIPs Plan for the duration of the decommissioning phase.	EPC and Specialist	Throughout decommissioning phase	EO to inspect the site for AIPs weekly. Once-off functional monitoring to be undertaken by specialist after decommissioning.
3F	No vehicles or heavy machinery should be allowed to drive indiscriminately within any wetland areas or their buffer areas. All vehicles must remain on demarcated roads.	EPC and contractors, visitors	Ensure staff and visitors to the site are aware of sensitive areas, through environmental awareness training. Maintain the complaints register. Maintain on-site signage.	EO inspection reports
	Wetland monitoring must be carried out after the decommissioning phase to ensure the success of wetland rehabilitation.	Wetland Specialist	Once-off after decommissioning	Once-off functional monitoring to be undertaken by specialist after decommissioning.

9.4.3 Terrestrial Ecology: Decommissioning Phase Management Measures

Objective: to prevent, wherever possible, impacts to intact terrestrial ecosystems and protected species.

Indicators and/or Compliance Mechanism are as follows:

- Alien invasive plant management plan;
- Plant rescue and relocation plan;

- Rehabilitation and re-vegetation plan.

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
4H	Restrict impact to infrastructure footprint only and limit disturbance creeping into surrounding areas.	EPC	Demarcations to be established before decommissioning is initiated. Demarcations to be maintained throughout decommissioning phase.	EO to check demarcations in weekly inspections (including photographic records).
	As far as possible, locate new activities associated with decommissioning (new temporary laydown sites, stockpiling sites for components to be removed, contractor's yard etc.) within areas that have been previously disturbed or in areas with lower sensitivity scores.	EPC	Demarcations to be established before decommissioning is initiated. Demarcations to be maintained throughout decommissioning phase.	EO to check demarcations in weekly inspections (including photographic records).
	Avoid sensitive features and habitats during activities, by demarcating approved footprints and preventing workers from accessing adjacent areas.	EPC	Demarcations to be established before decommissioning is initiated. Demarcations to be maintained throughout decommissioning phase.	EO to check demarcations in weekly inspections (including photographic records).
	Compile a Rehabilitation Plan as part of decommissioning planning.	EPC	Rehabilitation plan to be compiled before decommissioning commences. To be implemented in each area, as decommissioning per area is completed.	EO to monitor the rehabilitation areas weekly (including photographic records).
	Only use existing access, farm and district roads.	EPC	Throughout decommissioning phase	EO to inspect the site for signs of off-road driving, Maintain training records and signage.
	Undertake monitoring of the success of rehabilitation (two seasons after decommissioning is complete is recommended) to evaluate whether further measures would be required to manage impacts.	ECO & EO	Once-off, two seasons after decommissioning is complete.	To be included in final audit.
4I	Update the Alien Plant Management Plan (that was implemented during the operational phase), and continue implementation during decommissioning, to ensure minimal impacts on surrounding areas.	EPC	Once-off update of plan as part of decommissioning planning, implementation throughout decommissioning phase.	To be included in final audit.

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
	Monitor the establishment of alien invasive plant species during decommissioning activities, and implement control as per the Alien Invasive Management Plan.	EO and EPC	Monitoring as per management plan, implementation of control measures as necessary, based on monitoring results.	To be included in final audit.

9.4.4 Avifauna: Decommissioning Phase Management Measures

Objective: To prevent impacts to birds by the placement of turbines outside of bird-sensitive areas.

Indicators and/or Compliance Mechanisms: EO inspection reports.

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
7F	Dismantling activity should be restricted to the immediate footprint of the infrastructure as far as possible.	EPC	Demarcations to be established before clearance of vegetation is initiated. Demarcations to be maintained throughout construction phase.	EO to check demarcations in weekly inspections (including photographic records).
	Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of priority species.	EO and EPC	Ensure staff and visitors to the site are aware of sensitive areas, through environmental awareness training. Maintain the complaints register. Maintain on-site signage.	EO inspection reports
	Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum.	EPC	Throughout construction phase	EO to inspect site roads at least every 2 weeks, including looking for signs of driving outside approved areas. Complaints register to be maintained.

9.4.5 Visual: Decommissioning Phase Management Measures

Objective: To maintain the decommissioning areas to be as visually unobtrusive as possible.

Indicators and/or Compliance Mechanisms:

- Grievance mechanism and complaints registers.
- EO inspection reports.

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
10C	All infrastructure that is not required post-decommissioning must be removed.	EPC	Upon decommissioning	EO to maintain complaints register
	Carefully plan to minimize the decommissioning period and avoid delays.	EPC	Throughout decommissioning phase	Report to Applicant on any and all delays
	Maintain a neat decommissioning site by removing rubble and waste materials regularly.	EPC	Throughout decommissioning phase	EO inspection reports
	Ensure that dust suppression procedures are maintained on all gravel access roads throughout the decommissioning phase.	EPC	As necessary (dependant on season and on-site conditions) throughout construction.	EO inspection reports
	All cleared areas should be rehabilitated as soon as possible.	EPC	Rehabilitation to be undertaken as soon as decommissioning in each specific area is concluded (i.e. phased, throughout the decommissioning phase).	EO to monitor the rehabilitation areas weekly (including photographic records).
	Rehabilitated areas should be monitored post-decommissioning and remedial actions implemented as required.	EPC and EO	Post-decommissioning (to be refined as part of decommissioning planning).	As per post-decommissioning rehabilitation plan

9.4.6 Waste Management: Decommissioning Phase Management Measures

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

Indicator and Compliance Mechanisms:

- Induction training and records;
- Material safety data sheets;
- Waste Management Plan (Aligned to Appendix H 9);
- Relevant SANS Codes of Practice;
- Safety disposal certificates and waste manifests (all waste streams);

- Emergency preparedness and response procedure (Aligned to Appendix H 7);
- Incident classification and reporting management procedure (to be developed);
- Waste manifest documentation (refer to procedure/guideline in Appendix H 9);
- Grievance Register (Appendix H 8); and
- Monitoring and audit reports

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
14B	Prior to decommissioning, the Developer must undertake investigations into the available recycling companies and technologies available at the time, and ensure that project components are recycled as far as possible.	Applicant / Developer	As part of decommissioning planning.	EPC to keep records of components transported off site (final destination)
	Where components cannot be recycled, these must be transported off-site by registered waste transporters, and disposed of at licensed waste management facilities (per type of waste).	EPC	Whenever components are transported off site.	EPC to keep records of components transported off site (final destination)
	When the decommissioning phase commences, a designated waste area must be established with the placement of skips to contain various waste streams.	EPC	Throughout decommissioning phase	EO to include waste area in weekly inspection reports
	Skips must be covered with a Tarp to prevent windblown litter	EPC	Throughout decommissioning phase	EO to include skips in weekly inspection reports
	A designated and appropriately demarcated and covered hazardous waste storage area or skip must be established on a hard standing area.	EPC	Throughout decommissioning phase	EO to include hazardous waste area/skip in weekly inspection reports
	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	EPC	Throughout decommissioning phase	Per Management Plan (Appendix H 9)

9.4.7 Post-Decommissioning Rehabilitation Management Measures

The EPC must compile, for approval by the Applicant, a detailed rehabilitation plan prior to commencement of the decommissioning phase. It is anticipated that this plan could be compiled as part of decommissioning planning, closer to the time. The plan must stipulate the specific rehabilitation measures that the EPC proposes to implement at the site, post-decommissioning.

Objective: To ensure that, post-decommissioning, all areas are returned to a stable, safe, and self-sustaining state, either as natural vegetation resembling the surroundings and pre-project condition, or as productive areas as per the land user specification.

To ensure that areas where infrastructure has been removed do not give rise to environmental risks (including pollution, sedimentation) or safety risks, and

To ensure that, where possible, these areas can contribute to continuing ecological processes or productive land uses post-construction.

Indicator and Compliance Mechanisms:

- As per EPC's rehabilitation and re-vegetation plan;
- EO inspection reports;
- Rehabilitation completion sign-off by Applicant and ECO.

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
15	Remove all temporary infrastructure used in the decommissioning phase from site (skips, bins, container offices etc.).	EPC	Once infrastructure is no longer needed	As per EPC's rehabilitation plan (to be approved by Applicant and DFFE as part of decommissioning planning)
16	Areas from where infrastructure has been removed must be ripped, shaped / levelled and seeded.	EPC	Once infrastructure is no longer needed	As per EPC's rehabilitation plan
17	Remaining excavations must be backfilled to natural ground level. Uncontaminated spoil material and demolition rubble may be used as backfill. Contaminated soils and rubble must be disposed of at a registered waste disposal site.	EPC	Upon rehabilitation	As per EPC's rehabilitation plan Applicant sign-off.
18	Steep slopes must be shaped/levelled and stabilised (vegetated, implement reno mattresses or gabions or similar) to prevent erosion.	EPC	During rehabilitation activities	EO to inspect rehabilitated sites for signs of erosion and advise EPC on remediation as required.

No	Management Actions	Responsible party (implementation)	Frequency / timing / duration (implementation)	Monitoring specifications
19	Temporary berms created for stormwater management must be rehabilitated (levelled, ripped and vegetated) once no longer needed for stormwater control in each specific area.	EPC	During rehabilitation activities	EO to inspect rehabilitated sites and advise the EPC on redundant berms to be rehabilitated.
20	Where new temporary roads have crossed cultivated farmlands, the lands must be rehabilitated by ripping which must be agreed to by the Applicant and the landowners	EPC	During rehabilitation activities	EO to inspect roads and advise the EPC on rehabilitation of redundant roads. Maintain complaints register.
21	Where new temporary roads were established over natural areas, rehabilitation must involve the ripping and re-vegetating of affected areas with species resembling the pre-construction condition	EPC	During rehabilitation activities	EO to inspect roads and advise the EPC on rehabilitation of redundant roads. Rehabilitation monitoring as per Management Plan.
22	Re-vegetation of denuded areas must involve species that are typical of the Eastern Highveld Grassland vegetation type. A preliminary seed mix is included in Appendix H 4. The EPC should propose a commercially available grass seed mix, the proposed density of seeding, and the identified supplier(s) of the seed mix for use in rehabilitation, in his rehabilitation plan, prior to decommissioning and rehabilitation commencing.	EPC	Seed mix and supplier to be specified prior to rehabilitation commencing.	EO weekly inspection reports to include rehabilitated areas.
22	Rehabilitated areas must be monitored for a period of one year, to ensure effective vegetation establishment, and the eradication of alien invasive species.	EPC	During and after rehabilitation activities	As per EPC's rehabilitation plan (to be approved by Applicant and DFFE as part of decommissioning planning)

10 Conclusion

ENERTRAG South Africa (Pty) Ltd (the Developer) proposes the development of the Hendrina Renewable Energy Complex (the Complex), comprising of the Hendrina North WEF, Hendrina North Grid Infrastructure, **Hendrina South WEF** and Hendrina South Grid Infrastructure.

Hendrina South Wind Energy Facility (RF) Pty Ltd is a Special Purpose Vehicle (SPV) established by the Developer, and The Applicant in terms of the Project. Should the outcome of the EIA process be positive, it is the Applicant's intention to bid the project into future Renewable Energy Independent Power Producer Programme (REIPPP) rounds, in line with the Integrated Resource Plan (IRP) – renewable wind energy.

This Environmental Management Programme Report (EMPr) relates to the Hendrina South Wind Energy Facility (WEF) and associated infrastructure (The Project) and must be read with the Environmental Impact Assessment (EIA) Report for the Project.

The Project requires Environmental Authorisation (EA) in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) before being undertaken. A Scoping and Environmental Impact Assessment (S&EIA) Process was followed to apply for authorisation.

Section 24C(2)(a) of the NEMA stipulates that the Minister of Forestry, Fisheries and the Environment ("the Minister") must be identified as the Competent Authority (CA) if the activity has implications for international environmental commitments or relations. GN 779 of 01 July 2016 identifies the Minister as the CA for the consideration and processing of environmental authorisations and amendments thereto for activities related to the Integrated Resource Plan (IRP) 2010 – 2030. As it is the Applicant's intention to bid the project into future REIPPP rounds, in line with the IRP, the National Department of Fisheries, Forestry and Environment (DFFE) is the CA for the Application.

The EIA has identified various potential impacts associated with the Project on the biophysical, socio-cultural and economic environments. No Fatal flaws have been identified, and the anticipated negative impacts are found to be manageable, provided that strict mitigation is implemented.

Specific management measures to avoid impacts entirely, or reduce their severity, duration or spatial extent, are described in this EMPr, along with the person(s) that will be responsible for implementing the various management measures. Further, monitoring protocols are prescribed to ensure the implementation of the stipulated measures, and the residual effects of potential impacts, are monitored and reported upon, so that adaptive management can be implemented to address unforeseen impacts.

The impact assessment further concluded that the socio-economic benefits of the Project outweigh the potential environmental risks, provided the management measures stipulated in this EMPr are implemented. It is therefore the opinion of the Environmental Assessment Practitioner, that the Project be considered for approval.

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Appendix H 1: High-Level Stormwater Management and Erosion Control Plan

Appendix H 2: Preliminary Plant Rescue and Relocation Plan

Appendix H 3: High Level Alien Invasive Management Plan

Appendix H 4: Preliminary Rehabilitation and Revegetation Plan

Appendix H 5: Preliminary Traffic Management Plan

Appendix H 6: Chance Find Protocol

Appendix H 7: Emergency Response Plan

Appendix H 8: Grievance Procedure (internal and external)

Appendix H 9: Waste Management Procedure