NEWCASTLE WIND POWER WIND ENERGY FACILITY
AMAJUBA DISTRICT MUNICIPALITY
KWAZULU NATAL PROVINCE

DFFE Reference Number: 14/12/16/3/3/2/2212 (PREVIOUS APPLICATION)
DFFE Reference Number: 14/12/16/3/3/2/2457 (NEW APPLICATION)

FINAL ENVIRONMENTAL MANAGEMENT PROGRAMME

(to be made available for public consultation)

PREPARED FOR:

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FEBRUARY 2024

This Report should be cited as follows: Draft *Final Environmental Management Programme: Mulilo Newcastle Wind Power Wind Energy Facility, KwaZulu Natal Province. CES. February 2024.*

ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES

REPORT TITLE:

FINAL ENVIRONMENTAL MANAGEMENT PROGRAMME – MULILO NEWCASTLE WIND POWER 2 WIND ENERGY FACILITY

REPORT VERSION:

FINAL

PROJECT NUMBER:

P40700009

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DEFINITIONS

For the purposes of this Environmental Management Programme (EMPr), the following terms, abbreviations and descriptions apply:

TERMS	DESCRIPTION
Acceptable Exposure	The exposure of the maximum permissible concentration of a substance to the environment that will have a minimal negative effect on health or the environment.
Agenda 21	The document by that name adopted at the United Nations Conference of Environment and Development held in Rio de Janeiro, Brazil in June 1992.
Agreement	For NEMA EIA Regulations GNR 982 regulation 1(3) and (4) (of 2014) means the Agreement as contemplated in section 50A (2) of the Act.
Agri-industry	An undertaking involving the beneficiation of agricultural produce.
Alternatives	In relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to – (a) the property on which, or location where, the activity is proposed to be undertaken; (b) the type of activity to be undertaken; (c) the design or layout of the activity; (d) the technology to be used in the activity; or (e) the operational aspects of the activity; And includes the option of not implementing the activity.
Alien Vegetation	Alien vegetation is defined as undesirable plant growth which shall include, but not be limited to all declared category 1 and 2 listed invader species as set out in the Conservation of Agricultural Resources Act (CARA) regulations. Other vegetation deemed to be alien shall be those plant species that show the potential to occupy in number, any area within the defined construction area and which are declared to be undesirable. This includes plant species identified as Alien and invasive species in the National Environmental Management Biodiversity Act of 2004, Alien and Invasive Species Regulations, 2014.
Applicant	Means a person who has submitted or who intends to submit an application.
Application	In terms of the NEMA EIA Regulations GNR 982 (2014) means an application for an– (a) Environmental authorisation in terms of Chapter 4 of these Regulations; (b) Amendment to an environmental authorisation in terms of Chapter 5 of these Regulations; (c) Amendment to an EMPr in terms of Chapter 5 of these Regulations; or (d) Amendment of a closure plan in terms of Chapter 5 of these Regulations.
Aquifer	A geological formation which has structures or textures that hold water or permit appreciable water movement through them.
Aquatic Critical Biodiversity Areas	Linkages between catchment, important rivers and sensitive estuaries whose safeguarding is critically required in order to meet biodiversity pattern and process thresholds and are spatially defined as part of a bioregional plan or systematic biodiversity plan, available on the South African National Biodiversity Institute's BGIS website (http://bgis.sanbi.org/WCBF14project.asp);
Associated Structures, Infrastructure and Earthworks	Any structures, infrastructure, or earthworks, including borrow pits, that is necessary for the functioning of a facility activity.
Basic Assessment Report	A report contemplated in NEMA EIA Regulations GNR 982 regulation 19 (of 2014).
Best Practicable Environmental Option	The Option that provides the most benefit or causes the least damage to the environment as a whole at a cost acceptable to society in the long term as well as in the short term.
Biodiversity	The variety of life in an area, including the number of different species, the genetic wealth within each species, and the natural areas where they are found.
Bioregional Plan	The bioregional plan contemplated in Chapter 3 of the National Environment Management Biodiversity Act, 2004 (Act No. 10 of 2004).

TERMS	DESCRIPTION
Borehole	includes a well, excavation or my artificially constructed or improved underground cavity which can be used for the purpose of— (a) intercepting, collecting or storing water in or removing water from an aquifer (b) observing and collecting data and information on water in an aquifer; or (c) recharging an aquifer.
Buffer Area	Means, unless specifically defined, an area extending 10 kilometres from the proclaimed boundary of a world heritage site or national park and 5 kilometres from the proclaimed boundary of a nature reserve, respectively, or that defined as such for a biosphere.
Building and Demolition Waste	Waste, excluding hazardous waste, produced during the construction, alteration, repair or demolition of any structure, and includes rubble, earth, rock and wood displaced during that construction, alteration, repair or demolition.
Business Waste	Waste that emanates from premises that are used wholly or mainly for commercial, retail, wholesale, entertainment or government administration purposes.
By-product	A substance that is produced as part of a process that is primarily intended to produce another substance or product and that has the characteristics of an equivalent virgin product or material
Canal	An open structure that is lined or reinforced, for the conveying of a liquid or that serves as an artificial watercourse.
Catchment	In relation to a watercourse or watercourses or part of a watercourse, means the area from which any rainfall will drain into the watercourse or watercourses or part of a watercourse, through surface flow to a common point or common points.
Channel	An excavated hollow bed for running water or an artificial underwater depression to make a water body navigable in a natural watercourse, river or the sea
Cement-laden water	Cement laden water refers to water containing cement or concrete arising from the Contractor's activities.
Clean Production	The continuous application of integrated preventative environmental strategies to processes, products and services to increase overall efficiency and to reduce the impact of such processes, procedures and services on health and the environment
Closure Plan	A plan contemplated in NEMA EIA Regulations GNR 982 regulation 19 (of 2014)
Commence	The start of any physical activity, including site preparation or any other activity on the site in furtherance of" a waste management activity, but does not include any activity required for investigation or feasibility study purposes as long as such investigation or feasibility study does not constitute a waste management activity.
Commercially Confidential Information	Commercial information the disclosure of which would prejudice to an unreasonable degree the commercial interests of the holder provided that details of emission levels and waste products must not be considered to be commercially confidential notwithstanding any provision of this Act or any other law.
Community	Any group of persons or a part of such a group who share common interests and who regard themselves as a community.
Competent Authority	The authority who in terms of the provisions of the NEMA and the EIA Regulations GNR 982 (of 2014) is identified as the authority who must consider and decide on an application in respect of a Specific listed activity.
Contaminated water	Contaminate water refers to water that has been contaminated by the Contractor's activities such as with hazardous substances, hydrocarbons, paints, solvents and runoff from plant, workshop or personnel wash areas but excludes water containing cement/ concrete or silt.
Construction	The building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity but excludes any modification, alteration or expansion of such a facility, structure or infrastructure and excluding the reconstruction of the same facility in the same location, with the same capacity and footprint.

TERMS	DESCRIPTION
Construction Camp	Construction camp (site camps) refers to all storage and stockpile sites, site offices, container sites, workshops and testing facilities and other areas required to undertake construction activities.
Contractor	An organisation that contracts with a Principal to carry out the work under the contract, including construction and related services, to deliver an asset or construction product.
Container	A disposable or re-usable vessel in which waste is placed for the purposes of storing, accumulating, handling, transporting, treating or disposing of that waste, and includes bins, bin-liners and skips.
Contaminated	The presence in or under any land, site, buildings or structures of a substance or micro- organism above the concentration that is normally present in or under that land, which substance or micro- organism directly or indirectly affects or may affect the quality of soil or the environment adversely.
Cumulative Impact	In relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities;
Dangerous Goods	Goods containing any of the substances as contemplated in South African National Standard No. 10234, supplement 2008 1.00: designated "List of classification and labelling of chemicals in accordance with the Globally Harmonized System (GHS)" published by Standards South Africa, and where the presence of such goods, regardless of quantity, in a blend or mixture, causes such blend or mixture to have one or more of the characteristics listed in the Hazard Statements in section 4.2.3, namely physical hazards, health hazards or environmental hazards;
Decommissioning	To take out of active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily re-commissioned.
Development	The building, erection, construction or establishment of a facility, structure of infrastructure, including associated earthworks or borrow pits, that is necessary for the undertaking of a listed or specified activity, including any associated post development monitoring, but excludes any modification, alteration or expansion of such a facility, structure of infrastructure, including associated earthworks or borrow pits, and excluding the redevelopment of the same facility in the same location, with the same capacity and footprint;
Disposal	The burial, deposit, discharge, abandoning, dumping, placing or release of any waste into, or onto, any land.
DWS	The Department of Water and Sanitation. This Department is the custodian of South Africa's water resources. It is primarily responsible for the formulation and implementation of policy governing this sector. It also has override responsibility for water services provided by local government.
Ecosystem	A dynamic system of plant animal and micro-organism communities and their non-living environment interacting as a functional unit.
Effluent	Any liquid discharge into the coastal environment as waste and includes any substance dissolved or suspended in the liquid; or Liquid which is a different temperature from the body of water into which it is being discharged.
Environment	Environment refers to the surroundings within which humans exist and that could be made up of:- (a) The land, water and atmosphere of the earth; (b) Micro-organisms, plant and animal life; (c) Any part or combination of (i) and (ii) and the interrelationships among and between them; and (d) The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.
Environmental Aspect	An environmental aspect is any component of a Contractor's construction activity that is likely to interact with the environment.

TERMS	DESCRIPTION
Environmental Assessment Practitioner (EAP)	The individual responsible for planning, management and coordination of environmental impact assessments, strategic environmental assessments, environmental management programmes or any other appropriate environmental instrument introduced through the NEMA EIA Regulations GNR 982 – as defined in section 1 of the Act.
Environmental Audit Report	A report contemplated in NEMA EIA Regulations GNR 982 regulation 34 (of 2014);
Environmental Authorisation (EA)	An Environmental Authorisation (EA) refers to a written statement from the relevant environmental authority, with or without conditions, that records the approval (partial approval or refusal) of a proposed project and the mitigating measures required to prevent or reduce the effects of environmental impacts during the lifespan of a contract.
Environmental Control Officer (ECO)	An Environmental Control Officer (ECO) refers to a suitably qualified and experienced person or entity appointed for the construction and/or operation of works, to perform the obligations specified in the EA.
Environmental Impact	An impact or environmental impact is the change to the environment, whether desirable or undesirable, that will result from the effect of a construction activity. An impact may be the direct or indirect consequence of a construction activity.
Environmental Impact Assessment (EIA)	A systematic process of identifying, assessing and reporting environmental impacts associated with an activity and includes basic assessment and S&EIR.
Environmental Impact Assessment Report (EIR)	A report contemplated in NEMA EIA Regulations GNR 982 regulation 23 (of 2014).
Environmental Management Plan/Programme (EMP/EMPr)	An Environmental Management Plan (EMP) or Programme (EMPr) is an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning specific to a project are prevented; and that the positive benefits of the project are enhanced.
Environmental Management System (EMS)	The internationally accepted and recognized environmental management system (EMS) which enables companies, organizations and operations to systematically manage, prevent and reduce environmental problems and associated costs. In terms of ISO 14001 an EMS is defined as, *"that part of the overall management system that includes organizational structure, planning activities, responsibilities, procedures, processes and resources for developing, implementing, reviewing and maintaining the environmental policy."*
Environmental Policy	Environmental Policy is a statement (or statements) by the organisation of its intentions and principles in relation to its overall environmental performance which provides a framework for action and for the setting of its environmental objectives and targets.
Environmental Site Officer (ESO)	An Environmental Site Officer (ESO) refers to the site-based designated person responsible for implementing the environmental provisions of the construction contract and is appointed by the service provider that carries-out construction activities.
Environmental Risk	A potential for adverse environmental impacts (such as pollution of a water source during construction activities).
External Auditor	An External Auditor is a suitably qualified and experienced independent expert as per the required auditor qualifications (ISO 14012).
General Waste	Waste that does not pose an immediate hazard or threat to health or to the environment, and includes— (e) domestic waste; (f) building and demolition waste; (g) business waste: and (h) inert waste;
Hazardous Waste	Any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment.
High-water Mark	Means the highest line reached by coastal wasters but excluding the line reached as a result of-

TERMS	DESCRIPTION
	(a) Exceptional or abnormal floods or storms that occur no more than one in ten years; or (b) An estuary being closed to the sea.
Important Bird and Biodiversity Area (IBA)	Areas/sites that hold significant numbers of globally and/or regionally threatened species (Categories A1 and C1); sites that are known or thought to hold a significant component of a group of species whose breeding distributions define and Endemic Bird Area (EBA) (Category A2); sites that are known or thought to hold a significant component of a group of species whose distributions are largely or wholly confined to one biome (Category A3);
Independent	In relation to an EAP, a specialist or the person responsible for the preparation of an environmental audit report, means – (a) That such EAP, specialist or person has no business, financial, personal or other interest in the activity or application in respect of which that EAP, specialist or person is appointed in terms of the NEMA EIA Regulations GNR 982 (2014); or (b) That there are no circumstances that may compromise the objectivity of that EAP, specialist or person in performing such work; excluding – i. Normal remuneration for a specialist permanently employed by the EAP; or ii. Fair remuneration for work performed in connection with that activity, application or environmental audit;
Independent Environmental Consultant (IEC)	An Independent Environmental Consultant (IEC) is a suitably qualified and IEC appointed by the Engineer to perform the obligations specified in the Contract. The IEC must provide reports to the regulatory authority, the Engineer and any other parties as specified by the regulatory authority.
Indigenous Vegetation	Vegetation consisting of indigenous plant species occurring naturally in an area, regardless the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.
Industrial Complex	An area used or zoned for bulk storage, manufacturing, processing or packaging purposes.
Inert Waste	Waste that— (a) does not undergo any significant physical, chemical or biological transformation after disposal; (b) does not burn, react physically or chemically biodegrade or otherwise adversely affect any other matter or environment with which it may come into contact; and (c) does not impact negatively on the environment, because of its pollutant content and because the toxicity of its leachate is insignificant.
In Stream Habitat	The physical structure of a watercourse and the associated vegetation in relation to the bed of the watercourse.
Interested and/or Affected Party (I&AP)	An Interested and/or Affected Party (I&AP) is contemplated in Section 24(4)(d) of the NEMA (1998, Act No. 107) and which, in terms of that section, includes – *(i) Any person, groups of persons, organisation interested in or affected by an activity, and;* *(ii) Any organ of state that may have jurisdiction over any aspect of the activity.*
ISO 14001 Environmental Management System (ISO 14001)	The internationally accepted and recognised Environmental Management System as reflected in the document SABS ISO 14001: 1996; the most recent being the ISO 14001:2015.
Life Cycle Assessment	a process where the potential environmental effects or impacts of a product or service throughout the life of that product or service are being evaluated.
Linear Activity	An activity that is arranged in or extending along one or more properties and which affects the environment or any aspect of the environment along the course of the activity, and includes railways, roads, canals, channels, funiculars, pipelines, conveyor belts, cableways, powerlines, fences, runways, aircraft landing strips, and telecommunication lines.
Maintenance	Actions performed to keep a structure or system functioning or in service on the same location, capacity and footprint;

TERMS	DESCRIPTION
Management	The planning and interactive controlling of human and material resources to achieve time, cost, quality, performance, functional and scope requirements. It involves the anticipation of changes due to changing circumstances and the making of other changes to minimise adverse effects.
Method Statement (MS)	A Method Statement (MS) is a written submission by the Contractor to the ECO in response to the EMPr or to a request by the ECO, setting out the plant (construction equipment), materials, labour and method the Contractor proposes to carry out an activity, identified by the relevant specification or the ECO when requesting the Method Statement. The MS should be in such detail that the ECO is able to assess whether the Contractor's proposal is in accordance with the EMPr and/or will produce results in accordance with the EMPr.
Mitigate/Mitigation	Mitigate (or mitigation) refers to the implementation of practical measures to reduce the adverse impacts, or to enhance beneficial impacts of a particular action.
National Appeal Regulations	The national appeal regulations published in terms of section 43(4) and 44 of the Act;
National Environmental Management Act (NEMA)	the National Environmental Management Act, 1998 (Act No. 107 of 1998); To provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote cooperative governance and procedures for co-ordinating environmental functions exercised by organs of state; to provide for certain aspects of the administration and enforcement of other environmental management laws; and to provide for matters connected therewith.
National Protected Area Expansion Strategy (NPAES)	South Africa's national strategy for expansion of the protected area network, led by the Department of Environmental Affairs and developed in collaboration with national and provincial conservation authorities. The NPAES sets targets for protected area expansion, provides maps of the most important areas for protected area expansion, and makes recommendations on mechanisms for protected area expansion. Focus areas for protected area expansion are identified in the NPAES. They are large, intact, unfragmented areas of high importance for land-based protected area expansion, suitable for the creation or expansion of large protected areas.
NEM:AQA	National Environmental Management: Air Quality Act (39 of 2004). The NEM: AQA's serves to protect the environment by providing reasonable measures for the protection and improvement of the quality of air; the prevention of air pollution and ecological degradation; and securing ecologically sustainable development while promoting economic and social development.
NEM:BA	National Environmental Management: Biodiversity Act (10 of 2004). This Act serves to provide for the management and conservation of biological diversity within an area and of the components of such biological diversity. This Acts objective is to preserve species and ecosystems irrespective of whether or not they are situated in protected areas.
NEM:ICM	National Environmental Management: Integrated Coastal Management Act (24 of 2008). This act applies to the coastal zone of South Africa and is intended to preserve, protect, extend and improve the status of coastal public property as being held in trust by the State on behalf of all South Africans, including future generations.
NEM:PAA	National Environmental Management: Protected Areas Act (57 of 2003). This Act is intended to protect and conserve ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. This includes the identification and classification of various types of protected areas to give effect to this intention and underpinning this intention is the stated objective of creating a national system of protected areas in South Africa as part of a strategy to manage and conserve its biodiversity. These protected areas are to fall on state owned land, privately owned land and communally owned land.
NEM:WA	National Environmental Management: Waste Act (59 of 2008). The NEM:WA serves to protect health and the environment by providing reasonable measures for the

TERMS	DESCRIPTION
	prevention of pollution and ecological degradation and for securing ecologically sustainable development; to provide for institutional arrangements and planning matters; to provide for national norms and standards for regulating the management of waste by all spheres of government; to provide for specific waste management measures; to provide for the licensing and control of waste management activities; to provide for the remediation of contaminated land; to provide for the national waste information system; to provide for compliance and enforcement; and to provide for matters connected therewith.
NEMA EIA Regulations	The environmental impact assessment regulations promulgated in terms of the national environmental management act, 1998 (act no. 107 of 1998) ("NEMA").
No-Go Area	A no-go area refers to an area in which construction activities are prohibited.
Pollution	According to the NEMA (Act No. 107 of 1998), pollution can be defined as, "*Any change in the environment caused by (i) substances; (ii) radioactive or other waves; or (iii) noise, odours, dust or heat emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future*".
Potentially hazardous substance	A potentially hazardous substance refers to a substance, which, in the reasonable opinion of the ECO, can have a harmful effect on the environment. Hazardous Chemical Substances are defined in the Regulations for Hazardous Chemical Substances published in terms of the Occupational Health and Safety Act.
Procurement	The collection of activities performed by and for an agency to acquire services and products, including assets, beginning with the identification/detailing of service requirements and concluding with the acceptance (and where applicable, disposal) of the services and products.
Proponent	A person intending to submit an application for environmental authorisation and is referred to as an applicant once such application for environmental authorisation has been submitted;
Protection	In relation to a water resource, means - (d) maintenance of the quality of the water resource to the extent that the water resource may be used in an ecologically sustainable way; (e) prevention of the degradation of the water resource; and (f) the rehabilitation of the water resource.
Protected Area	Those protected areas contemplated in section 9 of the NEMPAA and the core area of a biosphere reserve and shall include their buffers;
Public Participation Process	A process by which potential interested and affected parties are given an opportunity to comment on, or raise issues relevant to, an application.
Reasonable	Reasonable means reasonable in the opinion of the ECO, after consultation with the ESO - unless the context indicates otherwise.
Recycle	A process where waste is reclaimed for further use, which process involves the separation of waste from a waste stream for further use and the processing of that separated material as a product or raw material.
Rehabilitation	Rehabilitation refers to re-establishing or restoring something to its original state or to a healthy, sustainable capacity or state.
Riparian Habitat	The physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of Species with a composition and physical structure distinct from those of adjacent land areas.
Service Provider	A Contractor, sub-Contractor, supplier, consultant (including an agency) and sub-consultant (contracting with a consultant), and their service providers, that contract with a customer to carry out assets construction, provide other products (including goods) and/or provide services.

TERMS	DESCRIPTION
Significant Impact	An impact that may have a notable effect on one or more aspects of the environment or may result in non-compliance with accepted environmental quality standards, thresholds or targets and is determined through rating the positive and negative effects of an impact on the environment based on criteria such as duration, magnitude, intensity and probability of occurrence.
Site	A site, in this context, refers to the area in which construction is taking place.
Solid waste	Solid waste refers to all solid waste materials, including construction debris, chemical waste, excess cement/concrete, wrapping materials, timber, tins, cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers).
Specialist	A person that is generally recognised within the scientific community as having the capability of undertaking, in conformance with generally recognised scientific principles, specialist studies or preparing specialist reports, including due diligence studies and socio-economic studies.
Species of Conservation Concern (SCC)	Species of Conservation Concern (SCC) refers to species listed in the rare, indeterminate, or monitoring categories of the South African Red Data Books, and/or species listed in globally near threatened, nationally threatened or nationally near threatened categories (Barnes, 1998).
Sub-Contractor	An organisation that contracts with a Contractor as the customer to carry out construction and related services, and/or provide other products.
Supplier	An organisation that contracts with a Contractor/Principal to supply a product and/or service.
Sustainable Development	The integration of social, economic and environmental factors into planning, implementation and decision-making so as to ensure that development serves present and future generations.
Systematic Biodiversity Plan	A plan that identifies important areas for biodiversity conservation, taking into account biodiversity patterns (i.e. the principle of representation) and the ecological and evolutionary processes that sustain them (i.e. the principle of persistence). A systematic biodiversity plan must set quantitative targets/thresholds for aquatic and terrestrial biodiversity features in order to conserve a representative sample of biodiversity pattern and ecological processes.
Threatened species	Threatened species are defined as: a) species listed in the endangered or vulnerable categories in the revised South African Red Data Books or listed in the globally threatened category; b) species of special conservation concern (i.e. taxa described since the relevant South African Red Data Books, or whose conservation status has been highlighted subsequent to 1984); c) species which are included in other international lists; or d) species included in Appendix 1 or 2 of the Convention of International Trade in Endangered Species (CITES).
Topsoil	Topsoil refers to the top 100 mm of soil and may include top material e.g. vegetation and leaf litter.
Treatment	Any method, technique or process that is designed to— (g) change the physical, biological or chemical character or composition of a waste; or (h) remove, separate, concentrate or recover a hazardous or toxic component of a waste; or (i) destroy or reduce the toxicity of a waste, in order to minimise the impact of the waste on the environment prior to further use or disposal.
Urban Area	Areas situated within the urban edge (as defined or adopted by the competent authority), or in instances where no urban edge or boundary has been defined or adopted, it refers to areas situated within the edge of built-up areas.
Virgin Soil	Land not cultivated for the preceding 10 years.
Waste	Any substance, whether or not that substance can be reduced, re-used, recycled and recovered— (a) that is surplus, unwanted, rejected, discarded, abandoned or disposed of; (b) which the generator has no further use of for the purposes of production; (c) that must be treated or disposed of; or

TERMS	DESCRIPTION
	(d) that is identified as a waste by the Minister by notice in the Gazette, and includes waste generated by the mining, medical or other sector, but— (e) a by-product is not considered waste; and (f) any portion of waste, once re-used, recycled and recovered, ceases to be waste;
Waste Disposal Facility	Any site or premise used for the accumulation of waste with the purpose of disposing of that waste at that site or on that premise.
Waste Management Activity	Any activity listed in Schedule 1 or 40 published by notice in the Gazette under section 19, and includes— (a) the importation and exportation of waste; (b) the generation of waste, including the undertaking of any activity or process that is likely to result in the generation of waste: (c) the accumulation and storage of waste; (d) the collection and handling of waste; (e) the reduction, re-use, recycling and recovery of waste; (f) the trading in waste; (g) the transportation of waste; (h) the transfer of waste; 50 (i) the treatment of waste; and (j) the disposal of waste;
Waste Treatment Facility	Any site that is used to accumulate waste for the purpose of storage, recovery, treatment, reprocessing, recycling or sorting of that waste.
Watercourse	Means- (a) a river or spring; (b) a natural channel in which water flows regularly or intermittently; (c) a wetland lake or dam into which, or from which, water flows; and (d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse as defined in the National Water Act, 1998 (Act No. 36 of 1998); and (e) a reference to a watercourse includes, where relevant, its bed and banks;
Water Management Area	An area established as a management unit in the national water resource strategy within which a catchment management agency will conduct the protection use development, conservation, management and control of water resources.
Water Management Institution	A catchment management agency, a water user association, a body responsible for international water management or any person who fulfils the functions of a water management institution in terms of this Act.
Wetland	Land which is transitional between terrestrial and aquatic systems, where the water table is usually at or near the surface, or the land is periodically covered with shallow water and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

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1 INTRODUCTION

Mulilo Renewable Project Developments (Pty) Ltd (Mulilo) is proposing to develop the Newcastle Wind Energy Facility (WEF) Complex near Newcastle in the Newcastle Local Municipality, in KwaZulu-Natal Province, comprising:

- **Mulilo Newcastle Wind Power WEF (up to 200 MW and 35 turbine positions) (Scoping and Environmental Impact Assessment process) (Reference 14/12/16/3/3/2/2457)**
- Mulilo Newcastle Wind Power 2 WEF (up to 160 MW and 16 turbine positions) (Scoping and Environmental Impact Assessment process) (Reference 14/12/16/3/3/2/2458)
- Mulilo Newcastle Wind Power grid connection to Eskom and associated powerlines (Basic Assessment process)
- Mulilo Newcastle Wind Power 2 grid connection to Eskom and associated powerlines (Basic Assessment process).

A total of four (4) applications will be submitted for Environmental Authorization for the Mulilo Newcastle WEF Complex.

- Two (2) to DFFE for the WEFs.
- Two (2) to the KZN Department of Economic Development & Tourism and Environmental Affairs (DEDTEA) for the two (2) grid connection powerlines.

The current draft Final Environmental Management Programme (EMPr) is for:

- **Mulilo Newcastle Wind Power (Pty) Ltd (up to 200 MW and up to 35 possible turbine sites).**

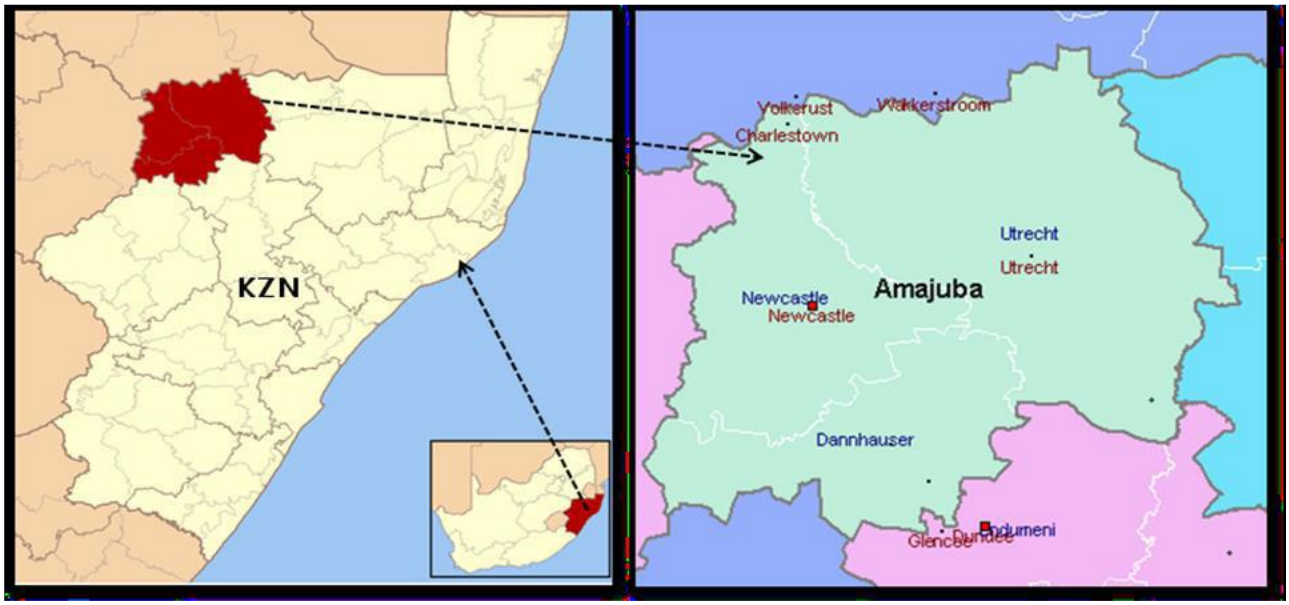

Figure 1.1: Locality Map of the Proposed MNWP WEF Complex within the KZN Province, Amajuba DM and Newcastle LM.

1.1 OBJECTIVES OF THE EMPR

This Environmental Management Programme (EMPr) has been compiled to provide mitigation, monitoring and institutional measures to be taken during the construction and operation of the MNWP 2 WEF near MNWP 1 WEF in the KwaZulu Natal Province. These measures aim to avoid and/or reduce adverse environmental and social impacts.

This EMPr informs all relevant parties, in this case, the Project Coordinator, the Contractor, the Environmental Control Officer (ECO) and all other staff employed by Mulilo Newcastle Wind Power (Pty) Ltd

at the site, of their duties in the fulfilment of the legal requirements for the construction and operation of the MNWP WEF, with particular reference to the prevention and mitigation of anticipated potential environmental and social impacts.

All parties should note that obligations imposed by the EMPr are legally binding in terms of the Environmental Authorisation (EA) granted by the relevant environmental permitting authority, the national Department of Forestry, Fisheries and the Environment (DFFE).

The general objectives of the EMPr are to:

- Ensure compliance with the regulatory authority stipulations and guidelines which could be local, provincial, national and/or international;
- Ensure that there is sufficient allocation of resources on the project budget so that the scale of EMPr-related activities is consistent with the significance of project impacts;
- Verify environmental performance through information on impacts as they occur;
- Respond to unforeseen events;
- Provide feedback for continual improvement in environmental performance;
- Identify a range of mitigation measures which could reduce and mitigate the potential impacts to minimal or insignificant levels;
- Detail specific actions deemed necessary to assist in mitigating the environmental impact of the project;
- Identify measures which could optimize beneficial impacts;
- Create management structures which address the concerns and complaints of I&APs relating to the development;
- Establish a method of monitoring and auditing environmental management practices during all phases of the activity;
- Ensure that safety recommendations are complied with; and
- Specify time periods within which the measures contemplated in the final EMPr must be implemented, where appropriate.

1.2 STRUCTURE AND FUNCTION OF THE EMPR

An EMPr is focused on sound environmental management practices, which will be undertaken to minimise adverse impacts on the environment through the lifetime of a development. In addition, an EMPr identifies measures which should be in place or will be actioned to manage any incidents and emergencies that could occur during the operation of the project.

As such, the EMPr provides specifications which must be adhered to in order to minimise adverse environmental and social impacts associated with the construction and operation of the MNWP 2 WEF. The contents of the EMPr are consistent with the requirements as set out in Appendix 4 of the National Environmental Management Act (NEMA) (Act No. 107 of 1998, as amended) Environmental Impact Assessment (EIA) Regulations (2014, as amended), as stipulated below.

REQUIREMENTS OF AN ENVIRONMENTAL MANAGEMENT PROGRAMME IN TERMS OF APPENDIX 4 OF GN R. 982 (GN R. 326, 2017)
(1) An EMPr must comply with Section 24(N) of the Act and include - (a) Details of – (i) The EAP who prepared the EMPr; and (ii) The expertise of the EAP to prepare an EMPr, including a curriculum vitae; (b) A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description; (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; (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;

(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;
(iv) Comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;

(g) The method of monitoring the implementation of the impact management actions contemplated in paragraph (f);
(h) The frequency of monitoring the implementation of the impact management actions contemplated in (f);
(i) An indication of the persons who will be responsible for the implementation of the impact management actions;
(j) The time periods within which the impact management actions contemplated in paragraph (f) must be implemented;
(k) The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);
(l) A program for reporting on compliance, taking into account the requirement as prescribed by the regulations;
(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
(n) Any specific information that may be required by the competent authority.
(2) Where a government notice *gazetted* by the Minister provides for a generic EMPr, such generic EMPr as indicated in such notice will apply.

1.3 LEGAL REQUIREMENTS

Construction must be according to the best industry practices, as identified in the project documents. This EMPr, which forms an integral part of the contract documents, informs the Contractor and the Applicant of their duties in the fulfilment of the project objectives, with reference to the prevention and mitigation of environmental and social impacts caused by the construction and operational activities associated with the MNWP WEF. The Contractor and the Applicant should note that obligations imposed by the approved EMPr are legally binding in terms of environmental statutory legislation and in terms of the additional conditions to the general conditions of contract which pertain to this project. If any rights and obligations contained in this document contradict those specified in the standard or project specifications, then the latter must prevail.

The Contractor and the Applicant must identify and comply with all South African national and provincial environmental legislation, including associated regulations and all local by-laws relevant to the project. Key legislation currently applicable to the phases of the project must be complied with. The list of applicable legislation provided in Table 1-1 below is intended to serve as a guideline only and is not exhaustive.

Table 1-1: Relevant Legislation, Policies and Guidelines.

TITLE OF LEGISLATION, POLICY OR GUIDELINE	DATE
National Environmental Management Act (NEMA) (Act No. 107 of 1998) and its subsequent amendments	1998 and amendments
National Environmental Management Act (NEMA) (Act No. 107 of 1998) Environmental Impact Assessment (EIA) Regulations (2014 and subsequent 2017 amendments)	2014 and amendments
The Constitution Act (Act No. 108 of 1996)	1996
National Heritage Resources Act (NHRA) (Act No. 25 of 1999)	1999
National Water Act (NWA) (Act No. 36 of 1998) and its subsequent amendments	1998
National Environmental Management: Waste Act (NEMWA) (Act No. 59 of 2008) and its subsequent amendments	2008
National Environmental Management: Protected Areas Amendment Act (NEMPAA) (Act No. 31 of 2004)	2004

National Environmental Management: Air Quality Act (NEMAQA) (Act No. 39 of 2004) and its subsequent amendments	2004
Conservation of Agricultural Resources Act (CARA) (Act No. 43 of 1983)	1983
National Environmental Management: Biodiversity Act (NEMBA) (Act No. 10 of 2004)	2004
National Forest Act (NFA) (Act No. 84 of 1998) and its subsequent amendments	1998
National Environmental Management: Biodiversity Act, Alien and Invasive Species Regulations (2014)	2014
Occupational Health and Safety Act (OHSA) (Act No. 85 of 1993)	1993
Hazardous Substances Act (HSA) (Act No. 15 of 1973)	1973
Spatial Planning and Land Use Management Act (SPLUMA) (Act No. 16 of 2013)	2013
Electricity Regulation Act (Act No. 4 of 2006) and its subsequent amendments	2006
Aviation Act (Act No. 74 of 1962): 13th Amendment of the Civil Aviation Regulations 1997, dated 2008	1962, 1997 and 2008
Minerals and Petroleum Resources Development Act (MPRDA) (Act No. 28 of 2002) and subsequent 2013 amendments	2002 and amendments
Subdivision of Agricultural Land Act (Act No. 70 of 1970)	1970
National Road Traffic Act (NRTA) (Act No. 39 of 1996)	1996
National Veld and Forest Fire Act (Act No. 101 of 1998)	1998
Environment Conservation Act (ECA) (Act No. 73 of 1989) Noise Control Regulations	1989
Telecommunication Act (1966)	1966
Provincial Nature and Environmental Conservation Ordinance (No. 19 of 1974)	1974
Local Municipality: Land Rezoning Permit. LUPO Ordinance (No. 15 of 1985)	1985
National Energy Regulator of South Africa (NERSA): Generation License	
Eskom: Connection agreement and Power Purchase Agreement (PPA)	
Amajuba District Municipality SDF and IDP	
Newcastle Local Municipality SDF and IDP	

1.4 ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR) ITERATIONS

In accordance with the requirements of the NEMA EIA Regulations (2014, as amended), the proposed MNWP WEF was subject to a Full Scoping and EIA Process.

In terms of the EIA Process, all reports generated from the environmental studies formed part of a series of documents for the project. The Environmental Impact Report (EIR) identified potentially significant environmental and social impacts and was the main report in the series. Additional specialist assessments served to supplement the assessment contained in the final EIR.

This EMPr interprets the findings of the EIR, and prescribes project-specific specifications to be achieved. The EMPr is a progressive working document which must be updated based on the auditing process throughout the lifespan of the proposed MNWP 2 WEF. The EMPr must evolve with the project and the correct process, in terms of NEMA EIA Regulations 2014, as amended must be followed when amending this document.

2 DETAILS OF THE EAP AND ENVIRONMENTAL ASSESSMENT TEAM

EAP: Dr Alan Carter, *Pri. Sci. Nat, EAPSA*

NEMA registered Company: Coastal and Environmental Services (Pty) Ltd, trading as CES.

Contact Person: Ms Caroline Evans

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DR ALAN CARTER

Alan has extensive training and experience in both financial accounting and environmental science disciplines with international accounting firms in South Africa and the USA. He is a member of the American Institute of Certified Public Accountants (licensed in Texas) and holds a PhD in Plant Sciences. Alan has been responsible for leading and managing numerous and varied consulting projects over the past 25 years. He is a registered professional with the South African Council for Natural Scientific Professionals (SACNASP) and EAPASA (2019/1807). Alan has led large scale EIAs for 20+ wind and solar energy projects.

MS LENE LE GRANGE

Lené has over 20 years of experience in the environmental management field. She is highly proficient in reviewing, applying for and implementing EIAs, EMPRs and all related environmental permits. Her law degree adds to her strengths in ensuring compliance and interpreting legislation. Working in government and with private entities has afforded her ample opportunities to work with various stakeholders and form part of various strategic projects. She has 13 years of experience in ensuring environmental compliance at electricity infrastructure construction sites. She is also an ISO14001 :2015 lead auditor and registered with EAPASA (2021/3311).

MS ROBYN THOMSON

Robyn Thomson is a Principal Environmental Consultant with 16 Years's experience and EAPASA registration of 2019/1813. She holds a BSc degree with majors in Archaeology, Environmental and Geographical Science, as well as a BSc Honours in Environmental Science from the University of Cape Town and Rhodes University respectively. Robyn's key experience includes renewable energy developments, linear developments, residential developments and mining developments, with her main interest being on renewable energy. Her areas of expertise include project management, basic assessment processes, scoping and EIA process, the environmental authorisation (EA) amendment processes, the public participation process (PPP), water use licence applications and associated reports, and GIS mapping. Robyn completed both the Introduction to Environmental Impact Assessment Procedure and Introduction to Environmental Risk Assessment Short Courses by Coastal and Environmental Services and the Department of Environmental Science, Rhodes University, respectively. In addition, Robyn is a member of the International Association for Impact Assessment (IAIA). Her experience with renewable energy facilities and associated infrastructure includes the management and report writing for various components of the Chaba, Haga Haga, and Great Kei WEFs in the Great Kei LM, Albany WEF in the Makana LM, and Ngxwabangu WEF in the Intsika Yethu LM, Eastern Cape; the Waaihoek WEF in the Emadlangeni LM, Kwa-Zulu Natal; and the Soyuz WEFs in the Pixley Ka Seme DM, Northern Cape.

MRS CAROLINE BEER

Caroline Evans is a Principal Environmental Consultant with more than 10 years' experience and based in the Grahamstown branch. She holds a BSc degree in Zoology and Environmental Science (with distinction) and a BSc Honours degree in Environmental Science (with distinction), both from Rhodes University. Caroline has completed accredited courses in environmental impact assessments and wetland assessments. Caroline's primary focuses include Project Management, the general Environmental Impact Assessment Process, Visual Impact Assessments and Wetland Impact Assessments. Examples of fields in which Caroline was the project manager and lead report writer include Wind Energy Facilities and the associated infrastructure (including powerlines), Solar PV, Wastewater Treatment Works, Housing Developments and Agricultural Developments. Her experience with wind energy facilities and associated infrastructure includes the project management and report writing for the Umsobomvu WEF, Dassiesridge WEF, Scarlet Ibis WEF, Waaihoek WEF and the Great Kei WEF. Caroline is well versed in South African policy and legislation relating to development, particularly in the Eastern Cape Province. In addition, Caroline's project management experience has helped her gain knowledge and experience in the technical and financial management and coordination of large specialist teams, competent authority and stakeholder engagement, and client liaison.

3 PROPOSED ACTIVITY

3.1 DESCRIPTION OF THE PROPOSED ACTIVITY

Mulilo Newcastle Wind Power (Pty) Ltd proposes to develop, construct and operate the 200 MW Mulilo Newcastle Wind Power (MNWP) WEF as part of the Mulilo Newcastle Wind Energy Facility (WEF) Complex located near Newcastle in KwaZulu-Natal.

The MNWP WEF will comprise up to 35 possible positions with a maximum output capacity of 200 MW and will have an anticipated lifespan of 20-25 years. The WEF will be located on six (6) land parcels with a total extent of 2,940 ha.

The proposed turbine footprints and associated facility infrastructure will cover an area of up to 65 ha after rehabilitation.

Figures 3-1 and 3-2 below provide the layout and sensitivity map of the proposed MNWP WEF, respectively.

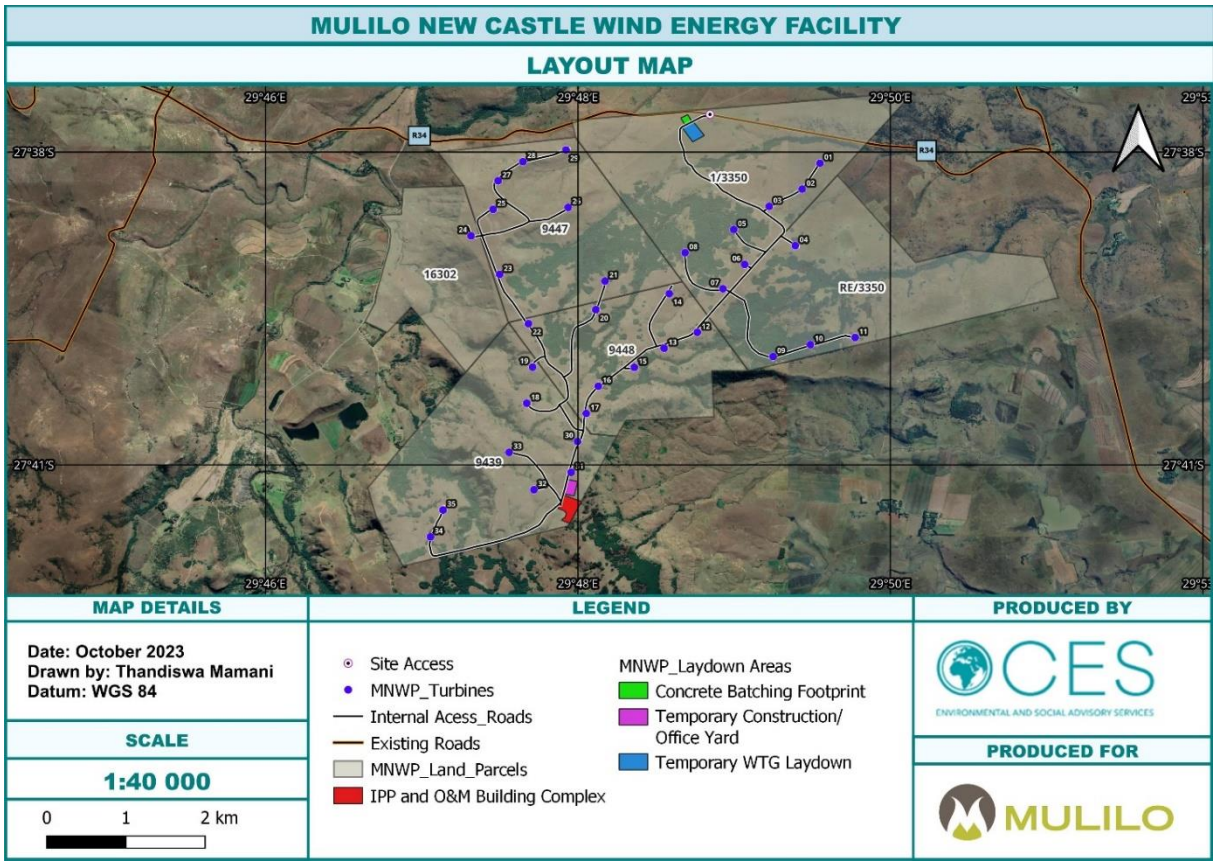


Figure 3-1: Final Layout Map of the MNWP WEF.

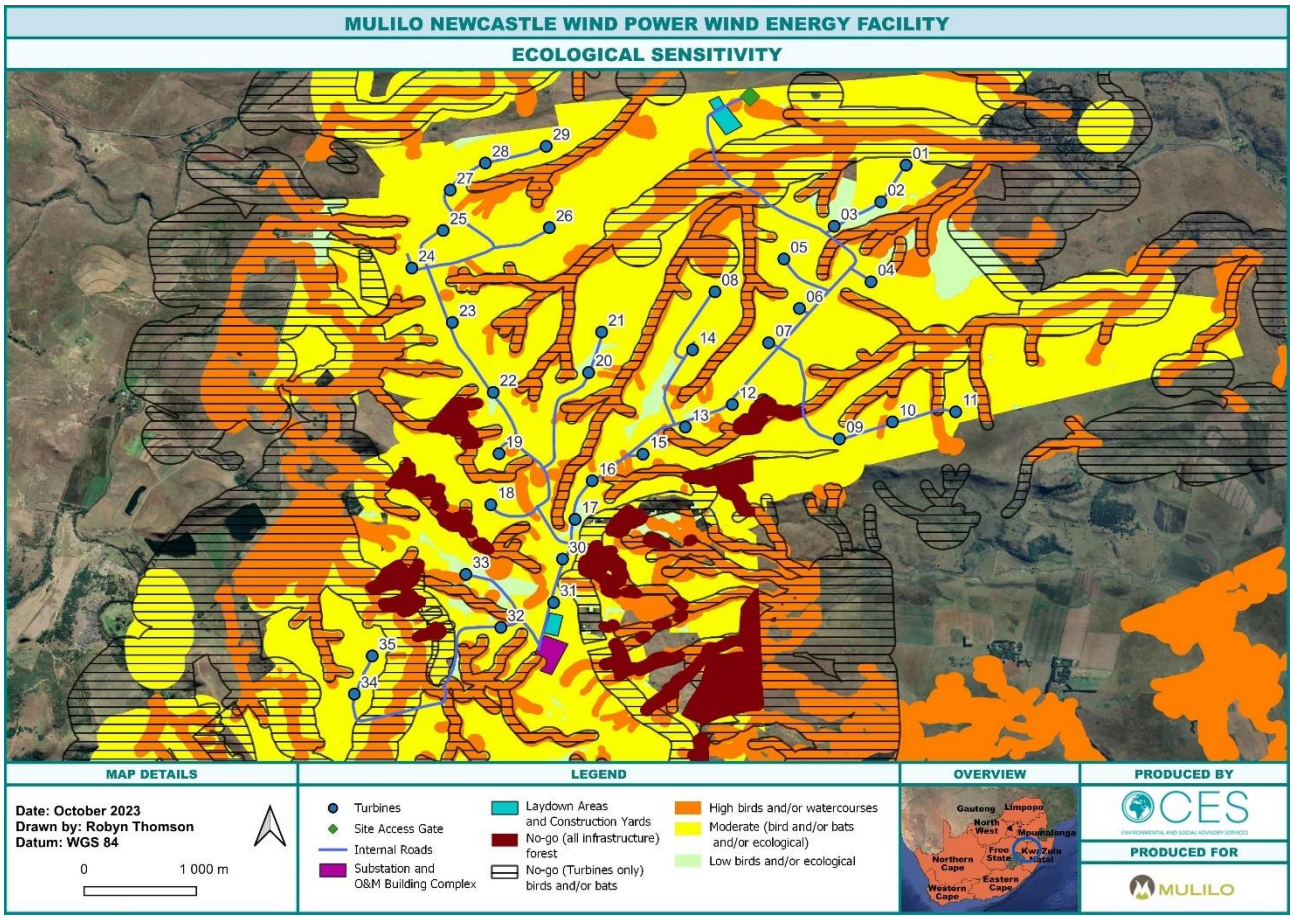


Figure 3-2: Final Sensitivity Map of the MNWP WEF.

The key technical details for the proposed MNWP WEF are indicated in the following three tables (Table 3-1, Table 3-2 and Table 3-3).

Table 3-1: Turbine Specifications of the Proposed MNWP WEF.

Facility Component	Specification
WEF Capacity	Up to 200 MW
Number of Turbines	Up to 35 turbines
Hub Height	Up to 140 m
Rotor Diameter	Up to 200 m
Blade length	Up to 100 m
Turbine tip height	Up to 240 m

Table 3-2: MNWP WEF Component Descriptions.

Facility Component	Description
Crane Platform and Hardstand Area	Crane platform and hardstand laydown for each turbine position.
Turbine Foundations	Reinforced Concrete Foundation. Depth: up to 3.5 m
IPP Substation	Diameter: up to 30 m per turbine
Construction/Office Yard	Volume of concrete: up to 800 m^3 per turbine.
WTG Component Laydown Area	33 kV to 132 kV collector substation to receive, convert and step-up electricity from the WEF to the 132 kV grid suitable supply. The substation's maximum height will be the Lightning Mast up to 25 m high. The facility will house control rooms and grid control yards for both Eskom and the IPP.
On-site Concrete Batching Plant	Additional infrastructure includes parking, up to 2.8 m high fencing, stormwater channels and culverts, ablutions, water storage tanks, septic tanks, and boreholes.
Primary Site Access Roads	This includes bunded fuel areas, oil storage areas, general stores (containers) and skips.
Internal Roads	Temporary laydown area.
33 kV Reticulation	Temporary on-site concrete batching plant.

Facility Component	Description
Operations and Maintenance (O&M) Buildings	Site access will, where possible, make use of existing farm roads that will be upgraded and maintained for the life of the WEF. The existing roads to be upgraded will be expanded to a width of up to 9 m.
Met masts	Two met masts (Up to 140 m height).

The turbine footprints and associated facility infrastructure will cover a total combined area of up to 86 ha during the construction phase. This footprint will be reduced, through rehabilitation, resulting in a maximum final total combined footprint of up to 65 ha.

Table 3-3: Construction and Operational Footprints of the MNWP WEF.

Facility Component	Construction Footprint	Operational Footprint (after rehabilitation)
Crane platform and hardstand area	Up to 0.8 ha per turbine which equates to up to 28 ha.	Up to 0.8 ha per turbine which equates to up to 28 ha.
Turbine foundations	Up to 0.07 ha per turbine which equates to up to 2.5 ha (included in hardstand area).	Up to 0.07 ha per turbine which equates to up to 2.5 ha (Included in hardstand area).
IPP substation	Up to 1 ha	Up to 1 ha
Construction/office yard	Up to 4 ha	0 ha
WTG component laydown area	Up to 4 ha	0 ha
On-site concrete batching plant	Up to 1 ha	0 ha
Temporary stockpiles	Up to 2 ha	0 ha
Primary site access road and reticulation	Total width of up to 15 m consisting of: ▪ Up to 12 m wide area prepared for road and v-drain ▪ Up to 3 m width for underground 33 kV reticulation. Overhead lines to be used where underground cables are not technically feasible. Total length up to 8.5 km which equates to up to 13 ha.	Total width of up to 12 m consisting of: ▪ Up to 9 m wide road ▪ Up to 1.5 m wide v-drain on either side of road Total length up to 8.5 km, which equates to up to 10.5 ha. 33 kV underground / overhead line reticulation and stockpile areas to be rehabilitated. Final footprint up to 0.25 ha to account for cable markers and/or overhead line foundations and stays along primary site access roads.
Internal roads and reticulation	Total width of up to 12 m consisting of: ▪ Up to 9 m wide area prepared for road and v-drain ▪ Up to 3 m wide area for underground 33 kV reticulation. Overhead lines to be used where underground cables are not technically feasible. Total length up to 25 km which equates to up to 30 ha.	Total width of up to 9 m consisting of: ▪ Up to 6 m wide road ▪ Up to 1.5 m wide v-drain on either side of road Total length up to 25 km, which equates to up to 22.5 ha. 33 kV underground / overhead line reticulation and stockpile areas to be rehabilitated. Final footprint up to 1 ha to account for cable markers and/or overhead line foundations and stays along internal roads.
Operations and Maintenance (O&M) buildings	Up to 0.5 ha	Up to 0.5 ha
Met masts	Up to 0.002 ha per met mast which equates to 0.004 ha.	Up to 0.002 ha per met mast which equates to 0.004 ha.
TOTAL FOOTPRINT	**Up to 86 ha** of clearing needed for the construction phase of the development of the proposed MNWP 2 WEF	**Up to 65 ha** of clearing remaining during the post-construction operational phase (after rehabilitation)

The Environmental Authorisations for the powerline connections to the Eskom grid at the Incandu Substation, has been subject to separate applications and the Basic Assessment process.

3.2 PROJECT LOCALITY

The proposed MNWP WEF will be located approximately 15 km northwest of the town of Newcastle in the Kwazulu-Natal Province. The study area (hereinafter referred to as the "Site") is situated in Ward 1 of the Newcastle Local Municipality within the Amajuba District Municipality (ADM) and which is detailed further in this Environmental Management Programme Report (hereinafter referred to as "EMPr").

Table 3-4: Farm Portions affected by the proposed MNWP WEF.

SG DIGIT NUMBER	FARM NAME	FARM NUMBER	AREA (HA)
N0HS00000000335000002	Geelhoutboom	3350	647
N0HS00000000335000001	Geelhoutboom	3350	567
N0HS00000000944700000	Bernard	9447	465
N0HS00000001630200000	Spitskop	16302	587
N0HS00000000943900000	Cliffdale	9439	280
N0HS00000000944800000	Byron	9448	392

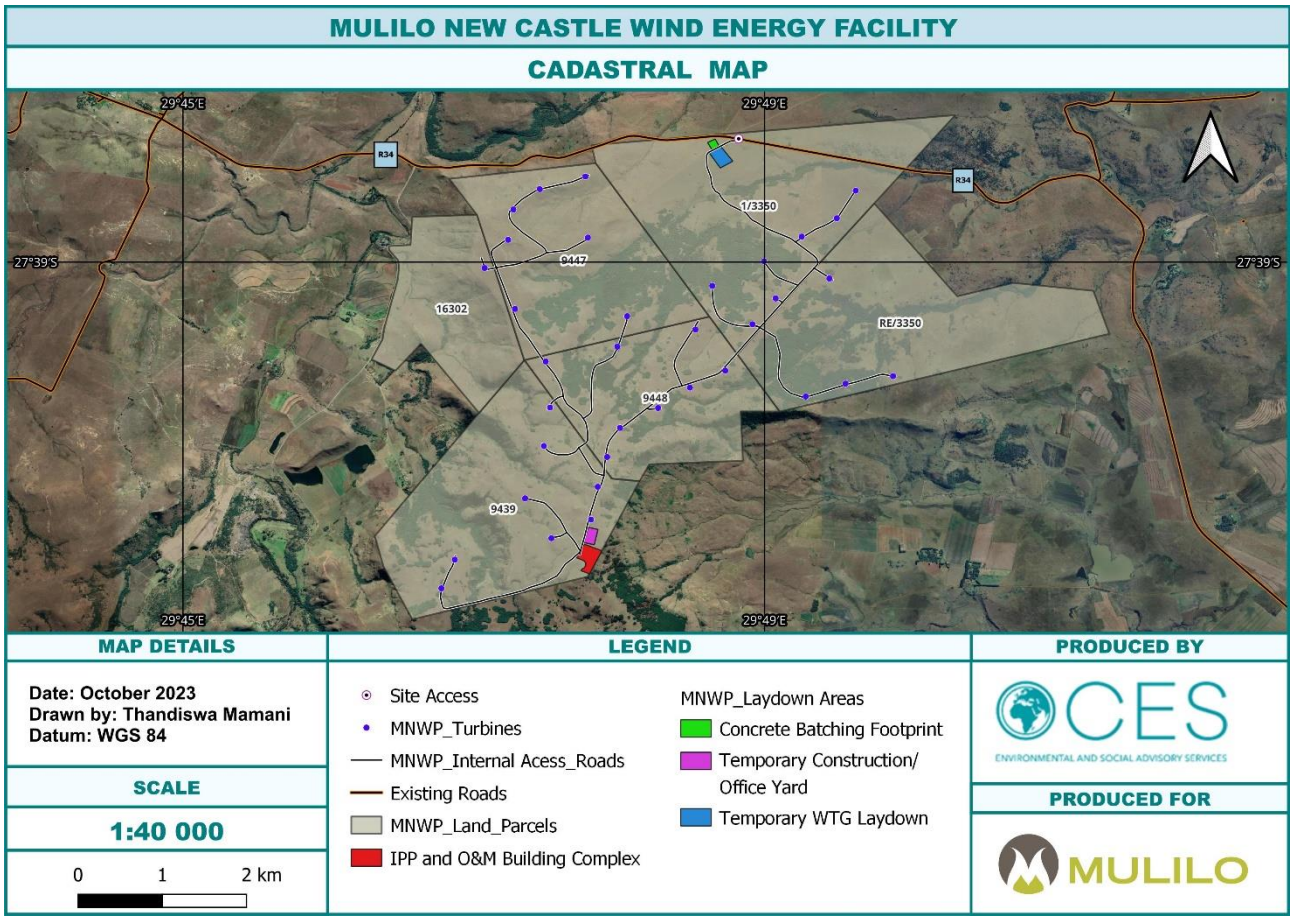


Figure 3-3: Cadastral Map of the Affected Properties within the MNWP WEF.

3.3 SITE PLAN: FINAL LAYOUT

The proposed MNWP WEF layout, as per the final project description as detailed in Chapter 3.1 of the EMPr, has been finalised. Table 3-5 includes the full infrastructure coordinates for all authorised components.

Table 3-5: Site Plan, Coordinates of all Preferred Infrastructure

Infrastructure	Latitude	Longitude
WIND TURBINE POSITIONS *Permanent Footprint (per turbine): 700m² / 0.07ha* *Temporary Footprint (per turbine): 800m² / 0.08ha*		
1	27°38'29"S	29°49'51"E
2	27°38'41"S	29°49'43"E
3	27°38'49"S	29°49'28"E
4	27°39'7"S	29°49'40"E
5	27°39'0"S	29°49'12"E
6	27°39'16"S	29°49'17"E
7	27°39'27"S	29°49'7"E
8	27°39'10"S	29°48'49"E
9	27°39'58"S	29°49'30"E
10	27°39'53"S	29°49'47"E
11	27°39'49"S	29°50'8"E
12	27°39'47"S	29°48'55"E
13	27°39'54"S	29°48'40"E
14	27°39'29"S	29°48'42"E
15	27°40'3"S	29°48'26"E
16	27°40'12"S	29°48'9"E
17	27°40'24"S	29°48'4"E
18	27°40'20"S	29°47'36"E
19	27°40'3"S	29°47'39"E
20	27°39'37"S	29°48'8"E
21	27°39'23"S	29°48'12"E
22	27°39'43"S	29°47'37"E
23	27°39'20"S	29°47'24"E
24	27°39'3"S	29°47'11"E
25	27°38'50"S	29°47'21"E
26	27°38'49"S	29°47'55"E
27	27°38'37"S	29°47'23"E
28	27°38'28"S	29°47'35"E
29	27°38'23"S	29°47'54"E
30	27°40'37"S	29°48'0"E
31	27°40'51"S	29°47'57"E
32	27°40'59"S	29°47'40"E
33	27°40'42"S	29°47'28"E
34	27°41'21"S	29°46'52"E
35	27°41'9"S	29°46'58"E
IPP SUBSTATION, AND O&M OFFICE. *Permanent Footprint: 59858 m² / 5.98 ha (the IPP substation), Operations and Maintenance (O&M) building and a temporary site office share a footprint)* *Temporary Footprint: 0 m² / 0 ha*		
Northwest Corner	27°41'2"S	29°47'54"E
Northeast Corner	27°41'5"S	29°48'1"E
Southeast Corner	27°41'15"S	29°47'56"E
Southwest Corner	27°41'8"S	29°47'51"E
LAYDOWN AREA Concreate batching *Permanent Footprint: 0m² / 0ha* *Temporary Footprint: 10436m² / 1.04 ha*		
North Corner	27°38'19"S	29°48'51"E
East Corner	27°38'10"S	29°48'52"E
South Corner	27°38'11"S	29°48'49"E

Infrastructure	Latitude	Longitude
West Corner	27°38'8"S	29°48'47"E
LAYDOWN AREA WTG *Permanent Footprint: 0m² / 0ha* *Temporary Footprint: 40675m² / 4.06ha*		
North Corner	27°38'10"S	29°48'53"E
East Corner	27°38'16"S	29°48'58"E
South Corner	27°38'19"S	29°48'53"E
West Corner	27°38'13"S	29°48'48"E
LAYDOWN AREA Temporary Construction/Office Yard *Permanent Footprint: 0m² / 0ha* *Temporary Footprint: 25952m² / 2.59ha*		
North Corner	27°40'55"S	29°47'56"E
East Corner	27°40'56"S	29°48'0"E
South Corner	27°41'2"S	29°47'58"E
West Corner	27°41'1"S	29°47'54"E
ACCESS ROADS (SITE ACCESS POINTS)		
Access Point 1 – R34	27°38'7"S	29°49'1"E

Please see Appendix E of the EMPr for the full site layout plan, inclusive of A3 maps.

3.4 CONSTRUCTION SITE: HOURS OF OPERATION

Due to the rural nature and on-going agricultural activities within the area, the Terrestrial Botanical and Faunal Specialist Report stipulated that no construction activities must occur between dusk and dawn. In certain cases, owing to the nature of the construction activity, it may be necessary to extend the working hours to allow for completion of tasks, such as turbine erection or concrete pouring into foundation excavations. Table 3-6 summarises the construction activities anticipated to take place on the site. Those activities underlined in Table 3-6 may take place during working hours AND between dusk and dawn if necessary.

Table 3-6: Summary of construction activities on site. Underlined activities may take place outside of regular working hours (i.e. between dusk and dawn).

PHASE	DURATION	ACTIVITIES	TYPICAL PLANT & CONSTRUCTION EQUIPMENT
Site Establishment (low impact)	Dependent on the number of turbines. Generally, 1 – 2 years.	1. Setting out of construction area 2. Site camp establishment o Levelling of camp area o Import and placement of aggregates to form a free draining platform o Delivery of office and welfare containers o Electricity, sanitation, and internet connections 3. Erection of temporary stock-proof fencing across the site to separate stock from the construction area	1. Light Duty Vehicle (LDV, i.e., bakkie) 2. Dump trucks, Tractor Loader Backhoe (TLB), roller and possibly a grader or excavator 3. LDV
Civil and Electrical Works (high impact)		1. Topsoil stripping and bulk earthworks (excavations and backfill) for roads, substation platform, hardstands and WTG foundations. <u>2. Concrete works</u> <u>3. Fixing reinforcement</u> 4. Cable ducting, trenching and laying 5. Road and hardstanding construction (placement of aggregate layers) 6. Blasting (if hard rock present)	1. Dozer, excavator, dump trucks, water trucks, vibratory roller 2. Concrete pump and concrete delivery trucks 3. Flat-bed delivery trucks, telehandler/ excavator 4. Excavator/ TLB 5. As item 1 6. Specialist explosives sub-contractor with appropriate drilling

PHASE	DURATION	ACTIVITIES	TYPICAL PLANT & CONSTRUCTION EQUIPMENT
		7. Pylon erection and electrical cable stringing (where there is an overhead power line) 8. Above activities but within the substation and relevant to substation construction and including building construction works e.g. bricklaying, roofing, installation and testing of electrical equipment such as transformers and switchgear	equipment. Excavators and dump trucks. 7. Flat-bed delivery trucks, telehandler/ excavator, LDVs 8. As above
Wind Turbine Erection (possible low impact)		1. Delivery of Wind Turbine Generator (WTG) components 2. Assembly/erection of WTG 3. Crane and assembling tools shifting 4. Crane disassembling, cranes, and site demobilisation	1. Flat-bed or clamp style delivery trucks with components of up to 10m height and 120m length, mobile crane (250 tonne capacity), telehandler 2. Mobile crane, flat bed delivery trucks, telehandler 3. Main crane (750 tonne capacity), mobile crane, telehandler
Wind Turbine Testing and Commissioning (low impact)		1. Internal fit-out of WTG 2. Testing and commissioning	1. LDV, generator on a trailer towed by the LDV. 2. As above.
Overall Wind Farm Testing (low impact)		1. Testing	1. LDV for staff transport

By allowing selected construction activities to continue outside of the stipulated working hours the construction period will be reduced, thus minimising the environmental impacts of the construction period as a whole.

If it becomes necessary for additional activities to take place outside of daylight hours, this must be agreed to in writing by the ECO, and permission from the landowner must be obtained.

4 LAYOUT OF THE EMPR

In order to ensure a holistic approach to the management of environmental impacts during the planning and design, construction, operational and decommissioning phases of the proposed MNWP WEF, this EMPr sets out the methods by which proper environmental controls are to be implemented by the Contractor and all other parties involved. The MNWP WEF may only be decommissioned 25-30 years after reaching Commercial Operations and thus the decommissioning phase for this development is not discussed further. The EAP strongly recommends that the decommissioning phase be subject to further assessment and a standalone EMPr when this phase becomes relevant. Each remaining phase of development is discussed in more detail below and has specific issues unique to that phase.

4.1 PLANNING AND DESIGN PHASE

The Planning and Design Phase is an integral component of the project life cycle and requires interaction between the design engineers and environmental consultants to ensure that the engineers are aware of the environmental constraints which must be considered and incorporated into the final planning stages of the project.

The format of the Planning and Design Phase section is to ensure that all specifications are included in the design phase. It requires ongoing and in-depth discussions between the design team and the appointed Environmental Control Officer (ECO). The engineer will have to cost for, and be available for, ongoing discussions with the ECO at all stages.

4.2 CONSTRUCTION PHASE

The Construction Phase section details the environmental management system/framework within which construction activities will be governed, and it consists of various actions, initiatives and systems which the Contractor will have to ensure are in place and are undertaken. It consists of both a management system and environmental specifications which contain detailed specifications that will need to be undertaken or adhered to by the Contractor.

The Construction Phase section must be developed based on the Final Design, and constructive input should be invited from the selected Contractor. Sound environmental management is orientated around a pragmatic, unambiguous but enforceable set of guidelines and specifications, and for this reason it is imperative that the Contractor, while being bound by the EMPr, fully understands it, and has had input into its final development. For this reason, this final EMPr will need to be signed-off after input from the selected Contractor prior to the initiation of construction activities.

4.3 OPERATIONAL PHASE

The Operational Phase section provides specific guidance related to operational activities associated with the development. By taking proactive measures during the Construction Phase, potential environmental and social impacts emanating during the Operational Phase will be minimised. Monitoring of certain issues, such as the success of vegetation re-establishment and erosion control, will be required to continue during operation. The final Operational Phase section should be developed in conjunction with any other relevant stakeholders prior to the adoption thereof.

4.4 CLOSURE & DECOMMISSIONING PHASE

This section includes principles for the decommissioning and closure phase of the MNWP WEF. This section will be required to be re-visited and updated at the time of decommissioning.

5 MITIGATION AND/OR MANAGEMENT MEASURES

5.1 MITIGATION AND MANAGEMENT MEASURES

The following general Construction Phase mitigation and management measures apply with respect to the MNWP WEF as per the Final EIAR.

5.2 EIR MITIGATION AND MANAGEMENT MEASURES

The following tables set out the potential environmental, social and specialist issues that could occur during the lifespan of the MNWP WEF development, as per the Final MNWP WEF EIR. The Final MNWP WEF EIAR and associated specialists provide mitigation measures and recommendations in an effort to reduce the significance of potential negative impacts and enhance potential benefits for the Planning and Design, Construction, Operational and Decommissioning Phases of the MNWP WEF development.

5.2.1 Planning and Design Phase

The following tables (Table 5-1 and Table 5-2) include the full list of Planning and Design Phase General Mitigation measures, followed by the Specialist Mitigation measures.

Table 5-1: Planning and Design | General Mitigation Measures

IMPACT/ISSUE	MITIGATION AND MANAGEMENT MEASURES
TRAFFIC & TRANSPORT	▪ Project planning must include a plan for traffic control that will be implemented, especially during the construction phase of the development. Consultation with the local Road Traffic Unit in this regard must be done early in the planning phase. The necessary road traffic permits must be obtained for transporting parts, containers, materials and construction equipment to the site. ▪ Also refer to recommendations in the Traffic Impact Assessment.
	▪ Careful planning of the routes taken by heavy vehicles must highlight areas of road that may need to be upgraded in order to accommodate these vehicles. Once identified, these areas must be upgraded if necessary.
STORAGE OF HAZARDOUS SUBSTANCES	▪ All hazardous substances such as paints, diesel and cement must be stored in a bunded area with an impermeable surface beneath them. ▪ Concrete mixing must be conducted at a single location which must be centrally located, where practical. This mixing must take place on an impermeable surface, and dried waste cement must be disposed of with building rubble.
ENVIRONMENTAL LEGAL AND POLICY COMPLIANCE	▪ Ensure that all relevant legislation and policy is consulted and further ensure that the project is compliant with such legislation and policy. ▪ These must include (but not restricted to): ○ Local and District Spatial Development Frameworks ○ Local Municipal bylaws ▪ In addition, planning for the construction and operation of the proposed energy facility must consider available best practice guidelines.
STORMWATER MANAGEMENT AND EROSION	▪ Structures must be located at least 32m away from identified drainage lines. ▪ A Stormwater Management Plan is included at Appendix D and must be implemented to ensure maximum water seepage at the source of water flow. ▪ The plan must also include management mitigation measures for water pollution, wastewater management and the management of surface erosion e.g. by considering the applicability of contouring, etc. ▪ An Erosion Management Plan is included at Appendix D and must be implemented to ensure minimal impact.

IMPACT/ISSUE	MITIGATION AND MANAGEMENT MEASURES
MANAGEMENT OF GENERAL WASTE	▪ A Waste Management Plan is included at Appendix D for handling on site waste and must be further developed and implemented by each individual contractor prior to the commencement of construction. ▪ An appropriate area where waste can be stored before disposal must be designed. ▪ General Waste must be disposed of at a registered landfill site.
SCHEDULING OF CONSTRUCTION	▪ Wherever possible, construction activities must be undertaken during the driest part of the year to minimize downstream sedimentation due to excavation, etc. ▪ When not possible, suitable stream diversions structures must be used to ensure that rivers/streams are not negatively impacted by construction activity.

Table 5-2: Planning and Design | Specialist Mitigation Measures

IMPACT/ISSUE	MITIGATION AND MANAGEMENT MEASURES
AGRICULTURAL IMPACT ASSESSMENT	
No impacts specified	
BOTANICAL AND FAUNAL IMPACT ASSESSMENT	
No impacts specified	
AQUATIC IMPACT ASSESSMENT	
No impacts specified	
AVIFAUNAL IMPACT ASSESSMENT	
No impacts specified	
BAT IMPACT ASSESSMENT	
No impacts specified	
HERITAGE IMPACT ASSESSMENT	
IMPACTS ON HERITAGE REOURCES	The following mitigation measures are recommended by the HIA. ▪ A servitude of at least 50m should be maintained around all identified heritage sites wherever possible.
PALAEONTOLOGICAL IMPACT ASSESSMENT	
No impacts specified	
NOISE IMPACT ASSESSMENT	
No impacts specified	
SOCIO-ECONOMIC IMPACT ASSESSMENT	
No impacts specified	
VISUAL IMPACT ASSESSMENT	
No impacts specified	
TRAFFIC IMPACT ASSESSMENT	
No impacts specified	

5.2.2 Construction Phase

The following tables (Table 5-3 and Table 5-4) include the full list of Construction General Mitigation measures, followed by the Specialist Mitigation measures.

Table 5-3: Construction | General Mitigation Measures

IMPACT/ISSUE	MITIGATION AND MANAGEMENT MEASURES

NUISANCE DUST	▪ Fugitive/nuisance dust must be reduced by implementing one of or a combination of the following:
	  ▪ Damping down of un-surfaced and un-vegetated areas;
	  ▪ Retention of vegetation where possible;
	  ▪ Excavations and other clearing activities must only be done during agreed working times and permitting weather conditions to avoid drifting of sand and dust into neighbouring areas;
	  ▪ A speed limit of 40km/h must not be exceeded on dirt roads;
	▪ Any complaints or claims emanating from the lack of dust control must be attended to immediately by the Contractor.

FIRE	▪ There must be no burning of construction waste or other waste and debris onsite.

IMPACT/ISSUE	MITIGATION AND MANAGEMENT MEASURES
	▪ Cooking and burning of vegetation must not be permitted on site. ▪ Smoking on site must be confined to a designated area in the vicinity of the site office which must be equipped with the necessary fire extinguishers. ▪ A Fire Management Plan is included at Section 9 and must be implemented by the Applicant and contractors.
STORMWATER MANAGEMENT	▪ The recommendations of the Stormwater Management Plan included at Section 9 must be implemented to avoid soil erosion and siltation of drainage line. ▪ The recommendations of the Erosion Management Plan included at Appendix D must be implemented to reduce the risk of soil erosion.
DEGRADATION OF DRAINAGE LINES FROM EARTHWORKS	▪ There must be no earthworks, apart from roadworks inclusive of culverts, within 32m of the drainage lines to avoid contamination of water sources.
MANAGEMENT OF GENERAL WASTE	▪ A Waste Management Plan is included at Section 9, but must be further developed by selected contractors, incorporating recycling and waste minimisation, must be implemented. The Waste Management Plan must be explained to all employees as part of the environmental induction training.
HAZARDOUS SUBSTANCES	▪ The storage of fuels and hazardous materials must be located away from sensitive water resources. ▪ All hazardous substances (e.g. diesel, oil drums, etc.) must be stored in a bunded area. ▪ The recommendations of the Stormwater Management Plan and the Waste Management Plan must be implemented during construction.
MANAGEMENT OF CONSTRUCTION WASTE	▪ A Waste Management Plan for the project must be developed and implemented in the construction phase. ▪ All waste must be disposed of at an appropriately licensed landfill site. ▪ All construction materials must be stored in a central and secure location with controlled access with an appropriate impermeable surface. ▪ The recommendations of the Stormwater Management Plan must be implemented to mitigate the impacts of run-off water on pollution.
WATER QUALITY	▪ There must be no concrete mixing within 32m of any watercourse. ▪ The concrete batching plant must be clearly demarcated, and no sprawl must be tolerated.
INFILLING/ EXCAVATION IN A WATERCOURSE	▪ Stockpiled excavated material must not be stored within 32m of a watercourse. ▪ Stockpile areas must be suitably bunded to prevent waterborne erosion of exposed soils where there is a likelihood that the soils will be washed into a watercourse. ▪ Materials used for infilling must be suitably stabilized to ensure that scour and erosion of the existing bed/banks is exacerbated.
DISPOSAL OF SPOIL MATERIAL	▪ Subsoil cannot be disposed of onsite without the appropriate Waste License in terms of the NEMA: Waste Act. ▪ Spoil could be used to rehabilitate open borrow pits or erosion features. ▪ Disposal of spoil material to a registered landfill must be the last option. ▪ No spoil stockpiles will be allowed to remain onsite once construction activities have ceased.

Table 5-4: Construction | Specialist Mitigation Measures

IMPACT/ISSUE	MITIGATION AND MANAGEMENT MEASURES
AGRICULTURAL IMPACT ASSESSMENT	
INDIRECT AND BIOLOGICAL IMPACTS	Biological impacts ▪ Keep the construction period as short as possible; and ▪ Employ dust reduction practices. Indirect impacts of development ▪ No unauthorised individuals should be allowed to access the site without permission from the landowners and/or the developers. Theft and vandalism can be reduced by providing additional security to farmers where necessary; ▪ The construction period is for a short period. Discuss the possible restriction of access to

IMPACT/ISSUE	MITIGATION AND MANAGEMENT MEASURES
	farm housing or farming infrastructure like watering facilities, boreholes, etc. with the farmers and come up with solutions; ▪ Maintenance workers must not handle or remove any livestock or wildlife from the site or the surrounding properties; and ▪ Police should be notified if any illegal actions take place.
LOSS OF HIGH CULTIVATED OR HIGH POTENTAL AGRICULTURAL LAND	▪ No mitigation necessary
LOSS OF GRAZING LAND	▪ Compensate farmers for what is lost. ▪ Keep the construction period as short as possible. ▪ Employ dust-supressing practices to protect adjoining grazing land. ▪ Protect the land against soil erosion by following guidelines of the stormwater management plan.
LOSS OF AGRICULTURAL PRODUCTION (YIELD AND INCOME)	▪ Compensate farmers for what is lost. ▪ Keep the construction period as short as possible.
LOSS OF AGRICULTURAL RESOURCES	▪ Replace topsoil during rehabilitation and ensure that the soil is well fertilised and rolled. ▪ Protect the land against soil erosion by following guidelines of the stormwater management plan. ▪ Sow seed of local plants that is adapted to the climate. ▪ Irrigate the soil to ensure germination and establishment of the seed occurs. ▪ Remove all alien plants and weeds until the natural plants are well established.
BOTANICAL AND FAUNAL IMPACT ASSESSMENT	
LOSS OF LOW ESCARPMENT MOIST GRASSLAND (LC) AND KWAZULU-NATAL HIGHLAND THORNVELD (LC)	▪ The clearance of vegetation must be strictly limited to that which is necessary for the construction of turbine hard stands, roads, pylons, and other project related infrastructure. ▪ Any impacted areas outside of the development footprint must be rehabilitated using indigenous plant species commonly occurring within Low Escarpment Moist Grassland in line with the approved Rehabilitation Management Plan. ▪ The footprint of turbine hardstands, pylons, roads, and other project related infrastructure must checked for protected species prior to construction and plants relocated if necessary. ▪ Permits for the removal of plant species protected in terms of the Natal Nature Conservation Ordinance (No. 15 of 1974) must be obtained prior to vegetation clearance.
LOSS OF SOUTHERN MISTBELT FOREST (LC)	▪ All forest patches have been delineated and declared **NO-GO** areas. ▪ A minimum of a 50 m no-go buffer must be established around all forest patches. ▪ Construction vehicles and machinery must not encroach into identified 'no-go' areas or areas outside the project footprint.
LOSS OF PLANT SCC	▪ The footprint of turbine hardstands, pylons, roads, and other project related infrastructure must be surveyed prior to construction. The presence of threatened SCC may require transplanting of certain individual plants or obtaining destruction permits if applicable. ▪ Where necessary, permits for the destruction, removal or transplanting of plant species protected in terms of the Natal Nature Conservation Ordinance (No. 15 of 1974) and/or TOPS must be obtained prior to vegetation clearance.
DISTURBANCE AND/OR DEATH OF HERPETOFAUNA AND/OR LOSS OF HABITATS	▪ It is illegal to remove or kill amphibians and reptiles within the study area listed as either Schedule I or II on the PNCO unless the relevant permit is acquired. ▪ All construction staff must be educated with regards to wildlife conservation, and all staff employed by the developer must ensure that any amphibians or reptiles encountered during construction of the proposed development are not harmed or killed.

IMPACT/ISSUE	MITIGATION AND MANAGEMENT MEASURES
	▪ No pets (cats or dogs) may be allowed on site. If feral cats/dogs are present, they should be removed as quickly and humanely as possible. ▪ Amphibians and reptiles encountered must be allowed to move away from the construction area. In the event they need to be translocated, amphibians must be released in the same catchment areas while reptiles must be relocated to directly adjacent areas of the proposed development. No amphibian or reptile species may be removed off site without proper authorisation from the relevant authority. ▪ A Search and Rescue Operation should be undertaken for protected amphibian and reptile species. ▪ A rescue plan must be developed by the main contractor to protect reptiles which could fall into construction pits. ▪ The appointed ECO should be trained in snake handling and removal techniques. ▪ Any amphibian or reptile species that may die due to construction activities associated with the proposed development must be recorded (e.g., photographed and GPS coordinates taken) and reported to the appointed ECO and relevant authorities (i.e., EWT). Where needed, the carcass should be donated to the nearest museum. ▪ All individuals, including construction workers must sign a register prior to accessing the construction site. ▪ Construction workers must not be housed on site. ▪ Speed restrictions (40 km per hour is recommended) must be implemented to reduce the chance of road kills, as well as to reduce the amount of dust caused by vehicle movement along the roads. ▪ All reasonable and feasible measures should be implemented to reduce noise in ecologically sensitive areas.
DISTURBANCE AND/OR DEATH OF MAMMALS AND/OR LOSS OF HABITATS	▪ Mitigation as per herpetofauna mitigation measures are also applicable to mammals. ▪ In addition, no hunting, baiting, or trapping of mammals shall be allowed within the affected properties or surrounding properties by construction staff. ▪ The appointed ECO should inquire and undertake an overview inspection of the site for the evidence of snares during the construction phase. ▪ Where possible, mammal SCC observed on site must be recorded (photographed, GPS coordinates taken) and loaded onto iNaturalist by the appointed ECO. ▪ An Oribi and Mountain Reedbuck Monitoring and Management Plan must be developed and implemented throughout the life of the development. (Note: These plans have been developed and are included in the Final EMPr Appendix G). Detail regarding the actions and objectives of this management plan are provided in Section 6.2 (of the Botanical and Faunal Impact Assessment Report).
DISRUPTION OF ECOSYSTEM FUNCTION AND PROCESS	▪ The applicant must Register as a member of the local Fire Protection Association and ensure that sufficient provision is made for seasonal fires with respect to infrastructure design and fire breaks. ▪ The clearance of vegetation must be strictly limited to that which is necessary for the construction of turbine hard stands, roads, pylons, and other project related infrastructure. ▪ Laydown areas should be located within previously disturbed areas. ▪ Any impacted areas outside of the development footprint must be rehabilitated using indigenous plant species commonly occurring within vegetation types of the project area. ▪ Existing access roads should be utilised.
ESTABLISHMENT OF ALIEN PLANT SPECIES	▪ The site must be checked regularly for the presence of alien invasive species. ▪ All alien invasive species that establish because of the proposed development must be removed and disposed of as per the Working for Water Guidelines. ▪ An Alien Invasive Management Plan must be implemented for Phase 1 (MNWP WEF) of the proposed Newcastle WEF Complex. (Note: This plan has been compiled and is included in Section 9 of the Final EMPr).

IMPACT/ISSUE	MITIGATION AND MANAGEMENT MEASURES
BIODIVERSITY IMPACT ASSESSMENT	
ALIGNMENT WITH BIODIVERSITY MANAGEMENT TOOLS	Develop and Implement: ▪ Restoration and rehabilitation programme (See Appendix F). ▪ Oribi and Mountain Reedbuck Monitoring and Management Plan (See Appendix G).
AQUATIC IMPACT ASSESSMENT	
DIRECT ECOSYSTEM DESTRUCTION AND MODIFICATION IMPACTS **INDIRECT HYDROLOGICAL AND GEOPHORMOLOGICAL IMPACTS** **WATER QUALITY IMPACTS** **FRAGMENTATION AND ECOLOGICAL DISTURBANCE IMPACTS** **DIRECT ECOSYSTEM DESTRUCTION AND MODIFICATION IMPACTS** **INDIRECT HYDROLOGICAL AND GEOMORPHOLOGICAL IMPACTS** **WATER QUALITY IMPACTS** **FRAGMENTATION AND ECOLOGICAL DISTURBANCE IMPACTS**	The following mitigation measures must be implemented in conjunction with any generic measures provided in the Environmental Management Programme (EMPr). ***Demarcation of 'No-Go' areas and construction corridors*** ▪ For all watercourses occurring within 50m of the development activities (e.g. turbine sites, access roads, powerline pylons, etc.), the outer edge of the 50m buffer zone to such watercourses must be staked out by a surveyor and demarcated using brightly coloured shade cloth. This must be completed and approved prior to the commencement of any construction activities. ▪ For all watercourses where activities encroach within the watercourses or buffer zones, the outer edge of the watercourses and/or remaining buffer zone must be staked out by a surveyor and demarcated using brightly coloured shade cloth. This must be completed and approved prior to the commencement of any construction activities. ▪ The construction corridor / footprint must be staked out by a surveyor and demarcated using brightly coloured shade cloth. The construction servitude should include the turbine footprints and working area and all new and existing access / haulage roads with a maximum 3m construction working area either side of the access/ haulage roads. ▪ All areas outside of thew delineated constriction servitude as defined above and/or the within / inside the 30m buffer zone of watercourses must be considered no-go areas for the entire construction phase. Any contractor found working within No-Go areas must be fined as per fining schedule/system setup for the project. ▪ The demarcation work must be signed off by the Environmental Control Officer (ECO) before any work commences. ▪ The demarcations are to remain until construction and rehabilitation is complete. ***Method Statements for working in water courses*** A detailed method statement for the construction activities to be undertaken as part of establishment of new roads and/or upgrading of existing roads at watercourses crossings must be compiled and appended to the construction (EMPr) prior to construction commencing. The final method statement must be reviewed by a wetland / freshwater specialist prior to commencement and must include all measures provided in this section where relevant and applicable. The following guidelines should be included in the method statement as detailed in the Aquatic Impact Assessment report: A. Wetland Crossings ▪ Site Setup ▪ Site clearing and stripping ▪ Running Track and Soil Stockpile Corridor Establishment ▪ Temporary flow diversion and dewatering ▪ Runoff, erosion and sediment control ▪ Rehabilitation ***Runoff, erosion and sediment control*** ▪ Wherever possible, existing vegetation cover on the development site should be maintained during the construction phase. The unnecessary removal of groundcover from slopes must be prevented, especially on steep slopes which will not be developed. ▪ Clearing activities must only be undertaken during agreed working times and permitted weather conditions. If heavy rains are expected, clearing activities should be put on hold.

IMPACT/ISSUE	MITIGATION AND MANAGEMENT MEASURES
	In this regard, the contractor must be aware of weather forecasts. ▪ Sediment barriers (e.g.: silt fences/sandbags/hay bales) must be installed immediately downstream of active work areas (including soil stockpiles) as necessary to trap any excessive sediments generated during construction. ▪ All bare slopes and surfaces to be exposed to the elements during clearing and earthworks must be protected against erosion using rows of hay-bales, sandbags and/or silt fences aligned along the contours and spaced at regular intervals (e.g. every 2m) to break the energy of surface flows. ▪ Once shaped, all exposed/bare surfaces and embankments must be re-vegetated immediately. ▪ If re-vegetation of exposed surfaces cannot be established immediately due to phasing issues, temporary erosion and sediment control measures must be maintained until such a time that re-vegetation can commence. ▪ All temporary erosion and sediment control measures must be monitored for the duration of the construction phase and repaired immediately when damaged. All temporary erosion and sediment control structures must only be removed once vegetation cover has successfully recolonised the affected areas. ▪ After every rainfall event, the contractor must check the site for erosion damage and rehabilitate this damage immediately. Erosion rills and gullies must be filled-in with appropriate material and silt fences or fascine work must be established along the gulley for additional protection until vegetation has re-colonised the rehabilitated area. ▪ Regular maintenance of any sediment control dams must be undertaken during the construction / establishment period to ensure that these structures continue to function appropriately. ***Hazardous substances / materials management*** ▪ The proper storage and handling of hazardous substances (e.g. fuel, oil, cement, etc.) needs to be administered. ▪ Mixing and/or decanting of all chemicals and hazardous substances must take place on a tray, shutter boards or on an impermeable surface and must be protected from the ingress and egress of stormwater. ▪ Drip trays should be utilised at all dispensing areas. ▪ No refuelling, servicing or chemical storage should occur within 30m of any watercourse. ▪ No vehicles transporting concrete, asphalt or any other bituminous product may be washed on site. ▪ Vehicle maintenance should not take place on site unless a specific bunded area is constructed for such a purpose. ▪ Hazardous storage and refuelling areas must be bunded prior to their use on site during the construction period following the appropriate SANS codes. The bund wall should be high enough to contain at least 110% of any stored volume. The surface of the bunded surface should be graded to the centre so that spillage may be collected and satisfactorily disposed of. ▪ All necessary equipment for dealing with spills of fuels/chemicals must be available at the site. Spills must be cleaned up immediately and contaminated soil/material disposed of appropriately at a registered site. ▪ Contaminated water containing fuel, oil or other hazardous substances must never be released into the environment. It must be disposed of at a registered hazardous landfill site. ▪ Spills must be cleaned up immediately and contaminated soil/material disposed of appropriately at a registered site. ***Invasive Alien Plant control*** ▪ All alien invasive vegetation that colonise the construction site must be removed, preferably by uprooting. The contactor should consult the ECO regarding the method of removal.

IMPACT/ISSUE	MITIGATION AND MANAGEMENT MEASURES
	▪ All bare surfaces across the construction site must be checked for IAPs every two weeks and IAPs removed by hand pulling/uprooting and adequately disposed. ▪ Herbicides should be utilised where hand pulling/uprooting is not possible. ONLY herbicides which have been certified safe for use in wetlands by independent testing authority are to be used. The ECO must be consulted in this regard. The herbicide contractor must be certified to apply/utilise the herbicide in question. ***Noise, dust and light pollution minimisation*** ▪ Temporary noise pollution due to construction works should be minimized by ensuring the proper maintenance of equipment and vehicles and tuning of engines and mufflers as well as employing low noise equipment where possible. ▪ Water trucks will be required to suppress dust by spraying water on affected areas producing dust. This will likely be required daily in the drier months or during dry periods. ▪ No lights must be established within the construction area near the watercourses and buffer zones. ***Prohibitions related to animals*** ▪ The handling and/or killing of any animal species present is strictly prohibited and all staff/personnel must be notified of such incidents. ▪ Wetland fauna (e.g. snakes, frogs, small mammals) that are encountered during the construction phase must be relocated to other parts of the wetland under the guidance of the EO or ECO. ▪ Poaching/snaring is strictly prohibited. ***General rehabilitation guidelines*** ▪ All disturbed areas beyond the construction site that are intentionally or accidentally disturbed during the construction phase must be rehabilitated immediately to the satisfaction of the ECO. ▪ All land impacted by the proposed development must be rehabilitated by undertaking the following general tasks: o All foreign material must be removed from site. o Land must be regraded / re-shaped and topsoils must be reinstated. o Compacted soils must be adequately ripped/loosened where compacted, as informed by the ECO. ▪ Re-vegetation should take place as follows: o For any permanently and seasonally saturated areas - via translocation / transplanting of resecured sods and, where there are not enough rescued sods, via the translocation / transplanting of sods from the surrounding wetland as advised a wetland ecologist. o For temporary and dryland areas - via hydroseeding using an appropriate indigenous seed mix as advised by a qualified ecologist. ***Construction phase monitoring measures*** ▪ Compliance monitoring will be the responsibility of a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that monitoring is undertaken effectively and appropriately. ▪ A photographic record of the state of the onsite wetlands prior to the commencement of clearing/construction must be kept for reference and rehabilitation monitoring purposes. ▪ The ECO must undertake bi-monthly compliance monitoring audits. Freshwater ecosystem aspects that must be monitored related to monitoring freshwater ecosystem impacts include: ▪ The condition of the demarcation fence. ▪ Evidence of any no-go area incursions. ▪ The condition of the temporary runoff, erosion and sediment control measures and

IMPACT/ISSUE	MITIGATION AND MANAGEMENT MEASURES
	evidence of any failures. ▪ Evidence of sedimentary deposits / plumes and elevated rates of sedimentation (i.e. vegetation smothering / burial). ▪ Evidence of elevated river / stream turbidity levels. ▪ Evidence of gully or bed/bank erosion. ▪ Visual assessment of stormwater quality and instream water quality. ▪ The condition of waste bins and the presence of litter within the working area. ▪ Evidence of solid waste within the no-go areas. ▪ Evidence of hazardous materials spills and soil contamination. ▪ Presence of alien invasive and weedy vegetation within the working area. ▪ Rehabilitation and re-vegetation methods and success. ▪ Once the construction and rehabilitation has been completed, the ECO should conduct a close out site audit 1 month after the completion of rehabilitation.
AVIFAUNAL IMPACT ASSESSMENT	
DIRECT HABITAT DESTRUCTION	▪ Infrastructure to avoid Very High Sensitivity areas, linear infrastructure permitted. ▪ The footprint within High Sensitivity areas must be minimized and avoided wherever possible. ▪ Laydown and other temporary infrastructure to be placed within Low or Medium sensitivity areas, preferably previously transformed areas, wherever possible. ▪ Appropriate run-off and erosion control measures must be implemented where required. ▪ A site-specific environmental management programme (EMPr) must be developed and implemented. The EMPr must give appropriate and detailed description of how construction activities must be conducted to reduce unnecessary destruction of habitat (e.g. no open fires outside of designated areas). ▪ All contractors are to adhere to the EMPr and must apply good environmental practice during construction. ▪ All hazardous materials must be stored in the appropriate manner to prevent contamination of the site and downstream environments. Any accidental chemical, fuel and oil spills that occur at the site must be cleared as appropriate for the nature of the spill. ▪ Existing roads and farm tracks must be used where possible. ▪ The minimum footprint areas of infrastructure must be used wherever possible, including road widths and lengths. ▪ No off-road driving must be permitted in areas not identified for clearing. ▪ An Environmental Site Officer (ESO) must form part of the on-site team to ensure that the EMPr is implemented and enforced and an Environmental Control Officer (ECO) must be appointed to oversee the implementation activities and monitor compliance for the duration of the construction phase. ▪ Following construction, rehabilitation of areas disturbed by temporary laydown areas and facilities must be undertaken.
DISTURBANCE AND DISPLACMENT	▪ A site specific EMPr must be developed and implemented. The EMPr must give appropriate and detailed description of how construction activities must be conducted. ▪ All contractors are to adhere to the EMPr and must apply good environmental practice during construction. ▪ The ECO must oversee activities and ensure that the site specific EMPr is implemented and enforced. ▪ Maximum use of existing access road and servitudes. ▪ Existing and novel access roads are to be suitably upgraded or constructed to prevent damage and erosion resulting from increased vehicular traffic and construction vehicles. ▪ No off-road driving in undesignated areas. ▪ Speed limits (50 km/h) must be strictly enforced on site to reduce unnecessary noise. ▪ Construction camps must be lit with as little light as practically possible, with the lights directed downwards where appropriate.

IMPACT/ISSUE	MITIGATION AND MANAGEMENT MEASURES
	▪ The movement of construction personnel must be restricted to the construction areas on the project site. ▪ No dogs or cats other than those of the landowners must be allowed on site. ▪ The appointed ECO must be trained to identify the potential Red Data species, as well as the signs that indicate possible breeding by these species. ▪ The ECO must during audits/site visits make a concerted effort to look out for such breeding activities of SCCs (e.g. cranes, Secretarybird). Additional efforts must include the training of construction staff (e.g. in Toolbox talks) to identify Red Data species, followed by regular questioning of staff as to the regular whereabouts on site of these species. ▪ If any avifaunal SCCs are confirmed to be breeding (e.g. if a nest site is found), construction activities within 500 m of the breeding site must cease, and an avifaunal specialist is to be contacted immediately for further assessment of the situation and instruction on how to proceed.
DIRECT MORTALITY	▪ Maximum use of existing access road and servitudes. ▪ No off-road driving in undesignated areas. ▪ Speed limits (50 km/h) must be strictly enforced on site to reduce probability of vehicle collisions. ▪ The movement of construction personnel must be restricted to the construction areas on the project site. ▪ No dogs or cats other than those of the landowners must be allowed on site. ▪ Any holes dug e.g. for foundations of pylons must not be left open for extended periods of time to prevent entrapment by ground dwelling avifauna or their young and only be dug when required and filled in soon thereafter. ▪ Temporary fencing must be suitably constructed, e.g. if double layers of fencing are required for security purposes, they must be positioned at least 2 m apart to reduce the probability of entrapment by larger bodied species that may find themselves between the two fences. ▪ All staff working on the project site should have awareness training that encourages braking for all wildlife (including birds, reptiles, and antelope) to prevent mortalities, with strict speed limit controls around high sensitivity areas. ▪ Roadkill must be reported to the ECO and removed as soon as possible.
BAT IMPACT ASSESSMENT	
HABITAT MODIFICATION	▪ The removal of vegetation and manmade buildings should be avoided in all high sensitive areas, as far as possible, and reduced across the project site in all other areas.
DISTURBANCE/DISPLACEMENT	▪ Limit construction activities to daylight hours. ▪ Avoid all construction activities within potential roosting habitats, if identified at the time when construction activities (for wind turbines and associated infrastructures) take place. Although no confirmed roosts have been identified on site to date, it is recommended for a final specialist site walk-through to take place prior to construction to confirm this.
HERITAGE IMPACT ASSESSMENT	
No mitigation necessary.	
PALAEONTOLOGICAL IMPACT ASSESSMENT	
DAMAGE TO FOSSIL DEPOSITS DURING CONTRUCTION OF THE WEF	▪ The Palaeontological Impact Assessment has recommended that no further palaeontological work needs to be undertaken, unless the "Chance Find Protocol" is triggered.
NOISE IMPACT ASSESSMENT	
DAYTIME ACTIVITIES RELATING TO THE CONSTRUCTION OF ACCESS ROADS	The significance of the noise impact is Low, and additional mitigation measures are not recommended or required.
DAYTIME	The significance of the noise impact is Low, and additional mitigation measures are not

IMPACT/ISSUE	MITIGATION AND MANAGEMENT MEASURES
CONSTRUCTION TRAFFIC PASSING NSR	recommended or required.
DAYTIME CONSTRUCTION ACTIVITIES AT MULILO NEWCASTLE WIND POWER WEF	The significance of the noise impact is Low, and additional mitigation measures are not recommended or required.
NIGHT-TIME CONSTRUCTION ACTIVITIES AT MULILO NEWCASTLE WIND POWER WEF	The significance of the noise impact is Medium and additional mitigation measures are recommended as follows: ▪ Only allow night-time construction activities at one WTG location (closer than 1,200m from an NSR); or ▪ The applicant should get written confirmation from NSR08 that the dwelling will not be used for permanent residential purposes in the future (or during the construction phase).
SOCIO-ECONOMIC IMPACT ASSESSMENT	
TEMPORARY EMPLOYMENT	Enhance benefit: ▪ Maximise local employment and local content (the Project's direct sending area) through the Preferential Procurement Plan and Contractor Social Management Plan (CSMP) for all contractors that are used. ▪ Involve local government structures from the early processes (from financial close already if possible). Determine their existing process with regards to a labour desk and streamline employment processes between the various stakeholders. ▪ Appoint a Community Employer Relations Officer / Community Liaison Officer (CLO). Communicate with communities through this one channel to ensure transparency, limit unrealistic expectations and to avoid conflict.
LOCAL PROCUREMENT	Enhance benefits: ▪ Maximise local content of procurement by procuring from the local and regional study areas as far as possible. ▪ Do a value-chain analysis of services required (directly and indirectly related to construction such as transport, laundry, catering, etc.). Communicate this to the relevant Municipal LED Units at least 4 months prior to the tender process commencing in order for SMME's to prepare. ▪ Join the existing Newcastle LED Forum to establish links with the local trade and industry sectors and suppliers. ▪ Include minimum thresholds in the CSMP for local employment, BBEEE procurement, SMME targets, local services providers, etc.
INDUCED LOCAL ECONOMIC IMPACTS	Enhance benefits: ▪ Maximise the Project's local content as much as possible.
IMPACTS ON LIVELIHOODS OF DIRECTLY AFFECTED LANDOWNERS	Avoid/prevent impact: ▪ Commence with the long-term lease agreements as soon as construction starts to ensure that temporary income losses are being off-set by compensation.

TRAINING / SKILLS DEVELOPMENT / CAPACITY BUILDING	Enhance benefits:
	▪ Include the Newcastle, Dannhauser, Emadlangeni, Phumelela and the Dr Pixley Ka Isaka Seme LM's LED Units in all relevant processes from the onset of the Project.
	▪ The developer is encouraged to take part / slot in with the various municipal initiatives and interventions to develop SMME's to enable them to take part in the Project's construction phase.
	▪ Where feasible the developer should:
	  ○ Make the skill requirements clear to the municipalities in advance and do a skills analysis of the available labour force.
	  ○ Do a Value-chain analysis of services required (directly and indirectly related to construction) and communicate this to local and district municipalities in

IMPACT/ISSUE	MITIGATION AND MANAGEMENT MEASURES
	advance so that they are prepared and equipped to take part in the tender process. ○ Require larger contractors to work with small SMMEs to train and transfer skills and include this in their respective CSMP's. ○ Implement on-the-job training for unskilled workers. ○ Capacitate the local government structures by involving them as early as possible in the Project; remain transparent throughout the processes. ○ Negotiate a MoU with the municipalities so that each role-player is clearly aware of its roles, responsibilities and timelines in the Project processes. ▪ Establish an EMC or similar Forum for the duration of construction to aid communication and transparency with local government. Members of the EMC / Forum to meet on a quarterly basis to discuss issues that may arise during the course of the construction period (if feasible).
EMPLOYMENT EQUITY	Enhance benefits: ▪ Obtain inputs from the respective local and district municipalities on the contents of the Procurement strategy and Employment Equity Plan to be implemented. ▪ Set targets for the employment of Youth, women and the disabled in the CSMPs.
IMPACTS ASSOCIATED WITH AN INFLUX OF JOBSEEKERS / TEMPORARY CONSTRUCTION WORKERS	Minimize/reduce impact: <u>Employment / Temporary construction workers</u>: ▪ Clearly identify the beneficiary communities / labour sending area and compile the employment strategy in collaboration with the affected municipalities' LED Units. ▪ Encourage the affected local municipalities to draw up a cooperation agreement that specifies the percentages of the workforce that will be sourced from each municipality. ▪ Ensure that the Community Employer Relations Officer /CLO has knowledge of the local communities, is educated with good public relation skills, committed to the cause and is accessible for community members. ▪ Contractually oblige contractors and sub-contractors to only source labour through the labour desk / job registration database and make this known to the target communities. ▪ Work through limited communication channels (e.g. Ward Councillors and the Employer Relations Officer / CLO). ▪ Be vigilant not to raise unrealistic expectations amongst the local communities and workers with regards to employment, skills requirements, local procurement and so forth. Ensure transparency through the Ward Councillors, CLO and the EMC / Forum. ▪ No recruitment of temporary workers at the access to the construction site. ▪ As part of their CSMP's, contractors to provide a transport and housing plan: (i) no workers are allowed to be housed on site or in informal housing / settlements; (ii) allow workers that do not live nearby time to return to their families at regular intervals or over weekends. ▪ No workers to remain on site after shifts. ▪ No informal traders to be allowed on or near the construction site/s. ▪ It is also recommended that the Developer embarks on a Social Awareness Campaign for the workforce that focuses on sexual health, unwanted pregnancies and related social issues. <u>Security, safety and environmental health</u>: ▪ Do a security risk assessment (if required) and base the exact security measures on the detailed assessment of the risks at the site. ▪ 24-hour security, demarcate and fence the construction site (if possible), material stores to be secured, access control and no trespassing of workers outside designated construction areas. ▪ Join the local community policing forum and similar initiatives (e.g. Amajuba District Fire Technical Task Team) for the duration of construction. ▪ Keep the local SAPS, other emergency services, Ward Councillors, landowners and other relevant stakeholders informed about the construction progress and time-lines. ▪ Develop a Fire / Emergency Management Plan in conjunction with affected and

IMPACT/ISSUE	MITIGATION AND MANAGEMENT MEASURES
	neighbouring landowners. ▪ Dispose of the various types of waste generated in the appropriate manner at licensed waste landfill sites at regular intervals. Comply with the waste management plan compiled for the construction phase. ▪ Display "danger" warning signs and "no public access" signs at all potential accesses, paths and along the periphery of the construction areas in English and the local languages. ▪ If water for construction is obtained from a natural water resource, comply with the Water Use Licence conditions for the duration of the construction period. ▪ Ensure implementation of the provisions of the Occupational Health and Safety Act No. 85 of 1993 and adhere to the Emergency and Safety plan procedures for the duration of the construction phase. <u>Awareness / community engagement</u>: ▪ Keep open communication channels with the landowners and address any potential issues as a matter of priority. ▪ Make contact details of the main contractor and procedures to lodge complaints available to landowners and the local communities through the Ward Councillors and EMC / Forum. ▪ Make a complaints register / log book available at the entrance to the construction site and act immediately should issues arise. ▪ Consult with surrounding landowners whose livestock, private residences and other infrastructure could be affected by dust, noise and other impacts that result from traffic movement and general construction activities. ▪ Where required, draw up a land use management plan with individual landowners to protect livestock and farmland, which addresses restricted access areas, procedures when farm gates are opened and closed and so forth. Remediate/rehabilitate impact: ▪ Rehabilitate the veld to its original state post construction.
LAND USE AND RESOURCE IMPACTS	Minimise/reduce impact: ▪ Implement all the mitigation and management measures as proposed in the Agricultural Study. ▪ Implement the Stormwater Management Plan for the duration of construction. Remediate/rehabilitate impact: ▪ Rehabilitate the veld to its original state post construction.
IMPACTS ON TOURISM / ACCOMMODATION FACILITIES / PROTECTED AREAS	Minimize/reduce impact: ▪ Implement all measures proposed in the SEIA and other Specialist Assessments to mitigate intrusion impacts (dust, noise, visual) during construction. ▪ Implement all mitigation measures related to awareness/community engagement as proposed in the section dealing with '*Impacts associated with an influx of jobseekers / temporary construction workers*'; keep open communication channels with affected tourism establishments and address potential issues proactively. ▪ Give preference to accommodation establishments in the local study area when workers are housed.
HEALTH AND SAFETY RISKS FOR WORKERS	Minimise/reduce impact: ▪ Ensure implementation of the provisions of the Occupational Health and Safety Act (Act No. 85 of 1993) and adhere to the Emergency and Safety plan procedures for the duration of the construction phase. ▪ Promote good conduct of employees through awareness campaigns. It is also recommended that the Developer embarks on a Social Awareness Campaign for the workforce that focuses on sexual health, unwanted pregnancies and related social issues. ▪ Contractors to provide a housing plan that makes provision for workers that do not live nearby to return to their families at regular intervals or over weekends. ▪ Suitable fire fighting equipment should be on-site and workers should be appropriately

IMPACT/ISSUE	MITIGATION AND MANAGEMENT MEASURES
	trained for fire fighting. ▪ Construction workers to wear protective clothing (e.g. masks that minimize dust inhalation, clothing that protects against sunburn) and earplugs. ▪ Lock away dangerous plant, equipment and material when not supervised or in use. ▪ Provide safe and clean drinking water and instil regular water breaks to keep workers hydrated. ▪ Provide sufficient ablution facilities (chemical/portable toilets, etc.) at strategic locations that are cleaned regularly. ▪ Keep the local police, emergency and ambulance services informed of construction times and progress. ▪ Implement measures to suppress dust.
VISUAL IMPACT ASSESSMENT	
POTENTIAL VISUAL IMPACT OF CONSTRUCTION ON SENSITIVE VISUAL RECEPTORS IN CLOSE PROXIMITY TO THE FACILITY	▪ Ensure that vegetation is not unnecessarily removed during the construction period. ▪ Reduce the construction period through careful logistical planning and productive implementation of resources. ▪ Plan the placement of lay-down areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e., in already disturbed areas) wherever possible. ▪ Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads. ▪ Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities. ▪ Reduce and control construction dust using approved dust suppression techniques as and when required (i.e., whenever dust becomes apparent). ▪ Restrict construction activities to daylight hours whenever possible in order to reduce lighting impacts. ▪ Rehabilitate all disturbed areas immediately after the completion of construction works.
TRAFFIC IMPACT ASSESSMENT	
TRAFFIC CONFLICT AND CONGESTION DURING CONTRUCTION OF THE WEF	***Traffic and Transportation Management Plan*** ▪ The Traffic and Transportation Management Plan provided in the TIA must be followed and implemented during the construction phase of the WEF. ***Building lines*** ▪ All other structures shall be erected at least 60m from a national or provincial road reserve fence and 500m from an intersection. **R*34/Access Road intersection*** ▪ There must be no vehicular accesses permitted onto the R34 other than at the proposed/existing access. It is therefore recommended that a suitable barrier be erected to prohibit such access. In this regard, the current fence serves such purpose. ▪ Vegetation should be cleared (in the form of cutting the long grass) on the two southern corners of the R34 access intersection. ***Abnormal load vehicles*** ▪ During the construction stage the abnormal load vehicles expected at the site will require the bell mouth of the R34/Access Road intersection to be increased to accommodate the large turning radius of these vehicles. The extent of the widening must be determined at the detailed design stage. ***Internal roads*** ▪ The internal gravel roadways should be designed in accordance with the Guidelines for Human Settlement Planning and Design ("The Redbook"). Geometric designs of the roads should ensure that the requirements of all types of vehicles expected to visit the site are met, i.e. minimum turning radii, roadway widths, etc. The pavement design, where necessary, will form part of the detailed design stage.

IMPACT/ISSUE	MITIGATION AND MANAGEMENT MEASURES
	General traffic and transportation ▪ All road works must comply with the SARTSM, Chapter 13 and Volume 2. ▪ Temporary traffic control zone signs must be adequate in order to convey both general and specific messages to the road users. ▪ Adequate signage must be placed on the roads, such as: speed limits, caution: electrical road works in progress, use of alternative roads, stop/go signs, flagman ahead, etc. ***Transporting of construction staff*** ▪ Company transport must be in the form of appropriate transportation vehicle/s. No persons must be transported in the back of a bakkie. ***Site access control*** ▪ Access control must be managed at the gate to ensure that no authorized person enters the site unless a valid access card is presented at the gate to the security guards. ▪ Control at pick-up locations prior to entering the transportation vehicle/s, must ensure that no unauthorized person enters the site. ▪ All persons must be inducted before entering the gate and proof of induction must be kept for inspection purposes. ▪ Upon entering the site all persons must undergo alcohol testing. ▪ All vehicles entering the site must have a beacon light and a whip and flag to ensure that these vehicles are visible. ▪ Necessary signage must be placed where needed and only vehicles designated as construction vehicles will be allowed to travel on the main roads. ▪ No private vehicles should be allowed to travel on the main roads. Those travelling with private vehicles should be escorted to the site with their vehicles and from there escorted in designated construction vehicles. ***Parking areas*** ▪ Designated parking areas must be identified on site where vehicles will park during the day. ▪ A designated walkway should also be created which should be barricaded, whereby workers can walk to access their work areas.

5.2.3 Operational Phase

The following tables (Table 5-5 and Table 5-6) include the full list of Operational Phase General Mitigation measures, followed by the Specialist Mitigation measures.

Table 5-5: Operational | General Mitigation Measures

IMPACT/ISSUE	MITIGATION AND MANAGEMENT MEASURES
AIR QUALITY CLIMATE CHANGE	▪ Enhance this impact by promoting the use of renewable energy locally.
ARCHITECTURE OF ANCILLARY INFRASTRUCTURE	▪ All project structures and buildings must be well maintained.
HAZARDOUS CHEMICAL STORAGE	▪ All hazardous substances must be stored in appropriately bunded locations during the operations.
INCREASED STORMWATER RUN-OFF	▪ Recommendations of the Stormwater Management Plan and Erosion Management Plan must be implemented during operations.
WASTE MANAGEMENT	▪ A Waste Management Plan, incorporating recycling and waste minimisation, must be implemented. The Waste Management Plan must be implemented throughout the operational phase.

Table 5-6: Operational | Specialist Mitigation Measures

IMPACT/ISSUE	MITIGATION AND MANAGEMENT MEASURES
AGRICULTURAL IMPACT ASSESSMENT	
LOSS OF HIGH CULTIVATED OR HIGH POTENTAL AGRICULTURAL LAND	▪ No mitigation necessary
LOSS OF GRAZING LAND	▪ Compensate farmers for what is lost. ▪ Keep the construction period as short as possible. ▪ Employ dust-supressing practices to protect adjoining grazing land. ▪ Protect the land against soil erosion by following guidelines of the stormwater management plan.
LOSS OF AGRICULTURAL PRODUCTION (YIELD AND INCOME)	▪ Compensate farmers for what is lost. ▪ Keep the construction period as short as possible.
LOSS OF AGRICULTURAL RESOURCES	▪ Replace topsoil during rehabilitation and ensure that the soil is well fertilised and rolled. ▪ Protect the land against soil erosion by following guidelines of the stormwater management plan. ▪ Sow seed of local plants that is adapted to the climate. ▪ Irrigate the soil to ensure germination and establishment of the seed occurs. ▪ Remove all alien plants and weeds until the natural plants are well established.
BOTANICAL AND FAUNAL IMPACT ASSESSMENT	
ESTABLISHMENT OF ALIEN PLANT SPECIES	▪ The site must be checked regularly for the presence of alien invasive species. ▪ All alien invasive species that establish as a result of the proposed development must be removed and disposed of as per the Working for Water Guidelines. ▪ An Alien Invasive Management Plan must be compiled and implemented for MNWP of the proposed Newcastle WEF Complex. . (Note: This plan has been compiled and is included in Section 9 of the Final EMPr).
DISTURBANCE AND/OR DEATH OF FAUNAL SPECIES	▪ Regular maintenance and checks of the infrastructure must be undertaken. ▪ The mitigation measures specified in the Noise Impact Assessment conducted for MNWP WEF must be implemented and adhered to during the operational phase of the proposed development. ▪ External lighting should be avoided where possible. However, if required, lighting should be down lighting and low wattage. ▪ Access to the site must be minimised. ▪ All individuals must sign a register prior to accessing the proposed development site. ▪ Speed restrictions (40 km per hour is recommended) must be implemented to reduce the chance of road kills, as well as to reduce the amount of dust caused by vehicle movement along the roads.
BIODIVERSITY IMPACT ASSESSMENT	
ALIGNMENT WITH BIODIVERSITY MANAGEMENT TOOLS	Develop and Implement: ▪ Restoration and rehabilitation programme (See Appendix F). ▪ Oribi and Mountain Reedbuck Monitoring and Management Plan (See Appendix G). ▪
AQUATIC IMPACT ASSESSMENT	
DIRECT ECOSYSTEM DESTRUCTION AND MODIFICATION IMPACTS **INDIRECT HYDROLOGICAL AND**	***Maintenance and management*** ▪ It is the applicant's responsibility to ensure the proper functioning of infrastructure that is likely to require regular on-going maintenance. This includes the stormwater management infrastructure and road infrastructure. ▪ It is important that the location and extent of the rivers and wetlands in the vicinity of project activities be incorporated into all formal maintenance and repair plans for the project.

IMPACT/ISSUE	MITIGATION AND MANAGEMENT MEASURES
GEOPHORMOLOGICAL IMPACTS **WATER QUALITY IMPACTS** **FRAGMENTATION AND ECOLOGICAL DISTURBANCE IMPACTS** **INTERNAL ACCESS AND HAULAGE ROADS** **DIRECT ECOSYSTEM DESTRUCTION AND MODIFICATION IMPACTS** **INDIRECT HYDROLOGICAL AND GEOMORPHOLOGICAL IMPACTS** **WATER QUALITY IMPACTS** **FRAGMENTATION AND ECOLOGICAL DISTURBANCE IMPACTS**	▪ In terms of management, alien invasive plant control must be practiced on an on-going basis in line with the requirements of Section 2(2) and Section 3 (2) the National Environmental Management: Biodiversity Act (NEM:BA), which obligates the landowner/developer to control IAPs on their property. ***Monitoring*** It will be important that long-term monitoring of the potential freshwater ecosystem impacts be undertaken to proactively to identity any environmental issues and impacts that may arise as a result of the operational phase of the project. The following key aspects should be monitored: ▪ Erosion and/or sedimentation in the onsite and downstream wetlands; ▪ Water table monitoring to determine any impacts to subsurface inputs; and ▪ Presence of alien invasive plants. ***Remediation / Rehabilitation*** Where appreciable direct vegetation/habitat impacts and/or indirect erosion/sedimentation impacts or hydrological impacts occur resulting from project activities, these must be reported immediately to the relevant environmental authorities, and an independent aquatic or wetland specialist appointed to conduct a site inspection to assess the residual impacts and determine the need for any onsite remediation or rehabilitation requirements. Following this assessment, if significant impact have occurred, an implementable remediation and/or wetland rehabilitation plan may need to be compiled and implemented to the satisfaction of KZN EDTEA and DWS.
AVIFAUNAL IMPACT ASSESSMENT	
DIRECT HABITAT DESTRUCTION	▪ Flow and erosion control measures must be implemented where appropriate to reduce uncontrolled runoff from hard surfaces. ▪ Infrastructure must be designed in a manner that is compatible with the continuation of burn regimes implemented in the surrounding grasslands. ▪ No open fires are to be permitted outside of designated areas. ▪ The operational EMPr must be developed and implemented and should include site specific measures for the effective management and treatment of any wastewater to be produced by the project.
	Cumulative ▪ All appropriate mitigation measures listed above should be implemented. ▪ The project should collaborate with other developments (current and proposed) in the broader project area. Companies in the area should share lessons learnt, align strategies and agree coordinated approaches to responding to environmental issues. ▪ A data sharing agreement should be setup with other wind farm projects in the region to share operational monitoring data. Data should be shared with regulators and interested stakeholders to allow cumulative impacts to be documented and to inform adaptive operational management. ▪ Implement an alien woody plant removal and eradication programme to restore currently degraded grassland and aquatic habitats.
DISTURBANCE AND DISPLACMENT	▪ A site specific operational EMPr must be developed and implemented, which gives appropriate and detailed description of how operational and maintenance activities must be conducted to reduce unnecessary disturbance.

IMPACT/ISSUE	MITIGATION AND MANAGEMENT MEASURES
	▪ All contractors are to adhere to the EMPr and must apply good environmental practice during all operations. ▪ Operational phase bird monitoring, in line with the latest available guidelines, must be implemented.
DIRECT MORTALITY – COLLISION WITH INFRASTRUCTURE	⅄ WTGs must not be constructed within any designated Very High Sensitivity (WTG no-go) areas. ⅄ A carcass management programme should be implemented to remove any livestock carcasses from the development site and surrounds (up to 2 km from the project site, subject to access being granted) to reduce the likelihood of attracting vultures to the area. ⅄ WTG placement that is within or encroach into high (i.e., turbine base no-go areas) and medium sensitivity areas must have blade painting from the start of operations, subject to CAA approval. It is also suggested that an experiment be designed and implemented whereby half of the turbine are marked and the remaining turbines left unmarked as a control. ⅄ Should approval by the CAA be outstanding at the time of commercial operation, WTGs placed within these areas are to be subject to shutdown-on-demand until such time that blades are painted. ⅄ Should operational monitoring results indicate that these measure as outlined above are not suitably effective and there are extensive residual impacts (based on an avifaunal specialist's opinion and consultation with relevant stakeholders in relation to the species concerned) shutdown-on-demand must be implemented. ⅄ Internal power lines must be buried wherever technically and practically feasible, and where not detrimental to other environmental features (e.g., wetlands and their protective buffers); ⅄ Appropriate (approved) Bird Flight Diverters (BFDs) must be affixed to the entire length of novel overhead power lines (in all sensitivity categories). ⅄ If one or more avifaunal SCC carcasses are located and determined likely to have resulted from collisions with infrastructure in any sensitivity area over the lifespan of the facility, the fatality is to be appropriately recorded and reported to an avifaunal specialist to determine the most appropriate action. ⅄ If double layers of fencing are required for security purposes, they should be positioned at least 2 m apart to reduce the probability of entrapment by larger bodied species that may find themselves between the two fences. ⅄ Develop and implement a carcass search and bird activity monitoring programme in-line with the latest applicable guidelines. Carcass monitoring should be overseen by an avifaunal specialist and should continue for the lifespan of the facility. ⅄ Regular reviews of operational phase monitoring data (activity and carcass) and results to be conducted by an avifaunal specialist. ⅄ The above reviews should strive to identify sensitive locations including WTGs and areas of increased collisions that may require additional mitigation. ⅄ An operational monitoring programme for any novel overhead power lines must be implemented to locate potential collision fatalities. ⅄ Any fatalities located must be reported to Birdlife South Africa (BLSA) and the Endangered Wildlife Trust (EWT) within 3 months of completion of the data collection surveys applicable to that reporting period. i.e Reports should be produced quarterly and submitted no later than 3 months after the completion of the quarter that being is reporting on. ⅄ Annual audits must be conducted to assess the effectiveness of the above mitigation measures.
DIRECT MORTALITY – ELECTROCUTION	⅄ Internal power lines must be buried wherever technically and practically feasible, and where not detrimental to other environmental features (e.g., wetlands and their protective buffers).

IMPACT/ISSUE	MITIGATION AND MANAGEMENT MEASURES
	✦ All new overhead power line pylons, transformer boxes and substation infrastructure must be of a design that minimizes electrocution risk and discourages nesting/ roosting on the infrastructure by birds. This can be achieved by using adequately insulated 'bird friendly' structures, with sufficient clearances between live components. ✦ An operational monitoring programme for the overhead power line route must be implemented to locate potential collision fatalities.
BAT IMPACT ASSESSMENT	
MORTAILITY DUE TO WIND TURBINE COLLISION AND/OR BAROTRAUMA	▪ Implement blade feathering (up to the manufacturers cut-in speed) as soon as operation begins, to prevent freewheeling. ▪ The placement of all turbines, as well as their full blade length, should avoid high sensitivity areas. ▪ The placement of all turbines, as well as their full blade length, should avoid medium sensitivity areas, as far as possible. However, if unavoidable, then the associated features (e.g., alien woody vegetation and plantations) should be removed prior to turbines becoming operational. Should these features not be removed, then strict minimisation techniques (i.e. turbine curtailment and/or acoustic deterrence mechanisms) are to be implemented as soon as the first turbine starts spinning. ▪ If residual impacts reach the threshold limit (at any wind turbine) *as determined by the best practise guidelines applicable at the time*, then appropriate minimisation measures are to be implemented (turbine curtailment and/or acoustic deterrence mechanisms). ▪ Lighting at the project should be kept to a minimum at all associated infrastructures. Appropriate types of lighting are to be used to avoid attracting insects, and hence, bats. ▪ This includes downward facing low pressure sodium and warm white LED lights.
	▪ All mitigation measures, as listed above, are to be strictly adhered to, to reduce the probability of significant mortality impacts occurring at MNWP WEF, and subsequently on a cumulative scale as well. This will be relevant for the MNWP WEF, as well as all surrounding WEF's. Fatalities should be considered across all WEF's as far as possible, and transparency / data sharing of operational results is recommended to further consider cumulative impacts.
DISTURBANCE/ DISPLACEMENT	▪ Limit operational/maintenance activities to daylight hours. ▪ Although no confirmed bat roosts have been identified on site to date, it is recommended that a suitably qualified bat specialist (appointed to conduct the operational phase bat monitoring programme) is to further advise on refining these recommendations as new information becomes available, during the project's operational phase.
HERITAGE IMPACT ASSESSMENT	
No mitigation measures are relevant	
PALAEONTOLOGICAL IMPACT ASSESSMENT	
No mitigation measures are relevant	
NOISE IMPACT ASSESSMENT	
DAYTIME OPERATION OF MULILO NEWCASTLE WIND POWER WEF (WORST-CASE SPL)	The significance of the noise impact is MEDIUM but the following mitigation will reduce noise level and significance: ▪ The applicant can design and implement a noise abatement plan (NAP) at certain wind speeds (scenario modelled) OR ▪ The applicant can select a quieter WTG (scenario modelled using SPL of 105.5 dBA) OR ▪ The applicant can get written confirmation from property owner of NSR08 that dwellings will not be used for permanent residential purposes in future.
NIGHTTIME OPERATION OF MULILO NEWCASTLE WIND POWER WEF (WORST-CASE SPL)	The significance of the noise impact is HIGH and the following mitigation will reduce noise level and significance: ▪ The applicant can design and implement a NAP at certain wind speeds (scenario modelled) OR ▪ The applicant can select a quieter WTG (scenario modelled using SPL of 105.5 dBA) OR ▪ The applicant should get written confirmation from property owner of NSR08 that the dwelling(s) will not be used for residential purposes in the future.

IMPACT/ISSUE	MITIGATION AND MANAGEMENT MEASURES
SOCIO-ECONOMIC IMPACT ASSESSMENT	
NEW EMPLOYMENT AND ECONOMIC IMPACTS	Enhance benefits: ▪ Maximise local employment and procurement (from the local and district municipalities) wherever possible. ▪ Coordinate the effort to obtain temporary employment, service providers, SMME's etc. required for maintenance work, with the municipal LED Unit. ▪ Assist and guide the local community with regards to the needs of the WEF plant and the types of supporting industries and services required for its successful operation. If feasible, make ED funding available to assist the existing municipal initiatives with skills training and capacity building of SMME's. ▪ Make employment creation one of the SED program's targets, aims and objectives. Local businesses that apply for SED funding have to demonstrate their commitment to employment creation (criteria for evaluation by the Implementing and Monitoring Agent).
	Minimize/reduce impact: ▪ Maximise local employment. ▪ Implement all the mitigation measures as proposed in Section 7.7 of the SEIA.
IMPACTS ON LIVELIHOODS OF DIRECTLY BENEFITTING LANDOWNERS	Minimize/reduce impact: ▪ Consider the potential increase in rates and taxes during the negotiation processes with landowners.
SOCIO-ECONOMIC CONTRIBUTION / COMMUNITY DEVELOPMENT	Enhance benefits: ▪ Involve the local and district municipalities' LED Units in all processes when SED and ED projects and suitable candidates for projects and/or training programmes are identified. ▪ Join the existing Newcastle LED Forum and align projects with the goals and objectives identified for the region's trade and industry sectors. ▪ Make gender and Youth issues a specific outcome of the needs analysis to ensure that these groups are targeted. ▪ Ensure further transparency and effective information sharing through industry associated websites, emailed newsletters, municipal noticeboards, information events and meetings and existing community channels used by the various wards. ▪ Become involved in local initiatives that address existing backlogs to ensure that real community-based needs are met.
TRAINING / SKILLS DEVELOPMENT / CAPACITY BUILDING	Enhance benefits: ▪ Link with existing NGO's to assist in skills transfer to new projects, community groups, Officials and project processes. ▪ Link with existing training workshops and programmes for SMME development that are done by municipal LED Units. ▪ Link with bigger institutions such as Universities and FET institutes to increase the impact of training and skills development in the region.
	Enhance the benefit: ▪ Link with existing NGO's to assist in skills transfer to new projects, community groups, Officials and project processes. ▪ Link with existing training workshops and programmes for SMME development that are done by municipal LED Units. ▪ Link with bigger institutions such as Universities and FET institutes to increase the impact of training and skills development in the region. This type of strategic partnership was also listed in the NLM IDP as one of the SMME Development interventions required to uplift and formally develop the skills of all contractors and service provider doing business with the municipality.
LAND USE AND RESOURCE IMPACTS	Remediate/rehabilitate impact: ▪ Implement all mitigation measures as proposed in the Agricultural Study and EMPr.
IMPACTS ON TOURISM /	Avoid/prevent impact: ▪ Based on the Specialist VIA findings, consult with individual tourism establishments that

IMPACT/ISSUE	MITIGATION AND MANAGEMENT MEASURES
ACCOMMODATION FACILITIES / PROTECTED AREAS	would experience a high or very high visual impact and/or who are concerned that revenues will be affected. .
IMPACTS ON LAND VALUES	No mitigation is proposed.
INTRUSION IMPACTS	Minimize/reduce impact: ▪ Implement an effective Land Use Management programme (procedures when gates are opened and closed, road maintenance, implementation of methods to address potential veld fires, no-go areas, etc.) in collaboration with the landowners. ▪ Implement all mitigation and management measures as proposed by the VIA and NIA Specialists.
	Minimize/reduce impact: ▪ Implement an effective Land Use Management programme (procedures when gates are opened and closed, road maintenance, implementation of methods to address potential veld fires, no-go areas, etc.) in collaboration with the landowners. ▪ Implement all mitigation and management measures as proposed by the VIA and NIA Specialists.
IMPACTS ON SENSE OF PLACE	Minimize/reduce impact: ▪ Implement all relevant mitigation measures as proposed to reduce intrusion impacts. ▪ Implement all measures as proposed in the VIA and NIA Reports. ▪ As far as possible, avoid turbines to be located in direct view of residences and / tourist and holiday accommodation establishments. ▪ Implement measures to increase communication and transparency between the land owners and Project as proposed in the previous sections of this report.
	Minimize/reduce impact: ▪ Implement all relevant measures to reduce intrusion impacts and as proposed in the Specialist NIA and VIA reports. ▪ As far as possible, avoid turbines to be located in direct view of residences and / or tourist and holiday accommodation establishments. Implement measures to increase communication and transparency between the land owners and IPP, as proposed in the previous sections of this report.
CONTRIBUTION TO NATIONAL POWER SUPPLY	▪ No mitigation required.
VISUAL IMPACT ASSESSMENT	
POTENTIAL VISUAL IMPACT OF FACILITY OPERATIONS ON SENSITIVE VISUAL RECEPTORS IN CLOSE PROXIMITY TO THE PROPOSED DEVELOPMENT	▪ Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint. ▪ Maintain the general appearance of the facility as a whole. ▪ Monitor rehabilitated areas and implement remedial action as and when required.
POTENTIAL VISUAL IMPACT OF FACILITY OPERATIONS ON SENSITIVE VISUAL RECEPTORS WITHIN THE REGION	**Site development & Operation:** ▪ Retain / re-establish and maintain large trees, natural features and noteworthy natural vegetation in all areas outside of the activity footprint. ▪ Retain natural pockets (wetland, river and other sensitive vegetation zones) as buffers within the property and along the perimeter. ▪ Dust suppression techniques should be in place at all times during the site development and operational phases. ▪ Access roads will require an effective dust suppression management programme, such as regular wetting and/or the use of non-polluting chemicals that will retain moisture in the road surface. ▪ Keeping infrastructure at minimum heights.

IMPACT/ISSUE	MITIGATION AND MANAGEMENT MEASURES
	▪ Introducing landscaping measures such as vegetating berms. ▪ Avoid the use of highly reflective material. ▪ Maintain the general appearance of the site as a whole. **Lighting** ▪ Lighting should be kept to a minimum wherever possible. ▪ Install light fixtures that provide precisely directed illumination to reduce light "spillage" beyond the immediate surrounds of the activity - this is especially relevant where the edge of the activity is exposed to residential properties. ▪ Wherever possible, lights should be directed downwards to avoid illuminating the sky. ▪ Avoid high pole top security lighting along the periphery of the site and use only lights that are activated on movement, or required by CAA regulations.
POTENTIAL VISUAL IMPACT OF OPERATIONAL LIGHTING AT NIGHT ON SENSITIVE VISUAL RECEPTORS IN THE REGION	**Planning & operation:** ▪ Aviation standards and CAA Regulations for turbine lighting must be followed. ▪ The possibility of limiting aircraft warning lights to the turbines on the perimeter according to CAA requirements, thereby reducing the overall impact, must be investigated. ▪ Install aircraft warning lights as per CAA requirements. ▪ Shield the sources of light by physical barriers (walls, vegetation, or the structure itself). ▪ Limit mounting heights of lighting fixtures, or alternatively use foot-lights or bollard level lights. ▪ Make use of minimum lumen or wattage in fixtures. ▪ Make use of down-lighters, or shielded fixtures. ▪ Make use of Low-Pressure Sodium lighting or other types of low impact lighting. ▪ Make use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.
POTENTIAL VISUAL IMPACT OF SHADOW FLICKER ON SENSITIVE VISUAL RECEPTORS IN CLOSE PROXIMITY TO THE PROPOSED DEVELOPMENT	No mitigation measures proposed.
ANCILLARY INFRASTRUCTURE	No mitigation measures proposed.
POTENTIAL VISUAL IMPACT OF FACILITY OPERATIONS ON THE VISUAL CHARACTER OF THE LANDSCAPE AND SENSE OF PLACE OF THE REGION **POTENTIAL VISUAL IMPACT OF FACILITY OPERATIONS ON PROTECTED/ CONSERVATION AREAS WITHIN THE REGION.**	**Planning:** ▪ Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint. ▪ Plan ancillary infrastructure in such a way and in such a location that clearing of vegetation is minimised. ▪ Use existing roads wherever possible. Where new roads are required to be constructed, these should be planned carefully, taking due cognisance of the local topography. Roads should be laid out along the contour wherever possible, and should never traverse slopes at 90 degrees. Construction of roads should be undertaken properly, with adequate drainage structures in place to forego potential erosion problems. **Construction:** ▪ Rehabilitate all construction areas. ▪ Ensure that vegetation is not cleared unnecessarily to make way for infrastructure. **Operations:** ▪ Maintain the general appearance of the facility as a whole. ▪ Monitor rehabilitated areas, and implement remedial action as and when required. **Decommissioning:** ▪ Remove infrastructure not required for the post-decommissioning use of the site.

IMPACT/ISSUE	MITIGATION AND MANAGEMENT MEASURES
	▪ Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications. ▪ Monitor rehabilitated areas post-decommissioning and implement remedial actions.
TRAFFIC IMPACT ASSESSMENT	
TRAFFIC CONFLICT AND CONGESTION DURING CONTRUCTION OF THE WEF	***Traffic and Transportation Management Plan*** ▪ The Traffic and Transportation Management Plan provided in the TIA must be followed and implemented during the construction phase of the WEF. ***Building lines*** ▪ All other structures shall be erected at least 60m from a national or provincial road reserve fence and 500m from an intersection. **R*34/Access Road intersection*** ▪ There must be no vehicular accesses permitted onto the R34 other than at the proposed/existing access. It is therefore recommended that a suitable barrier be erected to prohibit such access. In this regard, the current fence serves such purpose. ▪ Vegetation should be cleared (in the form of cutting the long grass) on the two southern corners of the R34 access intersection. ***Abnormal load vehicles*** ▪ During the construction stage the abnormal load vehicles expected at the site will require the bell mouth of the R34/Access Road intersection to be increased to accommodate the large turning radius of these vehicles. The extent of the widening must be determined at the detailed design stage. ***Internal roads*** ▪ The internal gravel roadways should be designed in accordance with the Guidelines for Human Settlement Planning and Design ("The Redbook"). Geometric designs of the roads should ensure that the requirements of all types of vehicles expected to visit the site are met, i.e. minimum turning radii, roadway widths, etc. The pavement design, where necessary, will form part of the detailed design stage. ***General traffic and transportation*** ▪ All road works must comply with the SARTSM, Chapter 13 and Volume 2. ▪ Temporary traffic control zone signs must be adequate in order to convey both general and specific messages to the road users. ▪ Adequate signage must be placed on the roads, such as: speed limits, caution: electrical road works in progress, use of alternative roads, stop/go signs, flagman ahead, etc. ***Transporting of construction staff*** ▪ Company transport must be in the form of appropriate transportation vehicle/s. No persons must be transported in the back of a bakkie. ***Site access control*** ▪ Access control must be managed at the gate to ensure that no authorized person enters the site unless a valid access card is presented at the gate to the security guards. ▪ Control at pick-up locations prior to entering the transportation vehicle/s, must ensure that no unauthorized person enters the site. ▪ All persons must be inducted before entering the gate and proof of induction must be kept for inspection purposes. ▪ Upon entering the site all persons must undergo alcohol testing. ▪ All vehicles entering the site must have a beacon light and a whip and flag to ensure that these vehicles are visible. ▪ Necessary signage must be placed where needed and only vehicles designated as construction vehicles will be allowed to travel on the main roads. ▪ No private vehicles should be allowed to travel on the main roads. Those travelling with

IMPACT/ISSUE	MITIGATION AND MANAGEMENT MEASURES
	private vehicles should be escorted to the site with their vehicles and from there escorted in designated construction vehicles. ***Parking areas*** ▪ Designated parking areas must be identified on site where vehicles will park during the day. ▪ A designated walkway should also be created which should be barricaded, whereby workers can walk to access their work areas.

5.2.4 Decommissioning Phase

The following table (Table 5-7) includes the full list of Decommissioning Phase General Mitigation measures.

Table 5-7: Decommissioning | General Mitigation Measures

IMPACT/ISSUE	MITIGATION AND MANAGEMENT MEASURES
POLLUTION	▪ Littering must be avoided, and litter bins must be made available at various strategic points on site. ▪ Refuse from the decommissioning of the site must be collected on a regular basis and deposited at an appropriate landfill.
	▪ The storage of fuels and hazardous materials must not be permitted near sensitive water resources. All hazardous substances (e.g. diesel, oil drums, etc.) to be stored in a bunded area.
DUST	▪ Management of fugitive/nuisance dust could be implemented through the following: o Damping down of un-surfaced and un-vegetated areas; o Retention of vegetation where possible; Demolitions and other clearing activities must only be done during agreed working times and permitting weather conditions to avoid drifting of sand and dust into neighbouring areas; o A speed limit of 40km/h must not be exceeded on dirt roads. ▪ Any complaints or claims emanating from the lack of dust control must be attended to immediately by the Contractor.
TRAFFIC & TRANSPORT	▪ Construction vehicles and machinery must make use of existing infrastructure such as roads as far as possible to minimise disturbance on the receiving environment during decommissioning.
SOIL EROSION	▪ After the removal of all wind turbine-related structures during decommissioning, the disturbed soils must be re-vegetated to avoid unnecessary soil erosion. This must be based on the Revegetation Plan and the Erosion Management Plan.
LAND-USE	▪ No mitigation necessary.

5.3 SENSITIVITY CONSOLIDATION

The environmental impact assessment process has been ongoing since 2022. During this time various specialists have undertaken site visits, monitoring and walkthroughs processes. During this time all specialists have documented their sensitivities spatially. This data has been consolidated into a single sensitivity map which demonstrates all sensitivities and their respective buffers. This map is available in A3 format in Appendix E as part of the Site Layout Plan but is also illustrated below for completeness.

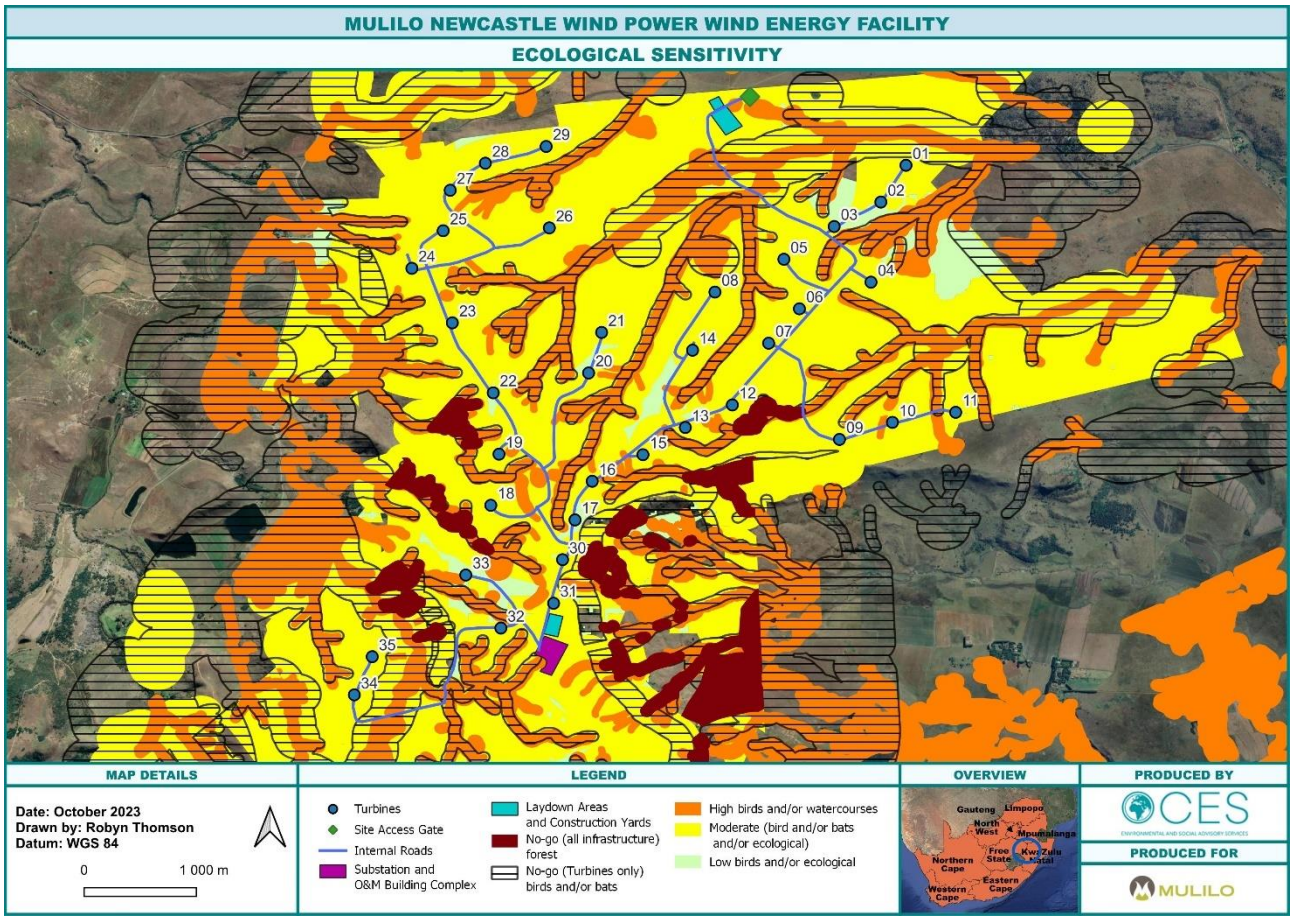


Figure 5.1: Consolidated Sensitivity Map of the MNWP WEF and its associated infrastructure.

5.4 GENERAL ENVIRONMENTAL MONITORING

A monitoring programme will be implemented for the duration of the construction of the MNWP WEF and associated infrastructure. This programme must include:

- Establishing a baseline through the taking of photographs of identified environmental aspects and potential impact sites along the routes prior to construction.
- Bi-weekly (fortnightly) monitoring during the first month of construction where after monthly audits must be conducted by the ECO for the remainder of the construction phase to ensure compliance to the EMPr conditions, and where necessary make recommendations for corrective action. These audits can be conducted randomly and do not require prior arrangement with the Project Coordinator. The ESO, who will report to the ECO, will be on-site daily to monitor the above.
- All documentation e.g., audit/monitoring/compliance reports and notifications, as per the MNWP WEF EA DFFE Ref: TBA, must be submitted to the Director: Compliance Monitoring of the Department.
- While construction is taking place at the MNWP WEF, the ECO must be on-site bi-weekly to ensure that protected plant and tree species are adequately demarcated. The ESO will be on site daily to ensure that these conditions are adhered to.

- Compilation of an audit report with a rating of compliance with the EMPr. The ECO must keep a photographic record of any damage to areas outside the demarcated site and construction area. The date, time of damage, type of damage and reason for the damage shall be recorded in full to ensure the responsible party is held liable. All claims for compensation emanating from damage should be directed to the ECO for appraisal. The Contractor will be held liable for all unnecessary damage to the environment. A register must be kept of all complaints from the landowners and/or the community. All complaints and/or claims should be handled immediately to ensure timeous rectification and/or payment by the responsible party.

6 ADMINISTRATION AND REGULATION OF ENVIRONMENTAL OBLIGATIONS

6.1 MANAGEMENT STRUCTURE

In line with this EMPr, the Contractor must prepare a document clearly outlining and demonstrating the environmental responsibilities, accountability and liability of the Contractor's employees. The Contractor must assign responsibilities for the following:

- Reporting structures;
- Actions to be taken to ensure compliance;
- Overall design, development and implementation of the EMPr;
- Documenting the environmental policy and strategy;
- Implementing the EMPr in all stages/phases of the project; and
- All the aspects which require action under the other core elements and sub-elements of the EMPr.

All official communication and reporting lines, including instructions, directives and information, should be channelled according to the organisation structure.

6.2 ROLES AND RESPONSIBILITIES

6.2.1 The Applicant/Developer

Mulilo Newcastle Wind Power (Pty) Ltd (hereafter referred to as the Applicant) was established for the sole purpose of developing, owning and operating the proposed MNWP WEF. The Applicant is the responsible entity for monitoring the implementation of the EMPr and compliance with the EA. However, if the company appoints a Contractor to implement the project and hence implement the proposed mitigation measures documented in this EMPr on their behalf, then the successful contractor's responsibilities are outlined as per the section that follows.

The Applicant will also be responsible for stipulating and enforcing fines and penalties to the Contractor for contravention of any non-compliances against the EMPr, the EA and other approved plans.

6.2.2 The Contractor

The successful Contractor will:

- Be responsible for the overall implementation of the EMPr in accordance with the requirements of the Developer and the EA;
- Ensure that all third parties, who carry out all or part of the Contractor's obligations under the contract, comply with the requirements of this EMPr;
- Be responsible for obtaining any outstanding permits and licenses which are required for the construction of the MNWP WEF; and
- Ensure that the appointment(s) of the ECO and the Environmental Site Officer (ESO) are subject to the approval of Mulilo Newcastle Wind Power (Pty) Ltd.

6.2.3 The Resident Engineer

The Resident Engineer (RE) should be appointed by the Developer and will be required to oversee the construction programme and construction activities performed by the Contractor. The RE is expected to liaise with the Contractor and ECO on environmental matters, as well as any pertinent engineering matters where these may have environmental consequences. The RE will oversee the general compliance of the Contractor with the EMPr and other pertinent site specifications. The RE should also be familiar with the EMPr specifications and further monitor the Contractor's compliance with the environmental specifications daily, through a Site Diary, and enforce compliance.

6.2.4 The Environmental Site Officer (ESO)

The Contractor should appoint a nominated representative of the Contractor as the ESO for the contract. The ESO must be site-based and should be the responsible person for implementing the environmental provisions of the construction contract.

The approved ESO must be onsite daily.

The ESO's duties will include, *inter alia*, the following:

- Ensuring that all the environmental authorisations, licenses and permits, required in terms of the applicable legislation, have been obtained prior to construction commencing;
- Reviewing and approving construction method statements with input from the ECO and RE, where necessary, in order to ensure that the environmental specifications contained within the construction contract are adhered to;
- Assisting the Contractor in finding environmentally responsible solutions to problems;
- Keeping accurate and detailed records of all activities on site;
- Keeping a register of complaints onsite and recording community comments and issues, and the actions taken in response to these complaints or working alongside the CLO to undertake these tasks;
- Ensuring that the required actions are undertaken to mitigate the impacts resulting from non-compliance;
- Reporting all incidences of non-compliance to the ECO and Contractor; and
- The ESO must submit regular written reports to the ECO, not less frequently than once a month, during the construction phase of the MNWP WEF.

The ESO must have:

- The ability to manage public communication and complaints, unless a suitably qualified CLO is appointed to undertake public liaison;
- The ability to think holistically about the structure, functioning and performance of environmental systems;
- The ESO must be fully conversant with the EIR, EMPr, EA, relevant environmental legislation and any other relevant documents relating to the MNWP WEF; and
- The ESO and/or CLO must have received professional training, including training in the skills necessary to be able to amicably and diplomatically deal with the public as outlined in the first bullet point above.

The ECO should be in the position to determine whether or not the ESO has adequately demonstrated their capabilities to carry out the tasks at hand and in a professional manner. The ECO will therefore have the authority to instruct the Contractor to replace the ESO if, in the ECO's opinion, the appointed officer is not fulfilling their duties in terms of the requirements of the construction contract. Such instruction must be in writing and must clearly set out the reasons why a replacement is required and within what timeframe. The ECO must visit the development site and, in addition to the responsibilities listed in section 6.2.5 below, review the performance of the ESO and submit performance reviews to the Developer, as and when required.

6.2.5 Environmental Control Officer (ECO)

For the purpose of implementing the conditions contained herein, Mulilo Wind Power (Pty) Ltd must appoint an ECO for the contract. The ECO must be the responsible person for ensuring that the provisions of the EMPr as well as the EA are complied with during the construction phase. The ECO will be responsible for issuing instructions to the Contractor, where environmental considerations call for action to be taken. The ECO must submit regular written reports, at least once a month, to the Developer and, when required and/or requested, to the environmental authority (national DFFE). The ECO will be responsible for the monitoring, reviewing and verifying of compliance with the EMPr and conditions of the EA by the Contractor.

The ECO's duties in this regard will include, *inter alia*, the following:

- Confirming that all the EAs, licenses and permits required in terms of the applicable legislation have been obtained prior to construction commencing;
- Monitoring and verifying that the EMPrs, EAs and Contract are adhered to at all times and taking action if specifications are not followed;
- Monitoring and verifying that environmental impacts are kept to a minimum;
- Reviewing and approving construction Method Statements with input from the ESO and RE, where necessary, to ensure that the environmental specifications contained within this EMPr and the EAs are adhered to;
- Inspecting the site and surrounding areas on a regular basis to monitor compliance with the EMPrs, EAs and Contract;
- Monitoring the undertaking by the Contractor of environmental awareness training for all personnel onsite;
- Ensuring that activities onsite comply with all relevant environmental legislation;
- Undertaking a continual internal review of the EMPr and submitting any changes to the Developer and the Competent Authority (national DFFE) for review and approval, as applicable;
- Checking the register of complaints, which should be kept onsite and maintained by the ESO and/or the CLO, and ensuring that the correct actions are/were taken in response to these complaints;
- Checking that the required actions are/were undertaken to mitigate the impacts resulting from non-compliance;
- Reporting all incidences of non-compliance to the Developer;
- The ECO should submit compliance audit reports to the national DFFE, in accordance with the NEMA EIA Regulations (2014, as amended);
- Keeping a photographic record of progress onsite from an environmental perspective. This can be conducted in conjunction with the ESO, because the ESO will be the person that will be onsite daily and can therefore take photographic records weekly. The ECO should ensure that the ESO understands the task at hand;
- Recommending additional environmental protection measures, where necessary; and
- Providing feedback on any environmental issues during the site meetings.

The ECO must have:

- A good working knowledge of all relevant environmental policies, legislation, guidelines and standards;
- The ability to conduct inspections and audits and to produce thorough, readable and informative reports;
- The ability to manage public communication and complaints;
- The ability to think holistically about the structure, functioning and performance of environmental systems; and
- Proven competence in the application of the following integrated environmental management tools:
    - Environmental Impact Assessment;
    - Environmental Management Plans/Programmes;
    - Environmental auditing;
    - Mitigation and optimisation of impacts; and
    - Monitoring and evaluation of impacts.

The ECO must be fully conversant with the EIA Process, the MNWP WEF EIR, EAs (WEF and Grid), this EMPr and all relevant environmental legislation for the project. The Developer will have the authority to replace the ECO if, in their opinion, the appointed officer is not fulfilling their duties in terms of the requirements of the EMPr and the EAs as well as this specification. Such instruction must be in writing and must be clearly set out with reasons why a replacement is required and within what timeframe.

6.3 COMPLIANCE MONITORING AND CORRECTIVE ACTION

Non-compliance with the conditions of this EMPr and the Generic EMPrs must be viewed as a breach of appointment Contract for which the construction Contractors will be held liable. The Contractor is deemed NOT to have complied with the EMPrs if:

- There is evidence of contravention of the EMPrs, the environmental specifications or the method statements developed by the Contractor within the boundaries of the construction site or areas of contractor responsibility;
- Construction related activities take place outside the defined boundaries of the site;
- Environmental damage ensues due to negligence;
- The Contractor fails to comply with corrective or other instructions issued by the ECO within a specific time; or
- The Contractor fails to respond adequately to complaints from the public or authorities.

The Developer and the construction contractors are liable for any construction rehabilitation costs associated with their non-compliance with this EMPr. This rehabilitation must be undertaken to the satisfaction of the ECO. The construction contractors will have the right to appeal any punitive action undertaken by the ECO or the Developer.

6.4 REPORTING AND REVIEW

The EMPr reporting and documentation requirements must be based on best practice principles, e.g., ISO 14001, which must take the following requirements into account:

- Documents associated with the EMPr must be reviewed regularly and updated by all environmental management parties;
- Audits of the environmental performance of the construction phase of the project will be undertaken on a monthly basis by accredited auditors in fulfilment of likely conditions of EA in this regard;
- The findings of external, internal and informal environmental reviews will be recorded and items requiring action will be identified from the recommendations made; and
- The construction contractors will be contractually obliged to fulfil any reasonable recommendations, and implementation of these actions will be assessed in the above audit.

Meetings, where required, should take place onsite. Internal auditing and reporting should be subject to external review by the ECO during the monthly compliance audits.

6.5 ENVIRONMENTAL MONITORING

6.5.1 General Environmental Monitoring

A monitoring programme will be implemented for the duration of the construction of the MNWP WEF and associated infrastructure. This programme will include:

- Establishing a baseline through the taking of photographs of identified environmental aspects and potential impact sites along the routes prior to construction.
- Bi-weekly (fortnightly) monitoring during the first month of construction where after monthly audits will be conducted by the ECO for the remainder of the construction phase to ensure compliance to the EMPr conditions, and where necessary make recommendations for corrective action. These audits can be conducted randomly and do not require prior arrangement with the Project Coordinator.
- While construction is taking place at MNWP WEF, the ECO must be on site at least twice a week to ensure that protected plant and tree species are adequately demarcated.

- Compilation of an audit report with a rating of compliance with the EMPr. The ECO shall keep a photographic record of any damage to areas outside the demarcated site and construction area. The date, time of damage, type of damage and reason for the damage shall be recorded in full to ensure the responsible party is held liable. All claims for compensation emanating from damage should be directed to the ECO for appraisal. The Contractor shall be held liable for all unnecessary damage to the environment. A register shall be kept of all complaints from the Landowner or community. All complaints / claims shall be handled immediately to ensure timeous rectification / payment by the responsible party.

6.5.2 Avifaunal Monitoring

Prior to construction, an avifaunal specialist should be consulted in order to determine the requirements for monitoring of the avifauna present in the vicinity of the MNWP WEF, pre-and post-construction. The suggested monitoring programme should be incorporated into the final EMPr. The post-construction monitoring programme specified in the Avifaunal Impact Assessment must be followed, including:

- Avifaunal abundance and flight activity monitoring
- Fatality monitoring
- Carcass searching
- Searcher efficiency and scavenger trials
- Reporting content and frequency

6.5.3 Bat Monitoring

Baseline and monitoring data is vital for the assessment of the impact of wind turbines on surrounding bat populations. Prior to construction, baseline information on bat roosting sites, species diversity and seasonal migration should be taken into account and incorporated into the final design. In addition, operational monitoring should be undertaken in order to assess the fatalities incurred. This should be undertaken intensively during the first year of operation. The recently circulated “Good Practice Guidelines for Surveying Bats in Wind Farm Developments 2011” should be considered during the design of monitoring programmes. If this document is further amended prior to construction of the facility, the guideline incorporating the inputs of SAWEA should be used.

Prior to construction, a bat specialist should be consulted in order to determine the requirements for monitoring of the bats present in the vicinity of the wind farm, pre- and post-construction. The suggested monitoring programme must be incorporated into this EMPr.

6.6 EMERGENCY PREPAREDNESS AND RESPONSE

The Contractor must develop environmental emergency response procedures to ensure that there are appropriate responses to unexpected or accidental actions or incidents which are likely to cause environmental impacts during the construction phase. Such activities include, *inter alia*:

- Accidental discharges to water and land;
- Accidental exposure of employees to hazardous substances;
- Accidental fires;
- Accidental spillage of hazardous substances; and
- Specific environmental and ecosystem effects from accidental releases or incidents.

The Contractor and Subcontractors must comply with the emergency preparedness incident reporting requirements, which must be developed and in place prior to the commencement of the construction phase.

6.7 ENVIRONMENTAL INCIDENT MANAGEMENT

The construction contractors must adhere to the hazard and incident reporting protocols to be developed by the Contractor. A report must be completed for all incidents, and appropriate action taken, where necessary,

to minimise any potential impacts. The national DFFE must be informed of any environmental incidents, in accordance with legislative requirements, should this be necessitated by a major environmental incident.

6.8 REVIEW OF AUDIT REPORTS

A formal management review should be conducted in which the internal audit reports, written by the ESO and based on frequent inspections and interactions with the ECO and review of the periodic reports, including audit reports by the independent external auditor - will be reviewed. The purpose of the review is to critically examine the effectiveness of this EMPr and its implementation and to decide on potential modifications to this EMPr as and when necessary. The process of management review will be to keep to the principle of continual improvement.

Audit report review should take place when the liaison committee, consisting of representatives from the Contractor, construction Subcontractors (as appropriate), ECO and other parties or I&APs deem them necessary or on a quarterly basis. The purpose of these quarterly meetings will be to review the progress of the Contractor in implementing and complying with their obligations in terms of this EMPr for the duration of the project. Where necessary, audit report review will take place more frequently than the required quarterly meetings.

7 REPORTING

7.1 METHOD STATEMENTS

Method Statements must be completed by the Contractor, an individual that is competent with the tasks to be undertaken, for each activity which requires a Method Statement as specified in the EMPrs or as requested by the ECO. Each Method Statement must be submitted to the ECO and the Developer for approval. For the purposes of the environmental specification, a Method Statement is defined as:

"A *written submission by the Contractor to the ECO setting out the plant, materials, labour and method the Contractor proposes to carry out an activity, in such detail that the ECO is enabled to assess whether the Contractor's proposal is in accordance with the EMPr and/or will produce results in accordance with EMPr."*

The Method Statements must include details of the:

- Construction procedures;
- Materials and equipment to be used;
- Transportation of the equipment to- and from site;
- How the equipment and/or 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;
- Compliance and non-compliance with the specifications; and
- Any other information deemed necessary by the Engineer.

Method Statements can be for once-off tasks or a series of tasks which are often repeated. The risks are identified during the various work stages when a Method Statement is prepared. Steps taken to reduce the potential risk associated with these stages can then be determined. The sequential steps and actions to be followed by the persons carrying out the works are written down. This sequence of steps should include all environmental and safety aspects relevant to the task being executed.

As a minimum, the Contractor should produce the following method statements:

- Site Dust Management
- Working in Sensitive Environments
- Solid Waste Management
- Hazardous Material Management
- Hydrocarbon Management
- Site Clearing and Topsoil Management
- Fire Management
- Noise Management
- Concrete Mixing
- Pollution Control
- Site Access and Traffic Management
- Incident and Emergency Response Management

The Method Statements should be submitted to the ECO and the Developer not less than twenty (20) days prior to the intended date of commencement of the activity, or as directed by the ECO. The Contractor must not commence an activity until all required Method Statements have been approved by the ECO and the Developer. The ECO should provide comment on the methodology and procedures proposed by the Contractor, but the ECO will not be responsible for the Contractor's chosen measures of impact mitigation

and emergency/disaster management systems. Approval of the Method Statements should not be withheld unreasonably.

All control measures detailed in the Method Statement must be the subject of "toolbox" talks prior to the initiation of works. By introducing or reaffirming these measures during the "toolbox" talk, everyone involved should have a clear understanding of the work to be carried out, as well as the safe work method sequences and equipment required.

An example of a Method Statement layout is provided in Appendix C.

7.2 GOOD HOUSEKEEPING

The Contractor must undertake “good housekeeping” practices during the construction phase. This will help avoid disputes on responsibility and allow for the smooth running of the contract. Good housekeeping extends beyond the wise practice of construction methods to include the care for and preservation of the environment within which the construction is situated.

7.3 RECORD KEEPING

The ECO must continuously monitor the Contractor’s adherence to the approved impact prevention procedures and the ECO should issue the Contractor with a notice of non-compliance whenever transgressions are observed. The ECO should document the nature and magnitude of the non-compliance in a designated register, the actions taken to discontinue the non-compliance, the actions taken to mitigate its effects and the results of the actions. The non-compliance should be documented and reported to the Developer in the monthly reports. These reports must be made available to the national DFFE Director: Compliance Monitoring when requested or as per the frequency specified in this EMPr.

The Contractor shall ensure that an electronic filing system identifying all documentation related to the EMPr is established.

A list of reports likely to be generated during all phases of the Project is provided below, and all applicable documentation must be included in the environmental filing system catalogue or document retrieval index.

- Final Environmental Impact Assessment Report.
- Environmental Management Plan.
- Final design documents and diagrams issued to and by the Contractor.
- All communications detailing changes of design/scope that may have environmental implications.
- Daily, weekly and monthly site monitoring reports.
- Complaints register.
- Medical reports.
- Training manual.
- Training attendance registers.
- Incident and accident reports.
- Emergency preparedness and response plans.
- Copies of all relevant environmental legislation.
- Permits and legal documents, including letters authorising specific personnel of their duties as part of emergency preparedness teams e.g. fire teams, etc.
- Crisis communication manual.
- Disciplinary procedures.

- Monthly site meeting minutes during construction.
- All relevant permits.
- Environmental Authorisation on the EIA from the DFFE.
- All method statements from the Contractor for all phases of the project.

7.4 DOCUMENT CONTROL

The Contractor is responsible for establishing a procedure for electronic document control. The document control procedure should comply with the following requirements:

- Documents must be identifiable by organisation, division, function, activity and contact person.
- Every document should identify the personnel and their position(s), who drafted and compiled the document(s), who reviewed and recommended approval, and who finally approved the document for distribution; and
- All documents should be dated, provided with a revision number and reference number, filed systematically, and retained for a period of at least five (5) years.

The Contractor must ensure that documents are periodically reviewed and revised, where necessary, and that current versions are available at all locations where operations, essential to the functioning of this EMPr, are performed. All documents must be made available to the ECO and other independent external auditors.

8 ENVIRONMENTAL AWARENESS

8.1 ENVIRONMENTAL TRAINING

The Contractors must ensure that their employees and any third party, who carries out all or part of the Contractors' obligations, is adequately trained regarding the implementation of this EMPr and the general environmental legal requirements and obligations.

Environment and health awareness training programmes should be targeted at three (3) distinct levels of employment, i.e., the executive, middle management and labour. Environmental awareness training programmes should contain the following information:

- The names, positions and responsibilities of personnel to be trained
- The framework for appropriate training plans
- The summarised content of each training course
- A schedule for the presentation of the training courses.

The ECO must ensure that records of all training interventions are kept in accordance with the record keeping and documentation control requirements as set out in this EMPr. The training records must verify each of the targeted personnel's training experience.

The Developer must ensure that adequate environmental training takes place. All employees must be given an induction presentation on environmental awareness and the content of this EMPr. The presentation should be conducted in a language which is understood by the employees or explained by a suitably qualified translator. The environmental training must, as a minimum, include the following:

- The importance of conformance with all environmental policies;
- The environmental impacts, actual or potential, of their work activities;
- The environmental benefits of improved personal performance;
- Their roles and responsibilities in achieving conformance with the environmental policy and procedures and with the requirement of the Agency's environmental management systems, including emergency preparedness and response requirements;
- The potential consequences of departure from specified operating procedures;
- The mitigation measures required to be implemented when carrying out their work activities;
- Environmental legal requirements and obligations;
- Details regarding floral and faunal SCC and protected species, and the procedures to be followed should these be encountered during the construction of construction camps;
- The importance of not littering;
- The importance of using supplied ablution facilities;
- The need to use water sparingly;
- Details of and encouragement to minimise the production of waste and re-use, recover and recycle waste where possible; and
- Details regarding archaeological and/or historical sites which could be unearthed during construction and the procedures to be followed should these be encountered.

Recommended Environmental Education Material is provided in Appendix A.

8.2 MONITORING OF ENVIRONMENTAL TRAINING

The Contractor must monitor the performance of construction workers to ensure that the points relayed during their induction have been properly understood and are being followed. If necessary, the ECO and/or

a translator should be called to the site to further explain aspects of environmental or social behaviour that are unclear. Toolbox talks are recommended.

9 MANAGEMENT PLANS AND MONITORING RECOMMENDATIONS

This includes the following management and monitoring plans:

9.1. OPEN SPACE MANAGEMENT PLAN

9.2. SEARCH AND RESCUE, REHABILITATION AND ALIEN INVASION MANAGEMENT PLAN

9.3. FRESHWATER MANAGEMENT PLAN

9.4. STORMWATER MANAGEMENT, EROSION AND SEDIMENT CONTROL PLAN

9.5. WASTE MANAGEMENT PLAN

9.6. STORAGE AND HANDLING OF HAZARDOUS SUBSTANCES PLAN

9.7. FIRE MANAGEMENT PLAN

9.8. TRAFFIC AND TRANSPORTATION MANAGEMENT PLAN

9.9. EMERGENCY RESPONSE PLAN

9.10. CHANCE FIND PROCEDURE

9.11. AVIFAUNAL MONITORING AND MANAGEMENT PLAN

9.12. BAT MONITORING AND MANAGEMENT PLAN

9.13. RESTORATION AND REHABILITATION PROGRAMME (See Appendix F)

9.14. ORIBI AND MOUNTAIN REEDBUCK MANAGEMENT AND MONITORING PLAN (See Appendix G)

9.1 OPEN SPACE MANAGEMENT PLAN

All mitigation measures relating to vegetation clearance in this EMPr as well as all recommendations in the management plans in Section 9.1, Section 9.5 and Section 9.8 are applicable to the management of open space areas. Please note that *"open space"*, in terms of the MNWP WEF site, includes areas directly adjacent to constructed and upgraded roads, the turbine footprints and the associated infrastructure.

9.1.1 Management of Potential Issues

The following potential issues should be addressed (if they arise) by the Contractor and to the satisfaction of the ECO:

- The construction (and operation where necessary) of the MNWP WEF must be confined to the approved development footprint.
- Open space areas should be kept as contiguous blocks of vegetation as far as possible and no additional barriers, except for approved roads and fences, should be constructed to avoid impeding faunal movement.
- Vehicles must remain within the approved roads and no off-road driving should be permitted without prior consent from the ECO.
- Alien plants and weeds should be removed from the open space areas and these areas should be monitored for the regrowth of such plants.
- Only indigenous species from a list approved by the ECO may be used for any rehabilitation work in open space areas.
- No waste should be disposed of in open space areas, including but not restricted to cigarette butts and uneaten foodstuffs (i.e., fruit cores and peels) which could attract scavengers. It is recommended that receptacles be placed strategically to minimise this, especially during the construction phase.
- No material stockpiling should occur within open space areas without approval from the ECO.
- A plant Search and Rescue operation must be undertaken by a qualified botanist/horticulturalist prior to construction commencing and SCC identified within the development footprints must be transplanted in accordance with the Search and Rescue Plan. The Search and Rescue Plan must be updated with input from the qualified botanist/horticulturist prior its implementation.
- Vegetation cleared from development footprints must not be piled onto adjacent intact vegetation outside of the designated footprint, not even for temporary storage.
- The collection of indigenous plants from the site must not be allowed, unless the individual(s) are authorised to do so.
- Employees should undergo environmental awareness training and be sensitized to the need to avoid disturbance to the indigenous vegetation outside the approved development footprints.
- Rehabilitation guidelines for the development must prioritise the use of indigenous grass, tree and shrub species for the soil stabilisation landscaping of the development site once construction has been completed, if required.

The ECO should report on the condition of the open space areas and keep photographic records during the construction phase of the MNWP WEF.

9.2 SEARCH AND RESCUE, REHABILITATION AND ALIEN INVASION MANAGEMENT PLAN

The Search and Rescue, Rehabilitation and Alien Invasion Management Plan includes specialist input from Dr Greer Hawley.

9.2.1 Relevant Definitions

- **Composition** refers to the identity, and in some cases the abundance, of the species which occur in an assemblage.
- **Environmental Control Officer (ECO)** refers to independent Environmental Specialist(s) tasked with monitoring the environmental performance and compliance of Contractors involved in the construction of the MNWP WEF.
- **Framework Species** typically refers to a tree, herb or liana species occurring in established natural vegetation, and which is structural in the vegetation complex.
- **Pioneer species** are typically r-selection species which colonise a disturbed habitat in the initial stages of restoration, and they are typically a highly abundant, widespread species with high growth rates.
- **Re-vegetation** refers to the process of establishing vegetative cover, which is typically required in areas which need to be restored without the objective of reinstating a native ecosystem. In re-vegetation, any plant species would do (for instance, sowing a mixture of commercially available grasses on mine tailings for soil rehabilitation) although a commercial crop or timber producing trees are often used.
- **Replacement** refers to the establishment of a different type of vegetation on the degraded environment following the vegetation clearance associated with construction activities.
- **Restoration** is the process of reconstituting a degraded system to its original state.
- **Rehabilitation** is a general term which includes the replacement, restoration and re-vegetation, and is the process or programme implemented to achieve restoration or replacement.
- **Succession** is the directional development in the species composition of a community after disturbance, from the so-called pioneer stages to an end-state or climax that tends to persist.
- **Topsoil** refers to the top 100 mm of the soil which often includes organic material such as stem and leaf litter.
- **Weed** refers to an undesirable plant, typically an alien or non-native species, which exhibits robust growth and may provide competition for resources with the desired vegetation.

9.2.2 Vegetation Clearing Procedure

Vegetation clearance may only occur once the relevant permits have been secured.

A) <u>Vegetation Clearing</u>

The following activities must be undertaken prior to the commencement of the construction activities:

- All trees and identified plant Species of Conservation Concern (SCC) which need to be transplanted should be demarcated, using a suitable demarcation material which will not damage the trees and/or plant SCC.
- Herbaceous and geophytic plant species which need to be transplanted (bulbs and seedlings), slipped, or have their seed collected must be identified and marked.
- Obtain permits from the KwaZulu Natal provincial Department of Economic Development, Tourism and Environmental Affairs (DEDTEA) and the Department of Forestry and Fisheries and the Environment (DFFE) for the transplantation, removal, damage or destruction of protected plant species.
- Establish a nursery within the site or make use of a suitable nursery in proximity to the site to ensure that the plants are stored in suitable potting bags or pots, watered as often as required, sheltered from the weather, etc.
- All geophytic (bulbous) plants and tree samplings, which are visible, should be removed from the construction footprint and stored in nursery conditions.

- Grass sods from a variety of naturally occurring grasses should be collected from the site and kept in nursery conditions. At least ten (10) sods or runners per species should be collected. Where possible, the grass should be mowed during seeding season and the seed should be collected and stored for reseeding.

The following activities must be undertaken during the construction activities:

- Ensure that the plants which are housed in the nursery are cared for by a suitably qualified/experienced individual.
- Any geophytic (bulbous) plants which are observed in the topsoil during vegetation clearance must be removed and stored in nursery conditions.

Please note: If any unusual plant species are encountered, the Contractor and/or the ECO must contact a suitably qualified specialist and provide photographic depictions and GPS coordinates of the unknown plant species for rapid species identification by the specialist.

B) Disposal of Vegetation Material

In sections where the site is covered by grasses, the grasses and topsoil should be removed, no disposal mechanism is required. However, where woody vegetation has been cleared, all material should be chipped, shredded and utilised on the site for mulching and composting during rehabilitation.

9.2.3 Search and Rescue Plan (Plant Stockpiling)

The plant Search and Rescue Plan aims to establish which plants should be harvested from the turbine laydown areas, access roads and associated WEF infrastructure, in order to:

- Collect important pioneer plants which can be transplanted, kept under nursery conditions and utilised for re-vegetation after construction as part of rehabilitation activities; and to
- Collect and transplant plant SCC which have a high conservation value or apply for destruction permits, where transplanting will not be possible.

A nursery should be established within the site, in an area where minimal construction disturbance will occur, or a suitable existing nursery in proximity to the site should be used. Please note that if the latter is chosen, all necessary permits and conditions must be in place to ensure that the plant species are suitably transported to the nursery. If the former is chosen, the following minimum requirements must be implemented during the operation of the nursery within the site:

- Establish a nursery within the site, in an area where minimal construction disturbance will occur.
- Bush clumps within the site could be utilised in the nursery because of the shelter and micro-climate which is provided by the bush clumps/vegetative cover.
- Make use of fencing of at least 1.2 m in height to fence-off the nursery for protection from livestock, which are likely to continue grazing within the site and surrounds. A gate should be constructed to ensure access to the nursery for the maintenance of the plants, as well as for vehicle access and deliveries.
- Where necessary, equip the nursery with a water tank for irrigation purposes.
- Install hose-lines in the nursery, if required.
- Procured plants should be transported with care to ensure that they arrive at the nursery in a condition which is suitable for successful growth.
- All harvested seeds and seedlings, as well as plants removed for transplanting, are the responsibility of the Contractor and must be kept under approved nursery conditions. Additional measures and/or remedial action should be taken if the nursery is not functioning successfully under the approved nursery conditions.
- Plants which are to be stored in containers in the nursery should be planted in two (2) parts of topsoil which has been excavated from the site (to emulate site conditions) and one (1) part of compost (produced from mulching the cleared vegetation).

- Ensure that the nursery is properly equipped with the necessary implements, containers, fertilisers and other equipment required to function efficiently.
- All plants must be fully maintained by staff from the date of receipt until rehabilitation has concluded. This includes watering, weeding, fertilising, etc. as required.
- All plants must be protected against wind, frost and direct sunlight, until such time as they are fully acclimatised. If necessary, shade net or a shade house should be installed for this purpose.
- Plants which are held in the nursery for more than one (1) year, must be replanted into larger containers. Any plants which outgrow their current containers must be replanted in larger containers when required.
- The Contractor will be held liable for the replacement of plants lost due to negligence or mismanagement.

9.2.4 Rehabilitation Plan

Rehabilitation of disturbed and heavily impacted environments is closely linked to ecological successional theory (van Ardel & Aronson, 2005). Succession can be described as a change of species, or patterns of species abundance, over time. Directional, continuous and sequential patterns of colonisation by various species are indicators of successional stages of an environment.

The first sequence of succession (after a disturbance) is the initial colonisation of an area of fast-growing, aggressive *pioneering* species, which are often short-lived, perennial species and grasses. These plant species are responsible for changing soil properties and creating micro-niches for further colonisation.

The initial sequence of pioneer species is followed by early and late successional species migrating into the area, resulting in a *climax community*.

The "4 R" Approach should be employed for the rehabilitation of the disturbed environment. This includes:

- Restoration;
- Rehabilitation;
- Replacement/re-vegetation; and
- Reservation/conservation.

Ensure that these activities start with soil stabilisation and soil preparation or remediation. Soil remediation includes activities to improve soil stabilisation, soil structure and soil fertility.

The success of rehabilitating the community/population within a designated area is dependent on the satisfactory establishment of the chosen plant species. To ensure that the process is optimised, the correct plant species in the correct densities and combinations should be utilised. Monitoring of the rehabilitation process is imperative to ensure that aggressive plant species and herbivores are controlled, and slopes/banks remain stable.

The general aim of a rehabilitation programme is to recreate a natural ecosystem. The rehabilitation will therefore be outlined in three (3) phases, which are required, namely:

I. Take measures to stabilise the soil and remedy the soil, when required, through the monitoring and management of the soil composition, pH levels, nutrients, etc.;
II. Re-vegetate disturbed areas using appropriate natural successional species;
III. Monitor and manage the success of the rehabilitation by controlling aggressive indigenous plants, removing alien invasive plant species as soon as they are observed, and maintaining the re-vegetated areas to ensure the successful establishment of these re-vegetated areas.

A) Soil Stabilisation and Remediation

Topsoil, which is removed during construction, must be utilised in the nursery and stored on site for rehabilitation and re-vegetation. Once construction is complete, the topsoil must be spread over the

disturbed site and covered with mulch. Where necessary, the soil must be stabilised using suitable materials, such as netting or geotextiles. The plant material (grasses and herbs), which has been removed from the site, should be mixed into the topsoil to supplement the organic nutrient content of the soil. No further soil conditioning in terms of fertilising is deemed necessary at this stage.

B) Re-vegetation Procedure

The species which are to be used for re-vegetation should be based on the ability of the species to:

- Successfully grow from the indigenous seeds, sods and/or slips which have been collected from the site; and
- All Red Listed species, SCC and protected species which have been removed from the site.

The Table below consists of the steps which should be followed during out-planting for the re-vegetation procedure.

Plot preparation	The plots should be prepared as follows: • Prior to rehabilitation of the site, all remnants of foreign debris should be removed from the site. • Compacted soil should be ripped to a depth of more than 250 mm. • The final prepared surface should not be smooth but furrowed to follow the natural contours of the land. • All plots must be covered with topsoil. Topsoil should be manually spread evenly over the surface. Topsoil must be spread to the original depth and deeper where sufficient topsoil is available. • All the plots should be mulched. The vegetation stripped, chipped and stockpiled during site preparation must be spread in a single layer across the plots as mulch. • All plots should be treated with nitrogen-fixing bacteria which is important for legumes, *Trichoderma sp.* and mycorrhizal products as a natural form of soil remediation.
Plant Preparation	Plants should undergo a period of 'hardening-off' during which they have been exposed to full, direct sunlight and been under a reduced watering regime. The individual plants destined for each plot should be grouped into plot-specific, marked baskets or containers, before they leave the nursery. Each plant should be labelled with an aluminium label, giving species code, and a specific numeral identifying the plot. Before out-planting commences, the equipment necessary for the proper handling and placing of all required materials must be on hand, in good condition and to acceptable approved standards. Shrubs and trees • Planting should preferably be done during the rainy season (summer). • Unless otherwise specified by the ECO, excavate square holes of approximately 800 mm x 800 mm x 800 mm for trees and approximately 500 mm x 500 mm x 500 mm for shrubs. • Backfill planting holes with excavated material/approved topsoil, thoroughly mixed with weed-free manure or compost (per volume, approximately one quarter of the plant hole), one cup of 2:3:2 fertiliser and an approved ant and termite poison (if required). • As much of the soil from container plants as possible must be retained around the roots of the plant during planting. • The soil must cover all the roots and be gently pressed down to a level equal to that of the surrounding *in situ* material. • After planting, each plant must be well watered and additional soils should be added once the soil has settled, if necessary. • Add mulch to the surface area of the bermed basin in order to sustain soil moisture. • Stake all trees using at least three (3) weather resistant wooden or steel stakes anchored firmly into the ground. Two (2) of the three (3) stakes should be located on the windward side of the plant. Galvanised wire binding, 3 mm thick, covered with a 20 mm diameter plastic hosepipe must be tied tightly to the stakes, half- to two thirds the height of the tree above the ground and looped around the trunk of the tree. • Place stakes at least 500 mm apart and away from the stem and roots of the tree, so as not to damage the tree or its roots.

	• Thoroughly water plants as required until the plants are able to survive independently, i.e., until they are able to survive when receiving water from rainfall only. • A raised circular 200 mm high subsoil berm placed 500 mm (shrubs) to 750 mm (trees) from the plant stem must be provided for the watering. Do not simply leave the excavated plant hole partially backfilled for this purpose, the berm must be raised above the natural soil level. • Water aloes and bulbs once directly after transplanting to settle the soil. • Remove stakes and wire binds over time as required, as plants become established.
Grassing using sods	• "Sodding" is defined as the laying of grass sods. • Sodding may be done at any time of the year. • The soil should be uniformly wet to a depth of at least 150 mm before grass sods are planted. • Protect sods against drying out by keeping them moist from the time of harvesting until final placement. • Rake or spike the plot area to create a loose surface to a depth of approximately 100 mm. • Lay two (2) rows of sods in a straight line or following a contour, starting at the bottom of a slope, where possible. • Place the next two (2) rows of sods in the same direction, 5 m away, until the full area is covered with rows of sods. • Tightly push sods together, taking care not to stretch or overlap sods. • Where a good fit cannot be obtained, the intervening spaces should be filled with parts of sods or topsoil. • After planting, water sods to prevent drying out. • Irrigate as required until the grass is able to survive independently, i.e., until it is able to survive when receiving water from rainfall only.
Grassing using runners	• Plant grass runners evenly by hand or by mechanical means at a rate of at least 400 runners per hectare (i.e., at 250 mm centres). • Only use fresh runners, avoiding grass runners which have dried out. • Rake or spike the area to create a loose surface to a depth of approximately 100 mm. • The soil should be uniformly wet to a depth of at least 150 mm before planting of grass runners. • After planting, the runners must be given copious amounts of water and, when sufficiently dry, must be rolled with a light agricultural roller and re-watered. • Irrigate as required until the grass is able to survive independently, i.e., until it is able to survive when receiving water from rainfall only.
Grassing using seeds	• All seed should be collected from the site during vegetation clearing or from the neighbouring veld. • Seeding must be done during the summer months, when the germination rate is better. • The soil should be loose and uniformly wet to a depth specified by the ECO, before any seeding commences. • Halve the seed and fertiliser mixture as specified and apply evenly in two (2) successive applications perpendicular to each other. • The seeded area must be raked over after seed application and well-watered. • Irrigate as required until the grass is able to survive independently, i.e., until it is able to survive when receiving water from rainfall only.
Maintenance	• Cordon-off areas which are under rehabilitation as temporary no-go areas using danger tape and steel droppers. If necessary, these areas should be fenced-off to prevent vehicular, pedestrian and livestock access. • Delay the re-introduction of livestock to all rehabilitated areas until an acceptable level of re-vegetation has been reached. Fencing may be used, or the area may be covered by suitable branches. • Re-vegetation should be the same as the vegetation type which previously existed, unless otherwise indicated in the Contract or specified by the ECO. • Water all transplanted, planted and grassed areas as specified. • Watering must commence and continue immediately after the seeds have germinated and growth begins. • Mow lawns regularly to a height of 50 mm above ground level. This promotes adequate coverage.

	• Mowing of veld grass is to take place once a year after the grass has shed its seed and not before the grass has fully grown - fire breaks are important. • Check all plants for pests and diseases on a regular basis and treat the plants, when required, using approved methods and products as per the manufacturers' specifications. • Control weeds by means of extraction, cutting or other approved methods. • In planted areas which have failed to establish, replace plants with the same species as originally specified. The same species must be used unless otherwise specified by the ECO. • A minimum grass cover of approximately 80% is required. Individual plants must be strong and healthy growers by the end of the maintenance period. • Acceptable cover, in the case of sodding, is attaining 100% cover by the specified vegetation.

C) Rehabilitation Monitoring

It is recommended that the success of the rehabilitation is monitored from the commencement date of rehabilitation activities, which should be recorded in the Environmental File, and for a period of twelve (12) months after the rehabilitation procedure has been completed. Should any issues arise, which are not resolved through the implementation of the recommended measures, a suitably qualified horticulturist or botanist should be contacted to provide further rehabilitation/remedial measures.

The ECO should monitor the rehabilitation process and record the progress in the monthly audit reports using photographic evidence. This should include monitoring:

- Establishment success (presence, percentage cover or absence) of plant cover per plot; and
- Water used for irrigation.

Monitoring must be undertaken once a month for the first three (3) months and then quarterly thereafter for twelve (12) months or until rehabilitation has been deemed successful. Rehabilitation will be deemed successful once primary grass cover has been established, and there is no further requirement for frequent monitoring and management of the growth of alien species.

9.2.5 Alien Plant Species Management

An Alien Plant Species is *"(a) a species that is not an indigenous species; or (b) an indigenous species translocated or intended to be translocated to a place outside of its natural distribution range in nature, but not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention" (SANBI, 2020).*

It should be noted that not all introduced alien species are invasive and not all invasive species are necessarily alien.

South Africa's National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM:BA) has defined 'Invasive Alien Plant Species' to mean any species whose establishment and spread outside of its natural distribution range:

- Threatens ecosystems, habitats or other species or has a demonstrable potential to threaten ecosystems, habitats or other species; and
- May result in economic or environmental harm or harm to human health. Invasive alien plant species are globally considered as one of the greatest threats to the environment, biodiversity, ecosystem integrity and the economy.

According to the Conservation of Agricultural Resources Act (No. 43 of 1983 - Regulation 15, 30 March 2001) (CARA), for agricultural land, and the National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA), for natural areas, invasive alien plant species should be controlled and eradicated with an emphasis on urgent action in biodiversity priority areas. NEM:BA published a list of Alien and Invasive Species (No 599) in 2014/1 which regulates the management of alien and invasive plants in natural environments.

The Ecological Specialists describe the current state of the proposed MNWP WEF site vegetation as follows:

A) Potential Alien Invasive Plant Species on the MNWP WEF Site

FAMILY	SPECIES	COMMON NAME	CARA	NEMBA
Amaranthaceae	*Gomphrena celosioides*	Prostrate Globe-Amaranth	-	-
Amaranthaceae	*Gomphrena serrata*	Gomphrena Weed	-	-
Asteraceae	*Cirsium vulgare*	Bull Thistle	Category 1	Category 1b
Asteraceae	*Craspedia variabilis*	Common Billy Buttons	-	-
Asteraceae	*Erigeron canadensis*	Horseweed	-	-
Asteraceae	*Acanthospermum australe*	Paraguayan Starburr	-	-
Asteraceae	*Hypochaeris radicata*	Common Cat's-Ear	-	-
Asteraceae	*Schkuhria pinnata*	Dwarf Marigold	-	-
Brassicaceae	*Lepidium sp.*	-	Category 1	Category 1b
Fabaceae	*Acacia dealbata*	Silver Wattle	Category 2	Category 2
Fabaceae	*Acacia mearnsii*	Black Wattle	Category 2	Category 2
Malvaceae	*Hibiscus trionum*	Flower-of-an-Hour	-	-
Onagraceae	*Oenothera stricta*	Fragrant Evening Primrose	-	-
Onagraceae	*Oenothera tetraptera*	Fourwing Evening Primrose	-	-
Plantaginaceae	*Plantago tomentosa*	Dwarf Plantain	-	-
Poaceae	*Paspalum dilatatum*	Dallis Grass	-	-
Poaceae	*Paspalum notatum*	Bahia Grass	-	-
Poaceae	*Cymbopogon pospischilii*	Narrowleaf Turpentine Grass	-	-
Rubiaceae	*Richardia brasiliensis*	Tropical Mexican Clover	-	-
Solanaceae	*Solanum sisymbriifolium*	Red Buffalo-bur	Category 2	-
Solanaceae	*Solanum sp.*	-	-	-
Verbenaceae	*Verbena litoralis*	Seashore Vervain	-	-
Verbenaceae	*Verbena rigida*	Slender Vervain	-	Category 1b

B) Working for Water (WfW) Methods to Control Invasive Alien Plants

The following methods for the control of invasive alien plants are deemed acceptable, in accordance with the Working for Water (WfW) programme which was launched in 1995 and initially administered by the Department of Water Affairs and Forestry (DWAF) and now it is administered by the national DFFE. These include:

- **Mechanical methods** of invasive alien plant removal, such as tree felling, removing or burning.
- **Chemical methods** of invasive alien plant removal through the careful us of environmentally safe herbicides in accordance with the manufacturers' instructions.
- **Biological control** using species-specific insects and/or diseases from the alien plant's country of origin, this method should only be used with extreme caution. Biological control is not a feasible option for the MNWP WEF site and is therefore not recommended.
- **Integrated control** which consists of a combination of at least two (2) of these methods.

The WfW programme aims to improve the integrity of natural resources by:

- Preventing new and emerging invasive alien plant problems;
- Reducing the impact of existing priority invasive alien plants; and
- Enhancing capacity and commitment to solve invasive alien plant problems.

C) Recommended Guidelines for the Removal and Control of Invasive Alien Plants within the MNWP WEF Development Site

Please note: The Developer and/or Contractor will not be responsible for the removal of all the current alien invasive plants which occur within the affected properties, but the Contractor will be responsible for using suitable methods to remove the alien invasive plants from the proposed MNWP WEF development footprint and controlling alien invasive plant growth within the areas which have been disturbed by the construction activities.

The following general requirements are recommended for the removal of invasive alien plants within the site:

- All staff involved in the removal and management of invasive alien plans must receive suitable training prior to the removal of plants and tree cutting.
- Large trees should be cut with chainsaws or axes and the open stems should be poisoned to ensure that the plant dies and does not re-sprout.
- All cuttings and vegetative material should be removed from the site and disposed of at a suitably registered waste disposal site.
- Cleared sites should receive follow up inspections, as frequently as required, to remove upcoming seedlings.
- In areas in which large-scale alien plant removal has been conducted, measures to stabilise the soil from wind and water erosion must be taken. Soils can be mulched and planted with indigenous pioneer species.
- Continued monitoring throughout the life of the project will be required as the risk of alien plant species invasion is never eliminated.

The following mechanical methods for alien plant removal are recommended:

- Hand-pulling seedlings and/or young plants by gripping them low down with a gloved hand and pull the plant out. Ensure that the roots are removed from the soil and that the plant does not break-off above the root.
- Ringbark trees by removing bark from the bottom of the stem up to a height of between 0.75 and 1 m. Hatchets or bush-knives may be used for debarking.
- Cut stump treatment can be used by cutting stems as low as practical as stipulated on the herbicide label. Chemical herbicides are applied in diesel or water as recommended. Applications in diesel should be to the whole stump and exposed roots and in water to the cut area as recommended on the label.

The appointed ECO should monitor the mechanical methods used for the removal of invasive alien plants and provide additional recommendations if and/or when required.

Chemical methods for alien plant removal are also a feasible method which can be used within the MNWP WEF site to control alien invasive plants. The Contractor should submit a Method Statement, containing the details of the chosen environmentally safe herbicide(s) and the method(s) of application, to the ECO for approval prior to the use of chemical methods for alien plant removal. Once the Method Statement has been approved, the ECO should monitor the removal of the alien plants and ensure that it is being undertaken in accordance with the approved Method Statement.

9.2.6 Faunal Relocation Plan

- No fauna present on the property may be wilfully harmed unless it threatens the life of an employee.
- Hunting, disturbance, and collection of animals by employees must be prohibited.
- Construction areas must be screened for slow moving fauna before any activities commence and removed, if necessary.

- Any animals injured by the construction activities should be taken to a veterinarian for treatment.
- Minimise impacts on faunal habitat by adhering to the botanical specialists' recommendations.
- Vehicle speeds should be kept to a minimum (40km/h) by using informative signage and traffic calming methods.
- If certain areas are found to involve unusually high mortality rates, then suitable mitigation (e.g., the erection of low fences alongside the problem area) may be required.
- Monitor excavations daily and rescue any trapped fauna. When filled with water, the excavations should be checked twice a day. Release the rescued fauna into a suitable habitat adjacent to the study area.
- Domestic waste should be placed in suitable covered containers and removed from the site on a regular basis to reduce the attraction of scavenging animals, e.g., Vervet Monkeys.
- External and internal fences must be monitored for traps.
- In terms of the conducted survey, the areas demarcated for clearing do not pose a risk/threat to mammals, for example: the presence of mammals was minimal.
- If a mammal or reptile is trapped within an area where construction is taking place, then a professional handler must be called upon to remove the mammal or reptile.
- Protective clothing, such as gloves, should be used when handling mammals.
- All staff tasked to capture and relocate mammals should be inoculated against Rabies and Tetanus.
- Immobilizers and/or tranquillizers must not be used on the mammals.

9.3 FRESHWATER MANAGEMENT PLAN

9.3.1 Protection of Watercourses and Wetlands

All relevant water use authorisations in terms of the National Water Act (NWA) (Act No. 36 of 1998 and subsequent amendments) must be obtained from the Department of Water and Sanitation (DWS) prior to the commencement of the construction of the MNWP WEF. Kindly note that DWS has provided additional requirements during the MNWP WEF EIA PPP, these have been included in All recommendations and conditions of approval must be incorporated into the audit checklist and appended to the EMPr. The ECO should audit the Contractor's compliance with the DWS recommendations and conditions during the construction phase.

The following general guidelines should be implemented to mitigate potential adverse impacts on surface water resources and associated riparian vegetation and habitats:

- Although no hard stand is currently located within 100m of a channel edge, future deviations of the layout must take in consideration that no hard standing surfaces must be constructed within 100m from a channel edge, except for roads and cable crossings.
- Any stormwater management features must be suitably designed and constructed to maintain stormwater flow to acceptable levels and minimise risk of erosion and scouring.
- Stormwater leaving the Applicant's premises must in no way be contaminated by any substance, whether such substance is a solid, liquid, vapour or gas or a combination thereof which is produced, used, stored, dumped or spilled on the premises.
- Increase runoff due to vegetation clearance and/or soil compaction must be managed, and steps must be taken to ensure that stormwater does not lead to bank instability and excessive levels of silt entering the stream.
- No stormwater runoff should be discharged directly into the drainage line/seep, where it could lead to erosion.
- All stormwater that would naturally run across the pollution areas must be diverted via channels and trapezoidal drains designed to contain the 1 :50 year flood.
- Stormwater control works must be constructed, operated and maintained in a sustainable manner throughout the impacted area.
- Where necessary works must be constructed to attenuate the velocity of any stormwater discharge and to protect the banks of the affected watercourses.
- Any exotic vegetation growing within the drainage systems and/or buffers directly adjacent to the proposed development should be removed as soon as possible and these areas should be kept weed free.

The ECO should report on the condition of the surface water within the development site and keep photographic records during the construction phase of the MNWP WEF.

9.4 STORMWATER MANAGEMENT, EROSION AND SEDIMENT CONTROL PLAN

This plan aims to:

- Provide appropriate guidelines for the conservation of soil to reduce the risk of erosion and sedimentation.
- Provide appropriate plans for the management of stormwater runoff.
- Minimise the potential for sediment loss.
- Minimise the risk of contamination of stormwater.
- Provide corrective measures to be implemented if erosion increases as a result of construction activities.

All mitigation measures relating to vegetation clearance in this EMPr as well as all recommendations in the management plans in Section 9.1, Section 9.5 and Section 9.8 are applicable to the management of open space areas. Please note that *"open space"*, in terms of the MNWP WEF site, includes areas directly adjacent to constructed and upgraded roads, the turbine footprints and the associated infrastructure.

9.4.1 General Performance Criteria

The following general performance criteria will be applicable to the MNWP WEF site:

- Minimal soil erosion as a result of construction activities.
- Implementing reasonable and practical measures to manage and mitigate the impacts which could result in increased soil erosion during the construction phase.
- Minimal to no contaminants present within the site, including sediments and litter, which could result in adverse environmental impacts to surface water resources due to construction activities, including vehicle movements and spoil placement.
- Where applicable, the capture, containment and treatment of groundwater which has been collected in excavations as a result of construction activities.

9.4.2 Stormwater Management, Erosion and Sediment Control

In addition to the sections below, the Department of Water and Forestry Stormwater Management G1 Best Practice Guideline (2006) must be adhered to.

A) Planning

- The clearing of the development footprint must be planned prior to clearing and construction activities to ensure that clearing is undertaken in a controlled manner.
- The Contractor and all personnel must be made aware of site-specific stormwater management measures, erosion and sediment control measures, and the implementation and maintenance which is required.
- The risks associated with the management of stormwater, sedimentation and erosion must be identified and the mitigation measures stipulated in the approved EMPr must be implemented.
- The following factors must be considered when determining erosion and sediment control, as well as the effectiveness of the recommended measures:
  - Local climatic condition and seasonal variations;
  - The soil types present on site and the condition of the soils;
  - The surface water resources which are present within the site; and
  - Local drainage, including temporary and overland flow paths.

B) Recommended Actions

- All mitigation measures stipulated in the approved EMPr and the conditions of the EA relating to stormwater management, sedimentation and erosion must be implemented (see Section 9.5.3).
- Sediment controls, such as basins or catch drains, should be designed to provide adequate bunding of spoil placement areas to prevent surface runoff entering nearby stormwater drains and watercourses without treatment, where required. These should be implemented according to ECO's recommendations.
- Disturbances to the MNWP WEF site due to clearing must be limited to the approved development footprint(s). This should be achieved through the demarcation of the development footprint(s) prior to the commencement of vegetation clearance and construction activities.
- All restricted and/or "no-go" areas should be demarcated prior to the commencement of construction activities.
- Erosion and sediment control measures should be both reasonable and practical. These measures must consider the receiving environment, water quality objectives, quality and quantity of water, location and accessibility, and other necessary factors.
- The Contractor must submit a detailed Method Statement/(s) to the ECO for approval prior to the commencement of construction activities. This Method Statement should include, but not be limited to, the planned stormwater management measures, sediment control measures, and erosion management and corrective measures (should erosion occur as a result of construction activities). This Method Statement/(s) must align with the mitigation measures stipulated in the approved EMPr and the conditions of the EA.
- The ECO should monitor the site for erosion or increased erosion due to construction activities and recommend suitable corrective measures to the Contractor. Corrective action must be taken at the first signs of erosion or increased erosion (in areas which were eroded prior to the commencement of the construction activities).
- Construction activities within a watercourse or wetland, such as roads or cabling, must only take place once the necessary approvals and/or authorisations have been received. All relevant conditions, such as those in the EA, EMPr and Water Use Approval(s), must be adhered to during construction within a watercourse or wetland. A Method Statement should be submitted to the ECO for approval prior to the commencement of such activities. The ECO should monitor the construction within these sensitive areas and report on the Contractor's compliance with the relevant conditions and Method Statement(s) in the monthly ECO audit reports.
- All watercourse protection controls must be implemented and functional prior to the commencement of construction activities within watercourses and/or wetlands.
- Vehicles must remain within the approved roads and adhere to all traffic rules.
- Where applicable, uncontaminated sediment removed from erosion and sediment control devices should be stockpiled in a suitable and approved location for reuse in areas which require landscaping, or the sediment should be removed from the site and disposed of at a suitably registered facility.
- Access roads should be graded to a crossfall which allows water to naturally drain into the surrounding environment without slowing or cut-off berming across the roads. The effectiveness of the road drainage systems should be monitored and, should the current drainage systems not be sufficient or effective, additional drainage measures should be recommended by the ECO.
- In areas where the water table is high, the excavation areas should be dewatered. Should this be required, a Method Statement detailing the proposed dewatering process should be submitted to the ECO for approval prior to dewatering taking place.

C) Monitoring

- The stormwater management as well as erosion and sediment control measures within the MNWP WEF site should be monitored, and additional measures should be put in place if/when necessary.

- The monitoring of the management of stormwater and erosion control should be undertaken using an environmental inspection checklist, which contains all the required conditions, recommendations and mitigation measures.
- All drainage facilities and systems should be inspected regularly and maintained whenever required.
- Should circumstances arise which result in the current drainage facilities and/or systems being inadequate, further measures should be implemented to ensure the adequate functioning of drainage facilities and/or systems.

D) Reporting

- The monitoring of the management of stormwater and erosion control should be undertaken using an environmental inspection checklist, which contains all the required conditions, recommendations and mitigation measures, on a weekly basis.
- Any complaints and/or incidents relating to stormwater management, erosion and sediment control must be reported to the ESO and the ECO.
- The ECO will be responsible for notifying the Contractor and the Developer of any complaints and/or incidents relating to stormwater management, erosion and sediment control.
- The ECO should investigate all incidents and report the findings to the Contractor and the Developer in an Environmental Incident Report.

9.4.3 Recommended Mitigation Measures

- Stormwater should be managed using suitable structures such as swales, gabions and rock rip-wrap so that any runoff from the development site is attenuated prior to discharge. Silt and sedimentation should be kept to a minimum, using the above-mentioned structures. Ensure that the structures do not create any form of erosion.
- Natural runoff must be diverted to stormwater drains, where these are available.
- Stormwater structures must be located at least 32m away from identified drainage lines.
- This Stormwater Management Plan must be updated prior to commencement of construction to include measures for maximum water seepage at the source of water flow, mitigation measures for water pollution, wastewater management and the management of surface erosion e.g. by considering the applicability of contouring, etc.
- Stormwater management features must be suitably designed and constructed to maintain stormwater flow to acceptable levels and minimise the risk of erosion and scouring.
- No stormwater runoff should be discharged directly into the watercourses, where it could cause increased erosion.

Please note that this Stormwater Management Plan must be updated prior to the commencement of construction. In addition to the recommendations listed above, it should include detailed design drawings of the proposed structures for watercourse crossings for approved roads and cables.

9.5 WASTE MANAGEMENT PLAN

The activities associated with the MNWP WEF project carry a high risk of potentially polluting the ground and water courses due to the inappropriate production, storage and disposal of waste streams, and include:

- Pollution of freshwater resources (surface and groundwater);
- Pollution of soil;
- Release of odours and associated nuisance impacts on employees and communities;
- Attraction of vermin (rodents, birds, cats etc);
- Negative health impacts and injury to employees, contractors and external parties; and
- Disruption of ecological systems and/or loss of fauna and flora.

The purpose of this MNWP WEF Waste Management Plan (WMP) is to enable MNWP WEF to manage our waste streams (non-hazardous and hazardous) associated with our facilities and operations in a way that minimises risks to human health and the environment.

The requirements of this WMP are applicable to all MNWP WEF employees, contractors and visitors and to the MNWP WEF and relate to the storage, transportation and disposal of solid wastes.

9.5.1 Objectives

The intentions of this MNWP WEF WMP are as follows:

- Summarise the regulatory framework and international standards governing the management of solid waste associated with MNWP WEF project site, during both construction and operations;
- To minimize the risks to human and environmental health associated with wastes;
- escribe measures and controls related to the management of waste associated with the MNWP WEF and operations in line with the waste management hierarchy described below;
- Define roles and responsibilities for the implementation of this WMP and management of wastes;
- Ensure a rapid and correct response to non-conformances related to the management of wastes;
- To ensure that appropriate records are kept to support compliance with this procedure; and
- Provide a framework for monitoring and reporting on the management of waste.

9.5.2 References

South African legislation and regulations:

- National Environmental Management: Waste Act (NEMWA)
- Occupational Health & Safety Act (85 of 1993) (OSHA)
- NEMWA Waste Regulations (listed activities requiring a waste licence)
- Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste
- National Norms and Standards for the Storage of Waste
- National Norms and Standards for the Remediation of Contaminated Land and Soil Quality
- South African National Standard - The handling, storage and disposal of pesticides - SANS 10206:2010
- Municipal waste by-laws
- Municipal IWMP

9.5.3 Definitions

Waste	Any solid, liquid, or contained gaseous material that is being discarded by disposal, recycling, burning or incineration. It can be by-product of a manufacturing process or an obsolete commercial product that can no longer be used for intended purpose and requires disposal.
Hazardous waste	Share the properties of a hazardous material (e.g. ignitability, corrosivity, reactivity, or toxicity), or other physical, chemical, or biological characteristics that may pose a potential risk to human health or the environment if improperly managed. Waste may also be defined as "hazardous" by local regulations or international conventions, based on the origin of the

	waste and its inclusion on hazardous waste lists, or based on its characteristics; or any unwanted material that is believed to be deleterious to human safety or health or the environment.
Hazardous substances	Substances that may have short, medium or long term health effects when being taken into the body. There are four possible routes of entry: Inhalation, skin absorption, ingestion or injection.
Hydrocarbon	Petroleum in any form including crude oil, fuel oil, sludge, oil refuse and refined products including diesel.

9.5.4 Description of Waste Generation

The following table provides a high-levelled overview of MNWP WEF project activities that generate waste.

Function	Offices	Workshops	Contracts
WASTE STREAMS	Packaging (cardboard and plastic) Paper Various plastic containers Domestic waste	Used oil and lubricants Scrap metal Used oil drums Used pesticide containers Used paint tins Packaging Redundant equipment Used parts	Pesticide containers

9.5.5 National Waste Legislation and Regulations

MNWP WEF must comply with all South African waste related legislation, regulations and standards and also all relevant local municipal by-laws. Key legislation currently applicable to waste management is provided in the references section above.

The following waste permit requirements may be relevant to MNWP WEF activities:

Permit or License	Issuing Authority
Waste Storage and Transportation Permit	DFFE
Disposal of hazardous wastes	DFFE
Municipal Waste Disposal Permit	Relevant Local Municipal Authority

9.5.6 Management Principles and Requirements

General Principles

As far as reasonable and practical, waste streams from the MNWP WEF and operations (including contracts) must be managed in accordance with the international waste management hierarchy. This approach advocates that the options for management of wastes should be prioritised as follows:

- Reduce the amount of waste through avoidance or minimisation;
- Recover materials for re-use;
- Recover materials for recycling;
- Treat wastes to render them less hazardous or to enable re-use / recycling; and
- Dispose of wastes in a manner that is aligned with the requirements of relevant legislation and which poses minimal harm to humans and the environment.

General Requirements

MNWP WEF and Contract Managers must:

- Take reasonable measures to ensure that the management of waste produced during operations are compliant with relevant South African and international regulations and obligations;

- Ensure that our procedures and practices governing the management of waste reflect any changes and revisions to South African or international hazardous material management conventions, regulations and requirements;
- Collaborate with local authorities, to the extent considered reasonable, in an effort to manage the risks associated with the storage, transport and disposal of waste generated by our facilities and contracts;
- Avoid or, when avoidance is not possible, minimize and control the release of waste by our facilities and contracts;
- Ensure that as far as practical, non-hazardous and hazardous wastes generated by facilities and contracts is separated at source;
- Ensure that littering on site is prohibited and that all general wastes are placed directly into bins located at strategic points around the facilities.
- Ensure that this WMP as well as all associated procedures, which have been developed by MNWP WEF, are enforced;
- Establish annual waste reduction targets and incorporate details of actions to achieve these targets in the Annual E&S Action Plans for each facility and contract.

Waste Identification and Classification

The identification and classification (hazardous or non-hazardous) of MNWP WEF waste streams is required for effective management of our waste. The MNWP WEF must maintain a comprehensive waste inventory containing the following information for each waste stream:

- Waste name
- Source of waste
- Classification of the waste (non-hazardous / general or hazardous)
- Key E&S risks associated with the waste
- Estimated baseline production rate (unit: kilogram solid waste and m^3 for liquid wastes)

A template for the MNWP WEF Waste Management Inventory is provided at the end of this Chapter.

Hazardous Wastes

A waste, whether liquid or solid, will be considered “hazardous” if it exhibits one or more of the following properties:

- Explosive
- Flammable
- Toxic
- Infectious
- Carcinogenic
- Radioactive
- Corrosive
- Reactive
- Other physical, chemical, or biological characteristics that may pose a potential risk to human health or the environment if improperly managed.

Certain hazardous wastes, such as used oil, can be recycled and should be to the extent practical.

Non-hazardous wastes

Wastes are considered “non-hazardous” if they do not exhibit any of the properties associated with hazardous wastes and pose minimal or no risk to human health or the environment. Non-hazardous wastes typically associated with MNWP WEF’s operations include wood, paper, cardboard, plastic packaging / bottles, metal offcuts and waste food.

Wastes of unknown composition
In cases where the composition of a waste is unknown, it will be classified as "hazardous" and managed accordingly until such time as analytical tests have been used to confirm the composition.

9.5.7 Minimisation, Reuse and Recycling

Waste minimisation
MNWP WEF must ensure that, as far as practical, the quantity and toxicity of waste streams must be minimised. In order to achieve this, the following will be applicable:

- The quantity and toxicity of wastes associated with MNWP WEF activities must be considered explicitly for Branch and other activities;
- MNWP WEF Must set clear and realistic annual targets for waste reduction and these must be documented in the facility specific Waste Management Plan;
- All contractors must be required to prepare a waste management plan for their activities on site and these plans will demonstrate that options for the reduction of the quantity and toxicity of wastes have received due consideration;
- All wastes will be separated to ensure that mixing of hazardous and non-hazardous waste does not occur on site;
- MNWP WEF must make reasonable efforts to ensure that, where practical, empty containers and packaging will be returned to suppliers for disposal. However, the company will need to ensure that the suppliers then dispose of these containers in a manner that does not pose undue risk to human and environmental health;
- When procuring chemicals for use on site, less hazardous alternatives will be favoured.

Reuse and Recycling
MNWP WEF must make reasonable efforts to re-use and recycle wastes generated by their facilities. Although recycling would primarily focus on non-hazardous wastes, viable and safe options for recycling of certain hazardous wastes may also be available. This could include recycling of used oil.

Where external opportunities for recycling are identified, MNWP WEF must ensure that external parties are in possession of the necessary permits to undertake recycling activities and that the recycling activities do present undue risk of harm to human health or the environment. If legitimate and licensed recycling agents are not available locally, wastes will need to be stored safely on site until such time as they can be disposed of appropriately.

It is prohibited to supply local communities with empty chemical containers for domestic use. These containers must be disposed of as described below.

9.5.8 Storage of Waste

Non-hazardous Wastes
In order to ensure that non-hazardous wastes are stored appropriately prior to disposal, the following requirements will be adhered to at all times:

- All bins will be clearly marked or colour-coded to ensure that non-hazardous and hazardous wastes are not mixed accidentally.
- If certain waste types are to be collected separately for recycling, then bins for this purpose should also be clearly marked. Labels will be in English;
- Bins or similar waste receptacles will be located at each work area and will (as far as possible) be fitted with lids.

- All bins should be located in a position to minimise the risk that they may be knocked over or damaged, and should not be located close to drains, storm water gutters, ponds or any natural water courses;
- All bins and skips will be maintained in good condition to ensure that any leachate or liquid waste does not pollute the environment;
- All waste bins and skips will be emptied daily from the different areas of collection. The responsibility for this activity will be assigned by the HSE Representative;
- Storage areas for combustible non-hazardous waste, such as cardboard and paper, must not be stored near sources of heat or open flame;
- Littering on site is prohibited and all general wastes must be placed directly into bins located at strategic points around the facility.
- Open burning of waste at the MNWP WEF is prohibited.

Hazardous wastes

In order to ensure that hazardous wastes are stored appropriately prior to disposal, the following requirements will be adhered to at all times:

- Hazardous wastes will be stored separately from non-hazardous wastes and in a manner that prevents release of hazardous components into the environment;
- All requirements related to the storage of hazardous chemicals will be applicable to the storage of hazardous wastes;
- All liquid hazardous waste will be stored in a secured area before being transported off site for disposal. The storage area will only be accessible by authorised personnel and will be locked at all times;
- All areas for the storage of hazardous wastes will be clearly signed as such;
- All areas used for storage of hazardous liquid wastes will include secondary containment features; and
- Storage of hazardous liquid wastes will be in compliance with the requirements specified on the relevant Material Safety Data Sheet.

9.5.9 Transport of Wastes

- Transport of waste on site will be done in a manner that minimises the likelihood of release of waste to the environment;
- All drivers or contractors required to transport waste will be qualified and trained to respond to spillages;
- All vehicles used for transport of waste will be in good working order;
- Where there is a risk that waste may be blown from the back of a vehicle, measures will be taken to ensure that this does not occur; and
- Where hazardous waste is to be transported off site for disposal, the requirements for transport of hazardous materials (see Hazardous Chemical Substances and Pollution Risk Control Procedures) will be applicable.

9.5.10 Disposal of Wastes

The management of different waste streams is based on their classification and the mode of management and disposal of each waste stream associated with MNWP WEF facility activities.

The disposal routes presented must be reviewed regularly or when a new waste stream is identified, but at least annually, to ensure that all waste streams are included and that the disposal methods are feasible and adequately protect human and environmental health. These waste management plans will also be reviewed if there are any significant operational changes to at a facility.

9.5.11 Waste Management Plan – Inventory Sheet

Waste	Sources	E&S Risks	Baseline Quantity (Date?)	Storage	Re-Use / Recycling	Disposal	Annual reduction target
Non-Hazardous Wastes							
Example. General solid waste	Various sources including site offices, packaging etc.	▪ Visual impact ▪ Surface water contamination ▪ Odour	X tons/month	▪ Separated from hazardous waste at sources and stored in bins around the facility	▪ Aluminium cans – purchased to company	Incinerated on-site weekly	
Hazardous Wastes							

The Contractor's intended methods for waste management and waste minimisation must be implemented at the onset of the contract and approved by the ECO. Where required, Method Statements must be compiled and submitted to the ECO for approval. All personnel must be instructed to dispose of all waste in the proper manner.

No waste from construction or otherwise may be disposed of onsite. All waste generated on site must be removed from the site and disposed of at a licensed waste disposal site. In this regard, adequate litter drums or other suitable containers must be located onsite to ensure that waste generated on-site is disposed of in a suitable and timeous manner. Where possible, some of the construction waste should be recycled and used in construction.

9.5.12 Solid And Liquid Waste

During the construction phase, solid waste must be temporarily stored in a designated area within the site, which has been approved by the ECO, is covered, tip-proof drums for collection and disposal. All refuse containers must be free of any holes and must be in good condition. A refuse control system should be established for the collection and removal of refuse to the satisfaction of the ESO and the ECO. As far as possible, general waste (including paper, glass, plastics, aluminium, etc.) should be sorted for recycling. Disposal of solid waste should be at a licensed landfill site, or at a site approved by the DFFE in the event that an existing operating landfill site is not within a reasonable distance from the site. Waste must not be burned.

Any water contaminated by cement must not be allowed to flow freely into the environment. Instead, it must be contained, and solids allowed to settle out. Thereafter, the solid material should be disposed of at a landfill site with other solid waste.

9.5.13 Litter

During the construction phase, littering by construction workers must be prohibited onsite. The facilities should be maintained in a neat and tidy condition, and the site is to be kept free of litter throughout the construction phase. Fines should be implemented for persons found littering. All reasonable measures should

be taken to reduce the potential for litter and negligent behaviour with regards to the disposal of all refuse. At all places of work, the Contractor must provide litter collection facilities for later safe disposal at a licensed landfill site or at a DFFE approved waste disposal site.

During the operational phase, the area of the development should be cleared of litter on a regular basis. Once collected, this litter must be disposed of at a licensed landfill site or at a DFFE approved waste disposal site.

9.5.14 Hazardous Waste (and as per Chapter 9.6)

During the construction phase, hazardous waste such as bitumen, oils, oily rags, paint tins, etc., must be disposed of at a DFFE approved hazardous waste landfill site. Special care should be taken to avoid the spillage of hazardous waste and from this waste entering the ground or contaminating water. In the event of the above occurring, the affected areas must be promptly reinstated to the satisfaction of the ECO. As far as possible, maintenance of machinery and vehicles onsite should be avoided. Used oil, lubricants, and cleaning materials from the maintenance of vehicles and machinery should be collected in a holding tank and returned to the supplier. Water and oil should be separated in an oil trap. Oils collected in this manner, should be retained in a safe holding tank, and removed from site by a specialist oil recycling company for disposal at an approved waste disposal sites for toxic/hazardous materials. Oil collected by a mobile servicing unit should be stored in the service unit's sludge tank and discharged into the safe holding tank for collection by the specialist oil recycling company. The Contractor must ensure that an emergency preparedness plan is in place for implementation in the case of a spill or substances which can be harmful to an individual or the receiving environment. All used filter materials should be stored in a secure bin for disposal off-site. Hazardous waste must not be stored or stockpiled in any area other than at a site approved by the ECO. Any contaminated soil should be removed and replaced. Soils contaminated by oils and lubricants should be collected and disposed of at a facility designated by the local authority to accept contaminated materials. Washing of vehicles on the construction site should not be permitted as this is likely to result in the release of hydrocarbon-contaminated wash water into the environment.

During the operational phase, hazardous materials onsite (if any) must be disposed of in a DFFE approved hazardous waste landfill site. The Contractor should ensure that the Emergency Response Plan (as provided in Chapter 9.9) is in place for implementation in the case of a spill or substances which can be harmful to an individual or the receiving environment.

9.6 STORAGE AND HANDLING OF HAZARDOUS SUBSTANCES PLAN

All necessary equipment to handle hazardous substances must be available on the MNWP WEF site. Personnel responsible for the handling of hazardous substances must be suitably trained. The Developer's Site Supervisor or the Contractor should submit a Method Statement, detailing the storage and handling of hazardous substances, to the ECO for approval. In addition, the Method Statement should include a list of all potentially hazardous substances within the MNWP WEF site.

9.6.1 Legislation, Policy and Guidelines

The storage and handling of hazardous substance must be in accordance with the relevant legislation, policy and guidelines. This should include, but not be limited to, the following:

- Occupational Health and Safety Act (Act No. 85 of 1993),
- National Environmental Management: Waste Management Act (Act No. 59 of 2008),
- Hazardous Substances Act (Act No. 15 of 1973, as amended), and
- South African National Standards (SANS).

9.6.2 Responsibility

The Developer's Site Supervisor and/or the Contractor must be responsible for overseeing the storage and handling of hazardous substances in accordance with this plan and all relevant legislation. Should the Developer's Site Supervisor and/or the Contractor appoint a designated individual to undertake the tasks on their behalf, the designated individual (the Developer's Site Supervisor or the Contractor) will be responsible for the following:

- Assessing the hazardous properties and disposal requirements of the materials used on the MNWP WEF site.
- Monitoring the use and management of the inventory.
- Advising and assisting the personnel with the correct handling and storage of hazardous substances.
- Updating the chemical register when new chemicals are brought to the site.
- Preparing and maintaining the Material Safety Data Sheets (MSDSs).
- Maintaining a register of the consumption of oil, diesel, etc. and maintaining a spill register.

9.6.3 Registers

The Developer's Site Supervisor or the designated individual will be responsible for compiling and maintaining the chemical register, MSDSs and spill register.

The following should be included in the chemical register:

- Name and description of the substance,
- Supplier name and details,
- Quantity,
- MSDS,
- Validity of the MSDS,
- Storage location and storage requirements,
- Method of disposal, and
- Emergency equipment (firefighting equipment, first aid kits, emergency contact details, etc.).

9.6.4 Management of Hazardous Substances

The mitigation measures stipulated in this MNWP WEF EMPr must be implemented to manage hazardous substances, reduce the risk of accidental spillages and treat accidental spills.

- The transportation and handling of hazardous substances must comply with the provisions of the Hazardous Substances Act (Act No. 187 of 1993) and associated regulations as well as SABS 0228 and SABS 0229.
- The Contractor must also comply with all other applicable regional and local legislation as well as regulations regarding the transport, use and disposal of hazardous substances. Hazardous chemical substances (as defined in the Regulations for Hazardous Chemical Substances) used during construction must be stored in secondary containers. The relevant MSDS should be available onsite.
- Procedures detailed in the MSDSs must be followed in the event of an emergency.
- The Contractor and/or the Developer's Site Supervisor should be responsible for the training and education of all personnel onsite that will be handling hazardous materials about their proper use, handling and disposal.
- If potentially hazardous substances are to be stored or used onsite, the Contractor and/or the Developer's Site Supervisor must submit a Method Statement to the ECO detailing the substances/materials to be used, together with the transport, storage, handling and disposal procedures for the substances.
- Used oil should be stored at a central location onsite prior to removal offsite for disposal at an approved disposal site.
- Old oil filters and oil, petrol and diesel-soaked material must be treated as hazardous waste. The Contractor should remove all oil, petrol, and diesel-soaked sand immediately and should dispose of it as hazardous waste or treat it onsite with material which breaks-down or encapsulates such spillages, as approved by the ECO.
- The storage of fuels and hazardous materials must be located away from sensitive water resources.
- All hazardous substances (e.g., diesel, oil drums, etc.) must be stored in a bunded area.
- The recommendations of the Stormwater Management Plan must be implemented during construction.
- All construction materials including fuels and oil should be stored in demarcated areas which are contained within berms/bunds. Washing and cleaning of equipment should also be done in berms or bunds, in order to trap any cement and prevent excessive soil erosion.
- All necessary approvals with respect to fuel storage and dispensing must be obtained from the appropriate authorities. Symbolic safety signs depicting "No Smoking" and "Danger", conforming to the requirement of SABS 1186, must be prominently displayed in and around the fuel storage area. There must be adequate firefighting equipment at the fuel storage area.
- The Contractor and/or the Developer's Site Supervisor must ensure that all liquid fuels and oils are stored in tanks with lids, which are always kept firmly shut and under lock and key. The capacity of the tank should be clearly displayed, and the product contained within the tank clearly identified using the emergency information system detailed in SABS 0232 Part 1. The capacity of fuel storage tanks should not exceed 9 000 litres and must be kept on site only for as long as fuel is needed for construction activities, on completion of which they must be removed.
- Fuel storage tanks onsite should not be linked or joined via any pipe work but should remain as separate entities. The tanks must be situated on a smooth impermeable base with a bund. The volume inside the bund should be 110% of the total capacity of the largest storage tank. The base may be constructed of concrete, or of plastic sheeting with impermeable joints with a layer of sand over to prevent perishing. The impermeable lining should extend to the crest of the bund. The floor of the bund should be sloped to enable any spilled fuel and/or fuel-contaminated water to be removed. Appropriate material, approved by the ECO that absorbs/breaks-down or encapsulates minor hydrocarbon spillage and which is effective in water, should be installed in the sump.
- The tanks and bunded areas should be covered by a roofed structure, taken offsite to a disposal site approved by the ECO and the material, which absorbs/breaks-down or encapsulates minor hydrocarbon spillages, should be replenished.

- Adequate precautions should be provided to prevent spillage during the filling of any tank and during the dispensing of the contents. The dispensing mechanism for the fuel storage tanks should be stored in a waterproof container when not in use.
- As part of the required site layout for the construction camp, a plan must be submitted to the ECO detailing the design, location and construction of the fuel storage area as well as for the filling and dispensing from storage tanks and for the type of absorbing/breaking-down or encapsulating material to be used.
- Where reasonable and practical, the plant should be refuelled at a designated re-fuelling area/depot or at a workshop as applicable. If this is not reasonable or practical, then the surface under the refuelling area must be protected and appropriately bunded against pollution to the reasonable satisfaction of the ECO prior to any refuelling activities.
- If fuel is dispensed from 200 litre drums, the proper dispensing equipment must be used, and the drum should not be tipped in order to dispense fuel. The Contractor should ensure that the appropriate firefighting equipment is present during refuelling operations.
- The Contractor must ensure that there is always a supply of absorbent material readily available to absorb/breakdown or, where possible, be designed to encapsulate minor hydrocarbon spillages. The quantities of such materials should be able to handle a minimum of 200 ℓ of hydrocarbon liquid spill. Prior to any refuelling or maintenance activities, the ECO must approve this material.
- Used oil should be stored at a central location onsite prior to removal offsite for disposal at an approved disposal site.
- Old oil filters and oil, petrol and diesel-soaked material must be treated as hazardous waste. The Contractor should remove all oil, petrol, and diesel-soaked sand immediately and should dispose of it as hazardous waste or treat it onsite with material which breaks-down or encapsulates such spillages, as approved by the ECO.

9.7 FIRE MANAGEMENT PLAN

9.7.1 Background

The MNWP WEF must comply with the relevant sections of the following legislation, guidelines and policies with regards to fire management:

- National Veld and Forest Fire Act (Act No. 101 of 1998),
- Disaster Management Act (Act No. 57 of 2002, as amended),
- Fire Brigade Services Act (Act No. 99 of 1987, as amended),
- Local Government: Municipal Structures Act (Act No. 117 of 1998),
- Occupational Health and Safety Act (Act No. 85 of 1993),
- Municipal By-Laws, and the relevant
- South African National Standards (SANS).

9.7.2 Recommended Mitigation Measures

The following mitigation measures, as stipulated in this EMPr, should be implemented to reduce the risk of accidental fires and in response to accidental fires on the MNWP WEF site:

- A representative of the MNWP WEF should register as a member of the fire protection association in the area.
- Suitable firebreaks should be established at the MNWP WEF site and all practical measures should be taken to ensure that firebreaks are prepared and maintained in accordance with the specifications in Sections 12 to 14 of the National Veld and Forest Fire Act.
- Appropriate firefighting equipment and protective clothing must always be available on the MNWP WEF site. Personnel should receive basic firefighting training, which includes guidelines for extinguishing fires and the correct method to use firefighting equipment.
- The Contractor must take all the necessary precautions to ensure that fires are not started as a result of site activities.
- No open fires must be permitted on the site.
- Smoking must not be permitted in areas where there is a fire hazard. Such areas include the workshop and fuel storage areas and any areas where vegetation or other material is such as to support the rapid spreading of an initial flame.
- The Contractor should appoint a Fire Officer who will be responsible for ensuring immediate and appropriate actions in the event of a fire and will ensure that employees are aware of the procedures to be followed. The Contractor must forward the name and contact details of the Fire Officer to the ECO for approval within seven (7) days of being on site.
- The Contractor must ensure that basic firefighting equipment is always available onsite. This should include at least rubber beaters and at least one (1) fire extinguisher of the appropriate type when welding or other “hot” activities are undertaken.
- The Contractor will be liable for any expenses incurred by any organisations called to assist with fighting fires which resulted due to their activities or the activities of their personnel, and for any cost relating to the rehabilitation of burnt areas, or consequential damages.
- Emergency procedures, including the names and contact details of responsible personnel and emergency services must be made available to all staff and should be clearly displayed at relevant locations at the site. The Contractor should advise the ECO of any emergencies onsite, together with a record of action taken, within 24 hours of the emergency occurring.
- The Contractor must submit a Method Statement which covers the procedures for emergencies, such as fire and accidental leaks and spillages.
- The Contractor should advise the relevant authority of a fire as soon as one (1) starts. It is crucial that this is done before the fire is out of control.

- The Contractor must ensure that all employees are aware of the procedures to be followed in the event of a fire.

In preparation for temporary site closure, the following should apply:

- The Contractor must ensure that fire extinguishers are serviced and accessible.
- Emergency and contact numbers are available and displayed.
- There is adequate ventilation in enclosed spaces.
- Ensure that the site safety checks have been carried out in accordance with the Occupational Health and Safety Act (Act No. 85 of 1993) prior to site closure.
- Fire hazards have been identified and the local authority notified of any potential threats e.g., large brush stockpiles, fuels etc.

9.7.3 Emergency Contact Signage

Emergency contact details should be displayed at visible locations at the MNWP WEF site, these should include:

EMERGENCY SERVICE	CONTACT DETAILS
Local Municipality	
District Municipal Disaster Management Centre	
Fire Protection Associations	
Ambulance Services	
South African Police Services	
Public Emergency Centre	

9.8 TRAFFIC AND TRANSPORTATION MANAGEMENT PLAN

9.8.1 General Traffic Standards

The following general traffic standards must be adhered to during the phases of the MNWP WEF development:

- All drivers of vehicles which enter the site must comply with the site rules and regulations.
- Rotational lights must be operational and mounted on the most visible point of the vehicle.
- All traffic signage and/or flagmen instructions must be adhered to.
- All road traffic should keep to designated, approved, access routes and should not cause unnecessary damage to vegetation or features within the site.
- Only authorised vehicles should be permitted on the haulage roads.
- Construction vehicles and/or plant must not drive through any watercourses or wetlands.

9.8.2 Purpose of the Traffic and Transportation Management Plan

A Traffic Management Plan (TMP) provides a means to safely and efficiently guide road users through road works and to ensure the network performance is not negatively affected by the road works.

Traffic management is the management of occupational safety and network performance risks associated with work activities undertaken in a traffic environment.

The TMP is therefore a risk management plan consisting of:

i. documentation of the risk assessment for the project,
ii. the procedures that will be utilised to manage the risk exposure, and
iii. traffic control procedure that will be used to outlining signage etc. which are commonly used.

A site inspection was undertaken in preparation of the TMP. During the site inspection specific site conditions were identified such as, non-motorised transport facilities, speed limits, operating speeds, accesses, sight distance, etc.

Transportation management addresses the traffic-related impacts of a project in a cost-effective manner with minimal interference to the travelling public. Measures that can be implemented include public and traveller information, transportation and incident management, construction approaches, alternate routing, etc.

9.8.3 Objectives of the Traffic and Transportation Management Plan

The main objectives of the TTMP are to ensure that the safety and health of the work personnel and road users are not unnecessary inconvenienced. Further objectives include:

i. project site overview and key project activities that may influence traffic patterns,
ii. a framework plan of the traffic and transportation management elements involved with
iii. undertaking the construction and operation of the proposed project,
iv. a structure within which the Developer can further develop more detailed traffic and
v. transportation plans as a result of a detailed traffic impact study, and
vi. key management and mitigation measures that are to be adopted by the Developer, with final approval being obtained from relevant authorities.

9.8.4 Roles and Responsibilities

This section outlines the responsibilities of the personnel to ensure the safety of workers and the road users that pass through the site. Possible management OSH hazards that will include the following:

i. Personal protective equipment (PPE) – High visibility clothing, appropriate footwear, sun protection, eye and respiratory equipment to be available.
ii. Plant and equipment – all equipment must have suitable flashing lights and reversing alarms.

iii. Incident/accident procedures – outlining first aid facilities, arrangements for obtaining medical assistance and the requirements for reporting incidents/accidents.
iv. Works personnel access – outlining details of where works personnel shall park their vehicles and how safe access is to be provided to and from the worksite.
v. Protection of non-motorised road users from hazards associated with the road works, prescribing the measures to be undertaken to address these hazards.

The roles of the key personnel regarding the TTMP are as follows:

i. Project Manager
The Project Manager will take overall responsibility of the TTMP and compliance with regards to the Road Traffic Act. The Project Manager will be responsible for the coordination of the engineering, procurement and construction activities, relevant policies, methods and the implementation of the TTMP. The Project Manager will ensure that all rules and procedures defined in the TTMP are adhered to. Encourage sound work practices and avoid those that are off a high-risk nature. Ensure all employees comply with the TTMP.
ii. Site Supervisors
The Supervisors will continuously liaise with the Developer and the Health, Safety, Environment and Quality (HSEQ) department during the execution phase and ensure required tools and test equipment are in place and are safe to use.
iii. HSE Officer
The Health, Safety and Environment (HSE) Officer will be responsible for all issues related to health, safety and environment and to see that employees conform to the requirements as laid down by the South African Occupational Health and Safety and Environmental Acts, and/or those acts applicable to South Africa.
iv. HSE Manager
The role of the HSE Manager is to lead all aspects of the HSE on the project and provide HSE leadership.
v. Traffic Personnel
The role of traffic personnel on site involves directing vehicular and pedestrian traffic around a construction zone, accident or other road disruption, thus ensuring the safety of emergency response teams, construction workers and the general public. The Traffic Safety Officer will manage the traffic on construction sites in line with SANRAL and Department of Transport specifications.

9.8.5 Statutory Requirements

Traffic management is risk management and the principals, employers and persons in control of workplaces have a statutory duty under the Occupational Health and Safety Act, and Mine Health and Safety Act; to identify hazards, assess risks and consider means to control risk exposure. Due to the size and quantity of components, trucks will be used to deliver components. It is anticipated that trucks carrying large enough loads to be considered abnormal loads in terms of the Road Traffic Act (Act No 29 of 1989) will be required. A permit for a vehicle carrying an abnormal load must be obtained from the relevant Provincial Authority and/or National Authority (SANRAL).

Legal and other provisions

The current versions of the following documents and legislative provisions apply for those planning to conduct work within the road reserve of any public road, or to manage traffic for an event:

- National Road Traffic Act (Act No. 93 of 1996),
- Local Government Act,
- Occupational Health and Safety Act (Act 85 of 1993),
- Mine Health and Safety (Act No. 29 of 1996),
- Compensation for Occupational Diseases Act (Act No. 130 of 1993), and
- NEMA (Act No. 107 of 1998).

9.8.6 General Traffic and Transportation

SARTSM, Chapter 13 and Volume 2

It is not possible to predict how all construction sites shall be managed because there are too many variables. It is however considered very important to plan, and work, in a systematic manner and in standardised steps.

All road works need to comply with the SARTSM, Chapter 13 and Volume 2.

Factors such as speed limits will be conveyed to all workforce and signs will be posted where needed. These will be enforced by the traffic control official/s. Temporary traffic control zone signs are to be adequate in order to convey both general and specific messages to the road users.

Adequate signage will be placed on the roads, such as: speed limits, caution: electrical road works in progress, use of alternative roads, stop/go signs, flagman ahead, etc.

Transporting of staff

Company transport will be in the form of appropriate transportation vehicle/s. No persons will be transported in the back of a bakkie.

Site access control

Access control will be managed at the gate to ensure that no authorized person enters the site unless a valid access card is presented at the gate to the security guards. Control at pick-up locations prior to entering the transportation vehicle/s, will also ensure that no unauthorized person enters the site. All persons must be inducted before entering the gate and proof of induction must be kept for inspection purposes. Upon entering the site all persons will also undergo alcohol testing.

All vehicles entering the site must have a beacon light and a whip and flag to ensure that these vehicles are visible. Necessary signage will be placed where needed and only vehicles designated as construction vehicles will be allowed to travel on the main roads. No private vehicles will be allowed to travel on the main roads. Those travelling with private vehicles will be escorted to the site with their vehicles and from there they will be escorted in designated construction vehicles.

Parking areas

Designated parking areas will be identified on site where vehicles will park during the day. A designated walkway will also be created which will be barricaded, whereby workers can walk to access their work areas.

Rules for vehicle safety:

- Personnel must be trained, declared competent and authorised to operate a specified vehicle.
- The vehicle must be in a safe and good working condition, with daily inspections conducted.
- Drivers/operators must at all times consider and adapt to environment conditions.
- Drivers/operators must at all times comply with all relevant traffic rules and regulations.
- Seatbelts shall be worn when driving and/or operating vehicles or plant fitted with seatbelts.
- No talking on cell phones while driving will be permitted, and alcohol or drugs are prohibited.
- Adhere to all site traffic rules and signage, including speed limits.

9.8.7 Abnormal Loads Transported on National Roads

The National Road Traffic Act (Act No. 93 of 1996) (NRTA) and the National Road Traffic Regulations, 2000 (NRTR), prescribe certain limitations on vehicle dimensions and axle and vehicle masses that a vehicle using a public road must comply with. However, certain vehicles and loads cannot be moved on public roads without exceeding the limitations in terms of the dimensions and/or mass as prescribed in the NRTR. Where such a vehicle or load cannot be dismantled, without disproportionate effort, expense or risk of damage, into units that can travel or be transported legally, it is classified as an abnormal load. Provision for such abnormal vehicles and loads is made in the NRTA, and specifically in Section 811 of the NRTA, which reads as follows:

‘‘Vehicle and load may be exempted from provisions of Act 81.

(1) The Minister may, after the applicant has paid the fees or charges referred to in Section 7(3) and subject to such conditions as he or she may determine, authorise in writing, either generally or specifically, the operation on a public road of a vehicle which, due to such vehicle’s original design cannot comply with this Act.

(2) The MEC may, after the applicant has paid the fees or charges referred to in Section 7(3) and subject to such conditions as he or she may determine, authorise in writing, either generally or specifically, the conveyance in a safe manner on a public road of passengers or any load otherwise than in accordance with this Act.

(3) An MEC shall determine the fees or charges payable for a vehicle or load that does not comply with this Act.’’ When the movement of an abnormal load is considered to be in the economic and/or social interest of the country, an exemption permit may be issued to allow a vehicle(s) transporting such an abnormal load to operate on a public road for a limited period.”

The Administrative Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads, issued by the COTO, 2015, deals with the administrative procedures relating to the registration of abnormal vehicles and the application to or issuing of exemption permits.

The fundamental principles guiding this process are:

- An exemption permit for an abnormal load will only be considered for an indivisible load, abnormal in dimension and/or mass, where there is no possibility of transporting the load in a legal manner.
- The damage to the road infrastructure by an abnormal vehicle has to be recovered from the carrier.
- The risks to other road users must be reduced to a level equivalent to what it would be without the presence of the abnormal vehicle on the road.
- The conditions imposed must take the economic and/or social interest of the country and public at large into account.
- The purpose of the exemption permit system is not to undermine or circumvent the NRTA and the NRTR.
- The issuing authority can deviate from the guidelines and/or impose additional requirements when taking the circumstances applicable to each application into account.

As abnormal loads have to be transported by road to the site, a permit will need to be obtained from the KwaZulu-Natal Department of Transport.

In addition, SANRAL require a route clearance report to be undertaken. The requirements of the route clearance report include the following:

- Delay to road users.
- Road closures.
- Road construction works.
- Wide loads.
- Monitoring and records.

It should be noted that SANRAL reserves the right to oppose any issued abnormal load permit in the event of any un-envisioned delay or disruption to public road users on National roads, or in the event that the carrier does not consistently meet the requirements as defined by SANRAL.

A detailed programme will be issued in advance as to when the abnormal vehicles will be used.

The local municipality will be notified prior to the transporting of abnormal loads which might have a negative impact on the public road users. Traffic planners/personnel will ensure that the lane width, turning movements and vertical alignments of temporary arrangements are suitable for these vehicles. All personnel

will be advised to stay clear of any trucks with abnormal loads. Heavy oversized vehicles with abnormal loads will be escorted into site. All heavy oversized vehicles or heavy mobile equipment are to have the right of way.

9.8.8 Emergency Planning

Contact details of emergency services will be conveyed to all necessary personnel, thus ensuring that in the event of an incident occurring, the necessary service/s are informed immediately. Provision will be made to ensure that in the event of an incident occurring, access to the site will be available and accessible to emergency services to travel through the site where the incident occurred.

The following list provides a few contact numbers for emergency services in the vicinity of the site:

- Police – 10111
- Ambulance – 10 177/ Net care 082 911
- Fire Brigade – 046 622 2932
- Disaster Management – 046 603 6048
- Settlers Hospital – 046 622 2215
- Fort England Hospital – 046 602 2300
- Med-Life Ambulance Service – 046 622 7976
- Netcare 911 Air Ambulance – 082 911

9.9 EMERGENCY RESPONSE PLAN

This Emergency Response Plan should be implemented by the Contractor with guidance from the Health, Safety and Environment (HSE) Representative(s) during the Construction, Operational and Decommissioning Phases of the infrastructure development to reduce the likelihood of emergency incidents and to ensure that there will be appropriate responses to unexpected or accidental adverse incidents.

9.9.1 Emergency Incidence Avoidance

- Induction Training, which includes a suitable Environmental Education Course and the location of emergency evacuation assembly points, must be given to all employees involved in the Construction, Operational and Decommissioning Phases.
- All impact management actions specified in the EMPrs and the EAs must be implemented throughout the phases of development.
- If faunal species are encountered within the site subsequent to the faunal search and rescue procedure, which must be undertaken directly prior to vegetation clearance, these species must only be handled and relocated by a suitably experienced individual.
- A suitably experienced snake wrangler, with the ability to accurately identify snakes, must be present onsite during construction and decommissioning activities.
- A list of snakes which are likely to occur within the site must form part of the Environmental Education Course. In addition, it is recommended that the African Snakebite Institute app is downloaded by the ECO and the HSE Representative.
- Spill kits must be readily available onsite. These spill kits should include absorbent pads, bags, etc. and each refuelling vehicle must have a spill kit.
- A general first aid kit should be kept on-site and managed by a suitably experienced individual, who has received suitable first aid training.
- All vehicles and plants operated onsite must be serviced regularly.
- Tyre puncture repair kits should be kept onsite and used by a suitably experienced individual.
- Firefighting equipment must be readily available onsite. This should include rubber beaters and at least one (1) fire extinguisher of a suitable size. The fire extinguisher(s) must be serviced as per the manufacturer's recommendations.
- Fire breaks should be established and maintained where necessary.
- Smoking must only occur in designated areas, as approved by the appointed ECO.
- Open fires must not be permitted unless approval is received from the appointed ECO and the HSE representative.
- Emergency contact details should be clearly displayed on-site. These should include, but not be limited to, contact details for the nearest:
    - Fire Services/Fire Protection Agency (FPA);
    - South African Police Services;
    - Ambulance; and
    - National Crisis Line.
- Fuels, oils, and other hazardous materials must be kept in a bunded area under lock and key.
- A suitable number of drip trays must be readily available on-site, and the use of these drip trays must be monitored by the appointed ECO.
- All hazardous chemicals that will be used onsite must have Material Safety Data Sheets (MSDS).
- All hazardous substances must be stored in suitable containers as defined in the Method Statement.
- Hazardous materials must only be handled by trained personnel. The handling of hazardous materials must only be in accordance with the MSDS.
- Employees handling hazardous substances and materials must be aware of the potential impacts and follow appropriate safety measures. Appropriate personal protective equipment must be made available.
- Containers must be clearly marked to indicate contents, quantities, and safety requirements.

- Vehicle speed limits must be indicated on-site and limited to 40 km/hr on gravel roads.
- Employees must not be housed onsite.
- Any incidence of social unrest must be reported to the South African Police Services.
- Any incidence of theft must be reported to the South African Police Services.
- Any incidence of poaching must be reported to the South African Police Services.
- Weather forecasts should be observed, at least on a weekly basis, to plan for any potentially risky weather events.
- Additional safety measures must be implemented during periods of heavy rainfall, high wind speeds, snowfall, etc. During such periods, the recommended speed limit of 40 km/hr should be reduced to 30 km/hr.

9.9.2 Emergency Responses

Hazardous Substance Spills

In the event that an accidental spill of fuel, oil or other hazardous substances occurs, these actions must be taken immediately to isolate, control and manage the spill:

- Appropriate actions, in accordance with the approved (prior to construction) Method Statement(s), must be taken to isolate and contain the spill.
- The spill must be contained using spill kits; by applying suitable absorbent material to the spill and removing the contaminated soil (ground spills), or by using booms (watercourse spills).
- All spills must be treated with a matter of urgency.
- Used spill kit material and contaminated soil must be temporarily stored in a designated area on-site prior to disposal at a registered hazardous waste disposal site by a suitable service provider.
- The ECO and the HSE Representative must be informed of the incident as soon as possible, and an incident report must be completed which includes photographs of the spill, the measures taken to contain the spill and remediate the location of the spill as well as the success of the measures taken.

Fires

In the event of a fire, these actions must be taken immediately to control and extinguish the fire:

- Contact the Fire Services as soon as possible.
- Make use of the rubber beaters and fire extinguisher, the minimum firefighting equipment which should be available on-site, to control the fire until the Fire Services arrive.
- Should any employees have minor burns resulting from the fire, these burns should be treated with a burn dressing from the available first aid kit followed by an appointment with a suitably qualified healthcare professional.
- Should any employees have major burns resulting from the fire, an ambulance must be called immediately, and the burns must be treated by a suitably qualified healthcare professional.
- The ECO and the HSE Representative must be informed of the incident as soon as possible, and an incident report must be completed which includes photographs, the measures taken to contain the fire and remediate the affected area.

Emergency Evacuation

An Emergency Evacuation Method Statement must be compiled for approval from the appointed ECO and the HSE Representative prior to the commencement of the construction phase. Should emergency evacuation of the site be required, the following should be done as a matter of urgency:

- All employees must gather at the predetermined emergency evacuation assembly points and await the Contractor's instructions as per the approved Emergency Evacuation Method Statement.

Severe Weather Conditions

A Method Statement must be compiled for approval from the appointed ECO and the HSE Representative prior to the commencement of the construction phase for the protocols relating to severe weather

conditions. Should severe weather conditions be forecast, which could increase the risk of employees travelling to site or undertaking the necessary activities on-site, temporary site closure should be considered, and all necessary site closure measures must be put in place.

Snake Bites

In the event of a snake bite, these actions must be taken immediately:

- An ambulance must be contacted immediately.
- All efforts must be taken to obtain a description of the snake or a photograph in order to correctly identify the snake for treatment purposes.
- The snake must be captured by a suitably qualified snake wrangler and safely relocated away from the site.
- The ECO and the HSE Representative must be informed of the incident as soon as possible, and an incident report must be completed which includes the identification of the snake, the location where the incident occurred, the location in which the snake was relocated to, and the measures are taken to ensure the safety of the snake bite victim.

Injury, Illness or Death Onsite

Should an employee obtain a minor injury or illness onsite, a suitably trained individual should provide treatment from the first aid kit, followed by an appointment with a suitably qualified healthcare professional (if deemed necessary) and allowed to rest until fully recovered (if necessary).

Should an employee obtain a major injury or show signs of severe illness onsite, an ambulance must be contacted immediately so that the employee can be treated by a doctor.

Should an employee die onsite, an ambulance, as well as the South African Police Services, must be contacted immediately. Those present at the time of the death should engage with the South African Police Services and they should receive the necessary counselling and support.

The ECO and the HSE Representative must be informed of all injuries, illnesses and/or deaths which occur onsite. An incident report must be completed for every incident as well as the steps taken to ensure the safety of the employees.

9.9.3 Compliance

The ECO and HSE Representative must monitor and keep records of all emergency incidents onsite. These incidents must be included in the Audits Reports during the relevant phases of the development and the Contractor and Developer must be made aware of all incidents. In addition, the landowners must be notified of all incidents which occur within their properties.

9.10 CHANGE FINDS PROCEDURE

An archaeological or heritage asset Chance Find Procedure (CFP) for MNWP WEF is a tool for the protection of previously unidentified cultural heritage resources that may be uncovered or encountered particularly during MNWP site preparation and excavations during the construction phase of the project.

The purpose of this CFP is to ensure the protection of previously unrecorded heritage resources during any MNWP WEF activities involving excavations and intends to provide contractors with appropriate response in accordance with the South African National Heritage Resources Act No.25 of 1999 (NHRA).

Thus, this CFP covers the actions to be taken from the discovering of a heritage site or item to its investigation and assessment by a professional heritage specialist or archaeologist or other appropriately qualified person to its rescue or salvage.

9.10.1 Objectives

The objectives of the current procedure are to:

- Raise awareness among all MNWP WEF staff and contractors involved in site preparation and excavations particularly during project construction, regarding the potential for accidental discovery of cultural heritage resources; and
- Provide a procedure for the management and protection of these heritage resources.

9.10.2 References

- South African National Heritage Resources Act No.25 of 1999 (NHRA).

9.10.3 Definitions

- Chance Finds - Chance finds are defined as potential cultural heritage (or paleontological) objects, features, or sites that are identified outside of or after Heritage Impact studies, normally as a result of construction monitoring.
- Heritage resource – NHRA defines a heritage resource as:
    - Objects recovered from the soil or waters of South Africa including archaeological and palaeontological objects, meteorites and rare geological specimens
    - Visual art objects
    - Military objects
    - Numismatic objects
    - Objects of cultural and historical significance
    - Objects to which oral traditions are attached and which are associated with living heritage
    - Objects of scientific or technological interest
    - Any other prescribed category

9.10.4 Procedure

For the CFP to be effective, the MNWP WEF site manager or supervisor during construction, must ensure that all personnel on the site in question, understand the CFP and the importance of adhering to it if cultural heritage resources are encountered. In addition, training or induction on cultural heritage resources that might potentially be found on site should be provided. The CFP details the necessary steps to be taken if any culturally significant artefacts are found during construction.

The following procedure is to be executed in the event that heritage or archaeological materials or human graves discovered during site preparation and excavation.

- All clearance/excavation in the vicinity of the accidental find/feature/site must cease immediately to avoid further damage to the find site.

- Briefly note the type of archaeological materials that have been encountered, including location and the depth below surface of the find.
- Report the discovery to the site supervisor.
- The site supervisor must notify the HSE Representative who must in turn immediately report the find to a MNWP WEF appointed heritage specialist or archaeologist who must promptly notify South African Heritage Resources Agency or the Free State Provincial Heritage Agency.
- If the site supervisor is unavailable, the find must be reported to the HSE Representative who will provide further instructions.
- Delineate the discovered find/ feature/ site and provide 25m buffer zone from all sides of the find.
- Record the find GPS location, if able to.
- Stabilise all remains that are in situ.
- Secure the area to prevent any damage or loss of removable objects.
- Photograph the exposed materials, preferably with a scale (e.g. coin).
- The MNWP WEF appointed archaeologist will undertake the inspection process in accordance with all site preparation and excavation health and safety protocols under direction of the site supervisor.

9.11 AVIFAUNAL MONITORING AND MANAGEMENT PLAN

9.11.1 Avifaunal Abundance and Flight Activity Monitoring

As a minimum, survey protocols used in the pre-application monitoring should be repeated during the first three years of operation (repeated in year 5 and every five years thereafter) and should be combined with monitoring of fatalities. Requirements of the latest available guidelines should be included wherever necessary. The need for further monitoring of bird abundance and movements should be reviewed at the end this of period to determine if it is necessary to continue with some, or all, components of the monitoring.

Any observed changes in bird numbers and movements at a WEF could be linked to changes in the available habitat (e.g., agricultural expansion, mining, alien vegetation clearing as well as changes in weather conditions, rainfall, etc.). The avifaunal habitats available on both the development and reference sites should therefore be mapped at least once a year (at the same time every year).

9.11.2 Fatality Monitoring

In addition to avifaunal abundance, flight activity monitoring and habitat mapping, the post-construction monitoring programme must include fatality monitoring that incorporates carcass searches as well as scavenger removal (carcass persistence) and searcher efficiency trials. This is also to be conducted for the first three years of operations, the fifth year of operations and every five years of operations thereafter (at a minimum).

The aims of fatality estimates are to:

- Estimate the number and rate of fatalities at a WEF;
- Describe the species composition of fatalities (as well as the age and sex where possible);
- Record and document the circumstances and site characteristics associated with avian fatalities at turbines and ancillary infrastructure of the WEF (this could aid in understanding the cause of fatalities, and hence possible mitigation measures); and
- Mitigate impacts by informing final operational planning and ongoing management.

There are normally three separate components to estimating fatalities:

- Regular searches for collision casualties;
- Experimental assessment of search efficiency and scavenging rates of bird carcasses on the site; and
- Estimating fatality rates based on these data.

9.11.3 Carcass Searching

The search schedule will ultimately be dependent on the number of WTGs developed and their location. No fewer than 30% of the total number of WTGs constructed should be surveyed using intensive sampling methods. WTGs should be selected randomly, or through stratified random sampling where habitat variation is pronounced. The same turbines are searched at regular intervals and once the subset of turbines has been selected, these should be fixed for the rest of the monitoring period, unless there is good reason to change this.

As a minimum, the radius of the search area should be equal to 75% of the turbine height (ground to vertical blade-tip). The size of the search area should remain the same throughout the study. The area around each turbine should be searched using transects located no more than 10 m apart; this width should be reduced where thick groundcover hampers visibility. Transects should be walked slowly, and the target area searched carefully and methodically for any sign of a bird-collision incident (carcasses, dismembered body parts, scattered feathers, injured birds).

It may be acceptable to search only a subset of the search area if the habitat is such that surveying the entire area is not possible, although such circumstances should be carefully documented. All guyed masts and

sample sections of any new lengths of power line associated with the development should also be surveyed for collision and/or electrocution victims and included in the search schedule.

The search interval must be adjusted to ensure that WTG search intervals are shorter than scavenger removal rates.

All physical evidence associated with located carcasses should be photographed, referenced (including accurately geo-referenced using a GPS), checked for age and sex (where possible). Carcasses should be collected, bagged and carefully labelled (label inside and outside the bag(s) – if double-bagged, put one label inside the outer bag), and refrigerated or frozen to await further examination.

If an injured bird is recovered, it should be contained in a suitably sized cardboard box. The local conservation authority should be notified that the bird will be transported to the nearest veterinary clinic or wild-animal/bird rehabilitation centre. In such cases, the immediate area of the recovery should be searched for evidence of impact with the turbine blades, and any such evidence should be fully documented (as above).

Maintenance staff should be required to report bird mortalities through a formalised reporting system throughout the lifespan of the facility. This should be additional to post-construction monitoring and does not replace formal carcass searches. All information should be recorded as far as possible.

Where there are incidental carcass finds at turbines that are being formally monitored, the carcass should be left in place where they may be detected during formal searches.

Details of carcasses found incidentally must be included in post-construction monitoring reports. Where bird carcasses are found in years where there is no formal monitoring, carcasses should be labelled, bagged and frozen. Fatalities should be reported annually to BLSA, EWT, the Department of Environmental Affairs, South African National Biodiversity Institute (SANBI) and any relevant species specialists (more often if significant incidents occur).

An avifaunal specialist is to be notified of any significant (e.g., avifaunal SCCs) carcasses located as soon as possible to consider the most appropriate course of action.

9.11.4 Searcher Efficiency and Scavenger Trials

Scavenger removal trials must occur prior to the spinning of any WTG to determine the appropriate, initial search interval.

Fresh carcasses of birds of similar size and colour to a variety of the priority species should be placed randomly at sites around the search area and the location of each carcass recorded. As far as possible, carcasses used in trials should mimic the species characteristics and state of carcasses from WTG collisions. Care should be taken to avoid tainting carcasses with human scent and the total number of carcasses set out should not be fewer than 20, but not so plentiful as to saturate the food-supply for the local scavengers. These sites should be checked daily for the first week to record any changes in the presence, location and condition of each carcass. After the first week, the search interval can be increased and searches should continue for up to a month.

Scavenge and decomposition rates should therefore be measured at least twice over a monitoring year, once in winter and once in summer. Scavenger removal rates may also differ according to ground-cover and proximity to modified habitats and agricultural activity (e.g., from farm cats) and scavenger removal rate trials must be stratified to account for this.

To estimate the probability of an observer detecting a carcass, a sample of suitable bird carcasses should be obtained and distributed randomly around the search area. The number and location of the paced carcasses

should be recorded, and these carcasses should be of similar size and colour to the priority species. The proportion of the carcasses located in surveys will indicate the relative efficiency of the survey method. These trials should be done under the supervision of the avifaunal specialist during the scheduled carcass searches, without the knowledge of the field teams. Separate trials should be conducted for each individual searcher or search team. The location of all carcasses not detected by the survey team should be checked subsequently to discriminate between error due to search efficiency (those carcasses still in place which were missed) and scavenge rate (those immediately removed from the area).

Observed mortality rates need to be adjusted to account for searcher efficiency, scavenger removal and the probability that some carcasses may be outside the search area. It is recommended that the GenEst model is used when estimating fatality rates.

The need for further monitoring of fatalities should also be reviewed after the first two years, and then again on an annual basis. Carcass searches must always be repeated in the fifth year of operation, and again every five years thereafter.

9.11.5

Avifaunal monitoring should also include continuous breeding monitoring for threatened and/or priority species on site prior to construction, as well as during construction and operation in order to inform when construction and other activities should be halted in certain areas due to the effect of disturbance on breeding birds. Once a nest or active breeding has been located, the region should be undisturbed until the chick(s) have successfully fledged and is no longer in the vicinity of the nest.

9.11.6 Reporting

Quarterly monitoring reports should be completed for each site, presenting the results of the previous three months monitoring. Quarterly reports must include the details of carcasses found, including the species, date found, carcass condition (e.g., fresh, decomposed, feathers only), age class and sex (if possible), nearest turbine number, GPS location and proximity to relevant impact receptors (e.g., nests).

A post-construction monitoring report analysing the results of monitoring should be completed at the end of each year of monitoring. These reports must be submitted to the competent authority and relevant stakeholders. This includes any quarterly progress reports. These reports must be submitted to the relevant stakeholders, including BirdLife SA, EWT, within three months of the report being submitted to the operator.

Post-construction monitoring reports must also be made available to environmental assessment practitioners, specialists and scientists for the purposes of environmental audits, environmental impacts assessments, cumulative impact assessments and scientific research.

The annual report is to investigate the following:

- Has the habitat available to birds in and around the facility changed?
- Has the abundance of birds and/or species composition changed?
- Have the distributions and/or movements of priority species changed?
- Where the answer is yes to any of the above four questions, what is the nature of the observed changes? (Compare these changes before (during) and after construction).
- What is the nature, and likely drivers, of any changes observed?
- What is the likely demographic and ecological significance of any observed changes in bird populations at the site (including consideration of the magnitude and direction of change) at both the local and broader population scale?
- What are the collision rates and the total number of bird fatalities at the facility? (Collision rates should be reported per MW (nameplate capacity) and per turbine for different size classes of birds. Data should be reported in both raw and corrected formats, and the GPS locations of carcasses must be included).

- What is the species and, as far as possible, age and sex composition of fatalities?
- What proportion of fatalities is likely to be due to collisions with wind turbines?
- Are there any factors (e.g., site characteristics and proximity to wind turbines) that may contribute to these fatalities?
- Is additional monitoring and/or mitigation necessary and if so, what needs to be done?

The outcomes of the post-construction monitoring, including data and specialist's reports, must be uploaded onto the national bird monitoring database, to be accessed at https://www.environment.gov.za/birddatabase, once operational. If this database is not available, operational reports must be submitted timeously to EWT, BLSA and the DFFE no later than 6 months after the completion of the site work.

9.12 BAT MONITORING AND MANAGEMENT PLAN

The implementation of an operational phase bat monitoring program to document the effect of the operation of the wind energy facility on bats will be required. To achieve this, the operational fatality monitoring was designed to answer the following questions:

- What are the bat fatality rates for the facility?
- What are the fatality rates for species of concern (e.g. species with high conservation status, rare species and species at high risk of fatality)?
- Do bat fatalities vary within a facility in relation to site characteristics?
- How do the fatality rates compare with those from facilities in similar landscapes with similar species composition?
- What is the composition of fatalities with respect to migrating and resident bat species?
- What is the relationship between bat activity and bat fatality?
- What is the relationship between bat fatality and environmental variables (e.g. wind speed)?
- What is the relationship between bat fatality and season?
- Do fatality rates suggest the need for measures to reduce impacts?
- Which mitigation methods are the most effective?

The methodology for Year 1 post-construction bat monitoring was designed in accordance with South African best practise (Aronson et al. 2020). This entailed a repeat of the pre-construction baseline acoustic surveys, and the commencement of bat fatality monitoring.

9.12.1 Bat Acoustic Monitoring

The Applicant must install a passive long-term bat monitoring device (e.g. Song Meter SM4BAT FS Ultrasonic Recorder) at 50 m on the meteorological mast on site to collect bat acoustic activity data. The aim is to collect additional data to build on the baseline collected during the pre-construction phase.

The rationale for replicating the pre-construction phase is because long term spatio-temporal bat activity patterns are poorly understood and monitoring from specific locations over long time scales improves this understanding. This could be used to better understand the impact of the WEF on bats if any changes in bat activity because of the construction and operation of the WEF can be isolated from:

a) natural, background inter-annual variation in bat activity due to natural processes (e.g., climatic or environmentally driven).
b) changes in activity resulting from unknown reasons or other anthropogenic impacts to bats.

9.12.2 Bat Fatality Monitoring Program

The Bat Fatality Monitoring Program (FMP) should consist of three main components:

1) carcass search surveys
2) bias correction
3) fatality estimation

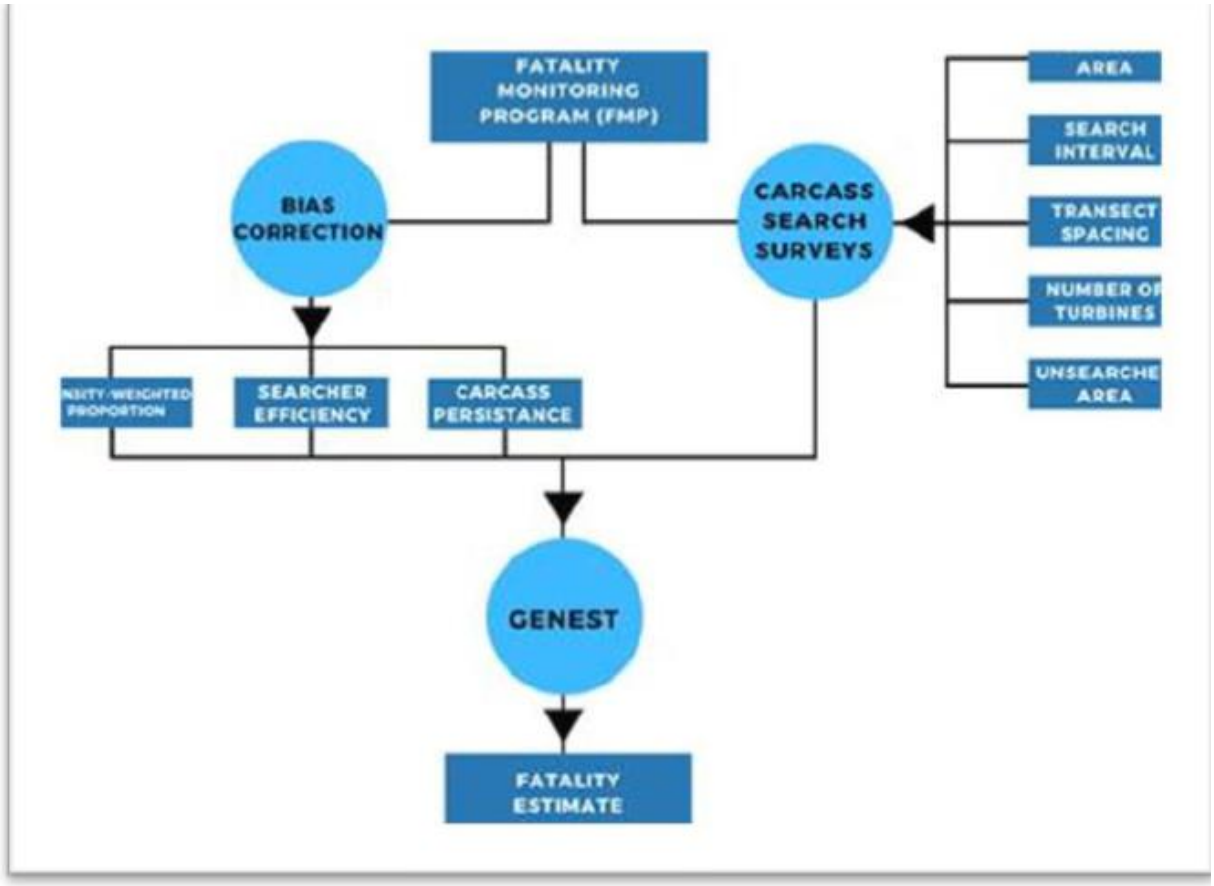


Figure 2.1: Simplified framework of the Fatality Monitoring Program (FMP).

9.12.3 Carcass Searches

The carcass search team (2 people) must conduct searches at all turbines sites twice weekly to look for dead and/or injured bats. Search areas should be demarcated using a square plot that is 206 m east-west by 206 m north-south (103 m radius from the turbine mast in any direction) centred on each turbine. Transects should be set 6 m apart within each search plot and searched 3 m on each side of the transect line. Within the search plots, two visibility classes may be used, namely High (e.g., turbine hardstands and access roads) and Moderate.

9.12.4 Bias Correction

Habitat Mapping

The applicant must map visibility classes within each turbine search plot using GIS and various spatial data such as aerial imagery to assist with the implementation of the bias correction experiments and fatality estimation.

Visibility classes are defined by how much ground cover, (e.g., vegetation or rocks), could conceal carcasses or decoys. Two visibility classes were used based on Aronson et al. (2020):

- High: Bare ground 90 % or greater, all ground cover sparse and 15 cm or less in height, no obstructions to see carcasses or decoys on the ground (includes turbine hardstand and access roads).
- Moderate: Bare ground 25 % or greater, all ground cover 15 cm or less in height and mostly sparse, ground conditions can potentially obstruct the surveyors' seeing carcasses or decoys.
- Low visibility areas (bare ground 25 % or less, 25 % or less of ground cover over 30 cm in height) were excluded from the assessment because bat carcasses are very difficult to find in these areas.

Thus, to optimize search effort, searching should be restricted to High and Moderate visibility classes. Since the degree of visibility may change seasonally this mapping will be repeated once per season where needed.

Searcher Efficiency

Searcher efficiency (SE) trials should be undertaken over a period of a month to evaluate the efficiency of the bat fatality search survey. Although the search team may be aware that trials will be conducted during the year, trials should be laid without their knowledge as far as possible to avoid artificially heightened concentration during trials.

Trials should be conducted using 120 decoys, to represent bats. These should be placed at turbines in batches of not more than three per turbine, in two visibility classes (10 per class):

- High (roads & hard stands – open gravel)
- Moderate (grassland).

Decoys should be placed in the morning pre-search, with the search team working as normal. The Applicant should return to the location of each decoy carcass at the end of the week to check which were found and not found, and to collect any not found.

Carcass Persistence

A carcass persistence (CP) trial for bats should be done over a period of a month to obtain an estimate of the rate at which bat carcasses are removed by scavengers or otherwise made 'undetectable' (e.g., buried).

Trials should be conducted using 120 store bought frozen mice, which should be thawed before placement. Batches of up to 3 carcasses should be placed a minimum of 30 m apart from each other away from turbines but in areas of the wind farm representative of conditions under turbines. Ten carcasses should be placed in the High and Moderate visibility classes respectively.

9.12.5 Reporting

Quarterly bat monitoring reports should be completed for each site, presenting the results of the previous three months monitoring. Quarterly reports must include the details of carcasses found, including the species, date found, carcass condition (e.g., fresh, decomposed), age class and sex (if possible), nearest turbine number, GPS location and proximity to relevant impact receptors (e.g., nests).

A post-construction monitoring report analysing the results of monitoring should be completed at the end of each year of monitoring. These reports must be submitted to the competent authority and relevant stakeholders. This includes any quarterly progress reports. These reports must be submitted to the relevant stakeholders, including SABAA and EWT, within three months of the report being submitted to the operator.

Post-construction monitoring reports must also be made available to environmental assessment practitioners, specialists and scientists for the purposes of environmental audits, environmental impacts assessments, cumulative impact assessments and scientific research.

The annual report is to investigate the following:

- Has the habitat available to bats in and around the facility changed?
- Has the abundance of bats and/or species composition changed?
- Have the distributions and/or movements of priority species changed?
- Where the answer is yes to any of the above four questions, what is the nature of the observed changes? (Compare these changes before (during) and after construction).
- What is the nature, and likely drivers, of any changes observed?

- What is the likely demographic and ecological significance of any observed changes in bird populations at the site (including consideration of the magnitude and direction of change) at both the local and broader population scale?
- What are the collision rates and the total number of bat fatalities at the facility? (Collision rates should be reported per MW (nameplate capacity) and per turbine for different size classes of bats. Data should be reported in both raw and corrected formats, and the GPS locations of carcasses must be included).
- What is the species and, as far as possible, age and sex composition of fatalities?
- What proportion of fatalities is likely to be due to collisions with wind turbines?
- Are there any factors (e.g., site characteristics and proximity to wind turbines) that may contribute to these fatalities?
- Is additional monitoring and/or mitigation necessary and if so, what needs to be done?

9.13 NOISE MONITORING PLAN

Noise Monitoring can be divided into two distinct categories, namely:

- Passive monitoring – the registering of any complaints (reasonable and valid) regarding noise; and
- Active monitoring – the measurement of noise levels at identified locations.

After the implementation of mitigation measures, noise levels will be higher than 42 dBA (more than 7 dBA of the night-time rating level of a rural noise district) and active noise monitoring is recommended and required.

In addition, should a reasonable and valid noise complaint be registered, the Developer should investigate the noise complaint as per the guidelines in sub-section 12.1 and 12.2. These guidelines should be used as a rough guideline as site-specific conditions may require that the monitoring locations, frequency or procedure be adapted.

9.13.1 Measurement Localities and Frequency

Ambient sound levels could be measured at NSR 8, 9/10 and 22 before the development of the WEF (at the minimum), with the measurements repeated after the first year of operation. In addition, should there be a valid and reasonable noise complaint, once-off noise measurements must be conducted at the location of the person that registered a valid and reasonable noise complaint. The measurement location should consider the direct surroundings to ensure that other sound sources cannot influence the reading. These measurement locations can be reduced accordingly if the NSRs are relocated or the dwellings are no longer used for residential purposes.

9.13.2 Measurement Procedures

Ambient sound measurements should be collected as defined in SANS 10103:2008. Due to the variability that naturally occurs in sound levels at most locations, it is recommended that semi-continuous measurements are conducted over a period of at least 48 hours, covering at least a full day- (06:00 – 22:00) and night-time (22:00 – 06:00) period. Spectral frequencies should also be measured to define the potential origin of noise. When a noise complaint is being investigated, measurements should be collected during a period or in conditions similar to when the receptor experienced the disturbing noise event.

10 CLOSURE PLANNING

The Contractor must clear and clean the site and ensure that all equipment and residual materials, not forming part of the permanent works, are removed from site before issuing the completion certificate or as otherwise agreed.

10.1 POST-CONSTRUCTION AUDIT

A post-construction audit must be carried out and submitted to the national DFFE at the expense of the Developer. Objectives should be to audit compliances with the key components of this EMPr, to identify main areas requiring attention and recommend priority actions. The post-construction audit must be submitted to the national DFFE within three (3) months of completion of the development and prior to the operational phase.

Results of the audits should inform changes required to the specifications of this EMPr or additional specifications to deal with any environmental issues which arise on site and have not been dealt with in the current document.

10.2 MANAGEMENT REVIEW AND REVISION OF THE EMPR

The EMPr is to be reviewed annually for the first three years and then once every five years thereafter, by an independent environmental consultant, unless otherwise specified by the authorities. The auditor is to highlight issues to be addressed in the EMPr or changes required during the annual audit. These points are to be included as an annexure to the EMPr and to be considered during the review process. Recommended changes to the EMPr must be forwarded to DFFE for approval and comment, before subsequently being incorporated into the EMPr.

10.3 GENERAL REVIEW OF EMPR

This EMPr must be reviewed by the ECO on an on-going basis. Based on observations during site inspections and issues raised at site meetings, the ECO will determine whether any procedures require modification to improve the efficiency and applicability of the EMPr on site.

Any such changes or updates will be registered in the ECO's record, as well as being included as an annexure to this document. Annexures of this nature must be distributed to all relevant parties.

11 CONCLUSIONS

All foreseeable actions and potential mitigations and/or management actions for the MNWP WEF have been (to date) and should be contained in this document. The EMPr should be seen as a day-to-day management document. The EMPr sets out the environmental and social standards, which would be required to minimise the negative impacts and maximise the positive benefits of the MNWP WEF development. The EMPr could therefore change daily, and, if managed correctly, lead to successful phases of development.

All attempts should be made to have this EMPr available, as part of any tender documentation, so that the Contractors are made aware of the potential cost and timing implications needed to fulfil the implementation of the EMPr, thus adequately costing for these.

12 APPENDIX A: ENVIRONMENTAL EDUCATION COURSE OUTLINE

PROPOSED ENVIRONMENTAL EDUCATION COURSE OUTLINE

www.webweaver.nu/clipart/environmental.shtml

Reasons why should we look after the environment

- We have a right to a clean environment
- A clean environment is essential to healthy living
- All our basic needs come from the environment
- A contract has been signed – development vs the environment
- Penalties / fines could be issued

How to look after the environment

- Report issues
- Teamwork
- Follow the set rules and guidelines (EA, EMPr, Method statements etc.)
- Conserve, reuse and recycle

Tips and Guidelines

- Workers and equipment should not be allowed outside demarcated areas
- No swimming or polluting of water bodies allowed
- No damage / disturbance to vegetation or water bodies without consent / permits
- No disturbance allowed in no-go areas
- No hunting of animals
- Report all fires
- No burning or burying of waste
- No smoking near hazardous materials
- Training on fire fighting equipment
- Hazardous materials to be stored in designated and bunded areas
- Spill kits and drip trays a must
- Report all spills
- Control dust and Noise
- Maintain construction vehicles
- Availability and maintenance of sanitation facilities

Tips and Guidelines

- Only eat is designated areas
- Do not litter
- Vehicles to remain on approved tracks and adhere to speed limit
- Ensure emergency phone numbers are available
- Ensure PPE is worn
- Report fires, leaks and injuries
- Ask if unsure

13 APPENDIX B: COPY OF THE ENVIRONMENTAL AUTHORISATION

COPY OF THE ENVIRONMENTAL AUTHORISATION (TO BE INSERTED)

14 APPENDIX C: EXAMPLE OF A METHOD STATEMENT

EXAMPLE OF A METHOD STATEMENT

METHOD STATEMENT

CONTRACT:…….. **DATE**:…….

PROPOSED ACTIVITY (give title of Method Statement and reference number from the EMPr):

WHAT WORK IS TO BE UNDERTAKEN (give a brief description of the works):

WHERE ARE THE WORKS TO BE UNDERTAKEN (where possible, provide an annotated plan and a full description of the extent of the works):

START AND END DATE OF THE WORKS FOR WHICH THE METHOD STATEMENT IS REQUIRED:

Start Date:	End Date:

HOW ARE THE WORKS TO BE UNDERTAKEN (provide as much detail as possible, including annotated sketches and plans where possible):

*** Note: Please attach additional pages should you require more space.**

DECLARATIONS

1) ENVIRONMENTAL CONTROL OFFICER (ECO)

The work described in this Method Statement, if carried out according to the methodology described, is satisfactorily mitigated to prevent avoidable environmental harm:

_____ _____
(Signed) (Print name)

Dated: _____

2) PERSON UNDERTAKING THE WORKS

I understand the contents of this Method Statement and the scope of the works required of me. I further understand that this Method Statement may be amended on application to other signatories and that the ECO will audit my compliance with the contents of this Method Statement

_____ _____
(Signed) (Print name)

Dated: _____

15 APPENDIX D: CURRICULUM VITAE OF EAP TEAM

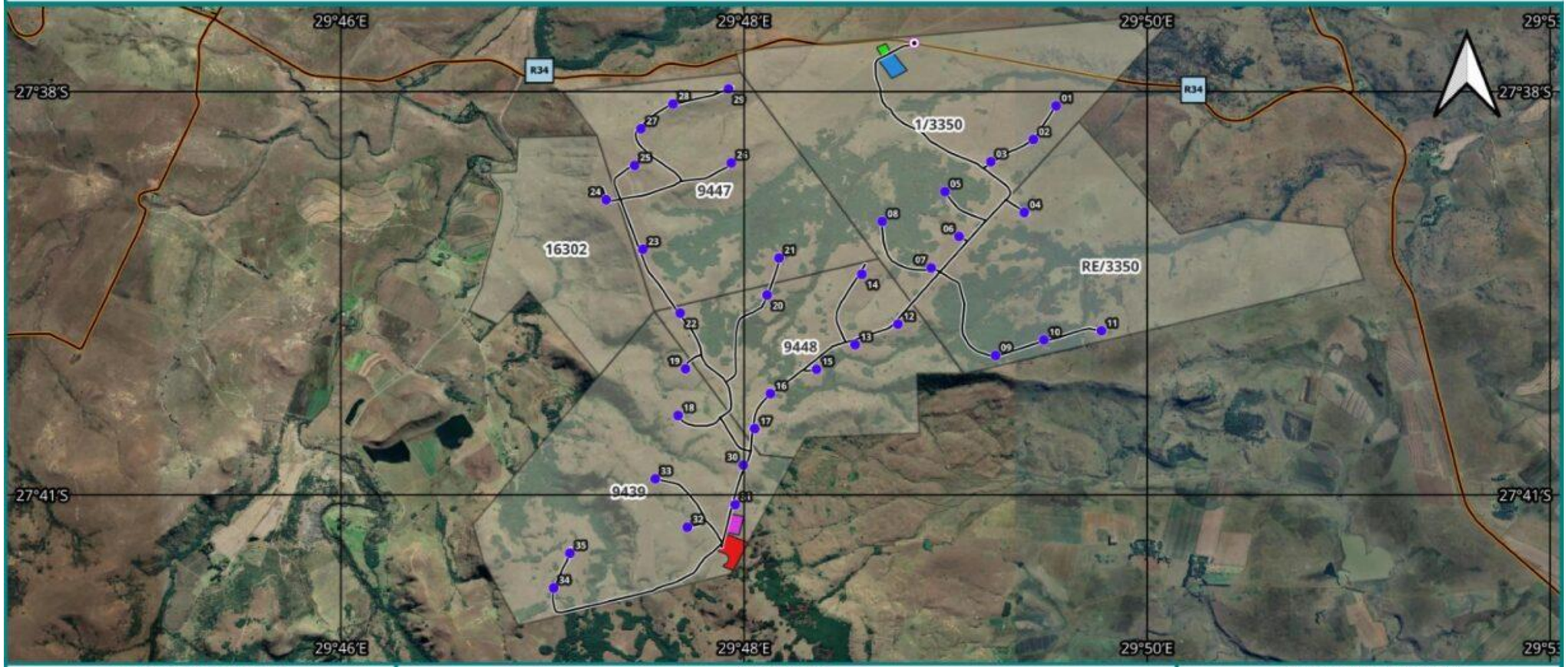
Curriculum Vitae (CVs) of the environmental team, including the EAP:

- Dr Alan Carter
- Ms Lene le Grange
- Ms Caroline Evans
- Ms Robyn Thomson

16 APPENDIX E: SITE LAYOUT PLAN

MULILO NEW CASTLE WIND ENERGY FACILITY

LAYOUT MAP



MAP DETAILS

Date: October 2023
Drawn by: Thandiswa Mamani
Datum: WGS 84

SCALE

1:40 000

0 1 2 km

LEGEND

- Site Access
- MNWP_Turbines
- Internal Acess_Roads
- Existing Roads
- MNWP_Land_Parcels
- IPP and O&M Building Complex

MNWP_Laydown Areas

- Concrete Batching Footprint
- Temporary Construction/ Office Yard
- Temporary WTG Laydown

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Table 16-1: Site Plan (Final Layout)

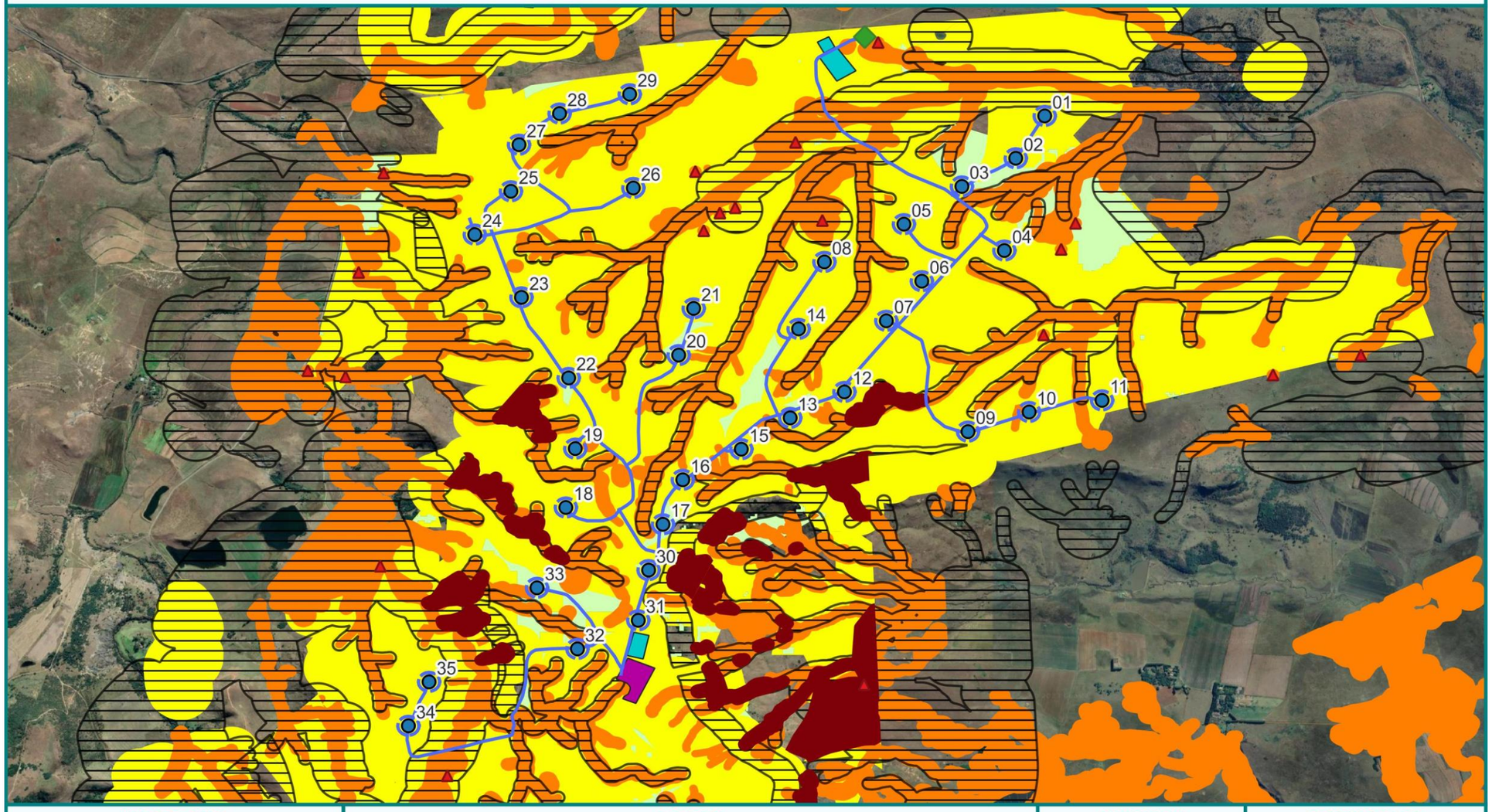
Infrastructure	Latitude	Longitude
WIND TURBINE POSITIONS *Permanent Footprint (per turbine): 700m² / 0.07ha* *Temporary Footprint (per turbine): 800m² / 0.08ha*		
1	27°38'29"S	29°49'51"E
2	27°38'41"S	29°49'43"E
3	27°38'49"S	29°49'28"E
4	27°39'7"S	29°49'40"E
5	27°39'0"S	29°49'12"E
6	27°39'16"S	29°49'17"E
7	27°39'27"S	29°49'7"E
8	27°39'10"S	29°48'49"E
9	27°39'58"S	29°49'30"E
10	27°39'53"S	29°49'47"E
11	27°39'49"S	29°50'8"E
12	27°39'47"S	29°48'55"E
13	27°39'54"S	29°48'40"E
14	27°39'29"S	29°48'42"E
15	27°40'3"S	29°48'26"E
16	27°40'12"S	29°48'9"E
17	27°40'24"S	29°48'4"E
18	27°40'20"S	29°47'36"E
19	27°40'3"S	29°47'39"E
20	27°39'37"S	29°48'8"E
21	27°39'23"S	29°48'12"E
22	27°39'43"S	29°47'37"E
23	27°39'20"S	29°47'24"E
24	27°39'3"S	29°47'11"E
25	27°38'50"S	29°47'21"E
26	27°38'49"S	29°47'55"E
27	27°38'37"S	29°47'23"E
28	27°38'28"S	29°47'35"E
29	27°38'23"S	29°47'54"E
30	27°40'37"S	29°48'0"E
31	27°40'51"S	29°47'57"E
32	27°40'59"S	29°47'40"E
33	27°40'42"S	29°47'28"E
34	27°41'21"S	29°46'52"E
35	27°41'9"S	29°46'58"E
IPP SUBSTATION, AND O&M OFFICE. *Permanent Footprint: 59858 m² / 5.98 ha (the IPP substation), Operations and Maintenance (O&M) building and a temporary site office share a footprint)* *Temporary Footprint: 0 m² / 0 ha*		
Northwest Corner	27°41'2"S	29°47'54"E
Northeast Corner	27°41'5"S	29°48'1"E
Southeast Corner	27°41'15"S	29°47'56"E
Southwest Corner	27°41'8"S	29°47'51"E
LAYDOWN AREA Concreate batching *Permanent Footprint: 0m² / 0ha* *Temporary Footprint: 10436m² / 1.04 ha*		
North Corner	27°38'19"S	29°48'51"E
East Corner	27°38'10"S	29°48'52"E

Infrastructure	Latitude	Longitude
South Corner	27°38'11"S	29°48'49"E
West Corner	27°38'8"S	29°48'47"E
LAYDOWN AREA WTG *Permanent Footprint: 0m^2 / 0ha* *Temporary Footprint: 40675m^2 / 4.06ha*		
North Corner	27°38'10"S	29°48'53"E
East Corner	27°38'16"S	29°48'58"E
South Corner	27°38'19"S	29°48'53"E
West Corner	27°38'13"S	29°48'48"E
LAYDOWN AREA Temporary Construction/Office Yard *Permanent Footprint: 0m^2 / 0ha* *Temporary Footprint: 25952m^2 / 2.59ha*		
North Corner	27°40'55"S	29°47'56"E
East Corner	27°40'56"S	29°48'0"E
South Corner	27°41'2"S	29°47'58"E
West Corner	27°41'1"S	29°47'54"E
ACCESS ROADS (SITE ACCESS POINTS)		
Access Point 1 – R34	27°38'7"S	29°49'1"E

17 APPENDIX E: SITE SENSITIVITY PLAN

MULILO NEWCASTLE WIND POWER WIND ENERGY FACILITY

COMPOSITE SENSITIVITY



MAP DETAILS

Date: October 2023
Drawn by: Robyn Thomson
Datum: WGS 84

0 1 000 m

LEGEND

- Turbines
- Site Access Gate
- 82.5m Turbine Buffer
- Internal Roads
- Substation and O&M Building Complex
- Laydown Areas and Construction Yards
- High (heritage)
- No-go (all infrastructure) forest
- No-go (Turbines only) birds and/or bats
- High (birds and/or watercourses and/or heritage)
- Moderate (bird and/or bats and/or ecological)
- Low birds and/or ecological

OVERVIEW

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APPENDIX F: RESTORATION AND REHABILITATION PROGRAMME

Mulilo Newcastle Wind Power Wind Energy Facility (MNWP)

Restoration and Rehabilitation Programme

PREPARED FOR:

Mulilo Newcastle Wind Power (Pty) Ltd

PREPARED BY:

Big Thorn Environmental

February 2024

Name	Dr Greer Hawley
Designation	Big Thorn Environmental
Cell Phone	+27 82 739 3419
E-mail	greer@btbio.co.za

Table of Contents

Section 1. Introduction and objectives

CES Environmental and Social Advisory Services and Big Thorn Environmental were appointed by Mulilo Newcastle Wind Power (Pty) Ltd to develop a Restoration and Rehabilitation Programme for grassland and wetland ecosystems on the site of the Mulilo Newcastle Wind Power Wind Energy Facility (WEF).

Mulilo Renewable Project Developments (Pty) Ltd (Mulilo) is developing the Mulilo Newcastle Wind Energy Facility (WEF) Complex near Newcastle in the Newcastle Local Municipality, in KwaZulu-Natal Province, comprising:

- **Mulilo Newcastle Wind Power WEF (MNWP WEF) (up to 200 MW and up to 35 turbines) (Scoping and Environmental Impact Assessment process)**
- Mulilo Newcastle Wind Power 2 WEF (MNWP2 WEF) (up to 160 MW and up to 16 turbines) (Scoping and Environmental Impact Assessment process)
- Mulilo Newcastle Wind Power (MNWP OHL) grid connection infrastructure and associated powerlines (Basic Assessment process)
- Mulilo Newcastle Wind Power 2 (MNWP2 OHL) grid connection infrastructure and associated powerlines (Basic Assessment process).

This document is applicable to the first component (in bold above), i.e. the MNWP WEF, and has been produced as an outcome of the recommendations of the Terrestrial Biodiversity Impact Assessment (Big Thorn, 2023), which requires that a programme (this report) be developed for the restoration and rehabilitation of Ecological Support Area 2 site in order to mitigate areas of Critical Biodiversity Area 2 (CBA2) that may be lost due to the proposed MNWP WEF. The programme will focus on the removal of alien tree species and subsequent rehabilitation and restoration grassland and wetland ecosystems.

The purpose of this report, therefore, is to develop an implementation framework for the permanent removal of alien plant species and the subsequent restoration and rehabilitation of identified degraded grassland and wetland ecosystems in line with the recommendations outlined in the Terrestrial Biodiversity Assessment.

The goal of this Restoration and Rehabilitation Programme is to facilitate the recovery of strategically important grasslands and wetlands to a natural (or near natural state).

The objectives of the Restoration and Rehabilitation Programme are to:

1. Identify and map degraded ecosystems in the project areas, that should be prioritised for restoration to a natural or near-natural state.
2. Outline acceptable approaches and applicable guidelines to clearing alien and invasive species, restoration in grassland and wetland ecosystems, respectively.
3. Develop an implementation plan, complete with spatial and temporal targets.
4. Outline monitoring requirements for the both the implementation of the programme, as well as the successful rehabilitation/restoration of areas, as determined by selected indicators.

The Terrestrial Biodiversity Impact Assessment report (Big Thorn, 2023) recommends that:

- The determination of the total areas to rehabilitated and restored is calculated using a 9:1 ratio (i.e. restore/rehabilitate 9ha for every 1ha of CBA2 is lost). As the MNWP WEF currently stands, an area of up to 60ha will be required.
- The programme is implemented in phases, with half of the calculated area earmarked for alien clearing and rehabilitation in the first two (2) years, with 5ha per year cleared thereafter in Year 3-8. Rehabilitation and restoration must be initiated at the highest elevation in the

catchment and implemented in phases that then extend down the catchment.
- The area selected for rehabilitation/restoration includes wetlands, riparian areas and terrestrial grasslands that would benefit from the clearing of alien invasive species.
- Areas that are cleared must be monitored annually for the resurgence of plants from extensive seed banks and kept cleared of alien invasive species, in line with best practices, for the life of the facility.

In addition to the above requirements, should MNWP be appointed as a preferred bidder, resources must be set aside in order to mobilise, facilitate and finance, within in reason, the following additional actions:

- A community-based programme to systematically and strategically eradicate a range of alien invasive species in the broader area.
- Provide the necessary resources to generate and submit joint proposals with partners, for submission to the Working for Water, Working for Wetland and Working for Fire programmes for project implementation in the region.
- Facilitate the establishment of a working group, consisting of multiple agents and project implementors, in order to co-ordinate alien clearing with the neighbouring landowners and within the broader region of the strategic water source area.

Section 2. Background to degraded ecosystems in the MNWP project area

The Environmental Impact Assessment (EIA) for the proposed MNWP, included a number of specialist assessments. The findings of the Botanical and Faunal, Aquatic and the Terrestrial Biodiversity Impact Assessments identified degraded terrestrial (grasslands) and aquatic (stream and wetland) ecosystems (streams and wetlands), the rehabilitation of which could be used to mitigate impacts associated with the WEF.

The main causal agent of aquatic and terrestrial ecosystem degradation in the Mulilo WEF complex area is the invasion of alien plant species, mainly **Black Wattle** (*Acacia mearnsii*), a Category 2 listed species in both National Environmental Management Biodiversity Act (No 10 of 2004) and the Conservation of Agricultural Resources Act (No 43 of 1983). Since Black Wattle impact on both grasslands and wetlands/water courses, a two-pronged approach is required which not only addresses alien invasive plantation eradication, but also apply best practice rehabilitation interventions specific to each ecosystem, which will assist recovery of these systems to a natural (or near to natural) state.

2.1. Alien and invasive plantations: causal agents of ecosystem degradation

Undoubtedly, one of the largest threats to biodiversity (species and ecosystems) in South Africa (apart from permanent modification/loss of ecosystems) is the establishment and invasion of alien species. This threat is particularly concerning when one considers the massive capital investment that has gone into spatially mapping, planning and programmes to actively remove of alien species, specifically alien and invasive plant species, with very little ground gained (Wilgen et al., 2022)). This is the challenge faced in the broader MNWP project area, where Black Wattle (*Acacia mearnsii*) has established over large tracts of land and landowners do not have the resources to control, never-mind eradicate the species.

A concerted effort has been made in South Africa to address the extent and severity of alien species invasion, through the requirement of agencies to monitor, control and eradicate alien species. It must

be noted that considerable work has gone into formulating regulations and guidelines for the control and eradication of alien species (See Section 3), but not much instruction or guidance is provided to revegetate or restore ecosystems once the alien species have been removed.

2.2. Changes to ecological drivers: fire and grazing regimes

In addition to disturbances and loss of biodiversity caused by alien and invasive species, poor management of key ecological drivers, such as fire regimes and grazing pressure, can reduce the basal cover and make grasslands and wetlands vulnerable to soil erosion. Poor management of either of these ecological drivers can negatively impact on the biodiversity and function of both grassland and wetlands ecosystems. Fire and grazing are also important considerations for the management of threatened wildlife in the project area and more detail regarding how these are managed are explored in the Oribi and Mountain Reedbuck Management and Monitoring Plan (CES, 2024).

Section 3. Approaches to ecosystem restoration and rehabilitation

3.1. Alien invasive species Monitoring and Eradication

The impact of alien invasive species is one of the most prominent threats to the biodiversity of South Africa. In terms Section 76 of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 Of 2004) (NEMBA) for species listed as invasive in terms of Section 70 of this Act, Alien and Invasive monitoring, control and eradication plans are required to be developed and implemented. It is recommended that plans to be active in an area for a minimum of 5 years. Guidance on the development of these plans is provided on the Invasives South Africa websites, as well as additional resources such as an updated list of approved herbicides and appropriate use (see links below).

Monitoring, control and eradication plan: guidelines for species listed as invasive in terms of Section 70 of NEMBA (DEA, 2015):
https://invasives.org.za/wp-content/uploads/2022/02/Monitoring-Control-and-Eradication-Plans.pdf

List of approved herbicides and appropriate use can be found here:
https://invasives.org.za/herbicides/

3.2. Grassland rehabilitation

According to the Grassland Ecosystem Guidelines (SANBI, 2013), the best-practices and minimum ecological requirements for managing grassland for biodiversity are:

- Managing fire
- Managing grazing
- Managing habitats and species
- Managing soil erosion and physical disturbance.

Grassland habitats and species are degraded in multiple ways by the invasive of alien plant species, such as Black Wattle. Guidelines for the safe and effective removal of alien plants species is available and should be used as a reference for all decisions regarding the method of alien plant (not just Black Wattle) removal.

Links to useful case-studies and guidelines for grassland rehabilitation:

Carbutt and Kirkman (2022) Ecological Grassland Restoration—A South African Perspective https://doi.org/10.3390/land11040575
SANBI Grassland Ecosystem Guidelines http://opus.sanbi.org/bitstream/20.500.12143/5406/1/2013_Grassland%20Ecosystem%20Guidelines.pdf

3.3. Wetland rehabilitation

In South Africa, there is a considerable body of knowledge on wetland health and rehabilitation. WET-RehabPlan (2009) and WET-Rehabevaluate (2019) will be important source documents that need to inform wetland rehabilitation methods statements and WET health assessments should be continuously used to determine the progress and success of wetland rehabilitation efforts.

An important step in the approach to wetland rehabilitation is identifying/diagnosing the 'problems' that have led to wetland degradation. These could include a range of external pressures including over-grazing, too frequent fires and the invasive of alien species or a combination of these. Reducing or eliminating these pressures will form part of the rehabilitation strategy. Wetland rehabilitation requires that natural processes and ecological drivers are imitated and/or reinstated in such a way that we aid the recovery (or maintenance) of dynamic systems. Ultimately, rehabilitation needs to strive for improvement of the state of the system.

The most typical rehabilitation interventions designed to assist in the recovery of degraded wetland ecosystems are 'plugs' constructed within artificial drainage channels. The 'plugs' are placed with the intention of re-instating a more natural hydrology. Typical interventions for maintaining the health of degraded wetland ecosystems are the placement of erosion control structures to prevent erosion head cuts. However, rehabilitation may include additional interventions such as reducing livestock grazing-pressure or reducing the frequency of burning.

Links to important documents and guidelines are provided below:

WRC (2009) WET-Rehabplan:
https://www.wrc.org.za/wp-content/uploads/mdocs/TT%20336-09.pdf

WRC (2019) WET-Rehabevaluate:
https://www.wrc.org.za/wp-content/uploads/mdocs/2344_final.pdf

WET-Health:
https://www.wrc.org.za/wp-content/uploads/mdocs/TT%20340-09.pdf

Section 4. Restoration and rehabilitation implementation plan

The Restoration and Rehabilitation Programme provides a framework for the implementation three intervention plans, namely:

- Alien invasive plant (AIP) removal,
- Grassland restoration, and
- Wetland restoration.

4.1. Restoration and rehabilitation design

The three plans have been described in terms of activities and methods, and area, locality and phasing. It must be noted that all mitigation measures provided in the EMPr relating to construction and rehabilitation apply to the activities of alien invasive plant (AIP) species removal, and likewise this document will be included as an appendix to the Final EMPr.

4.1.1. Restoration and rehabilitation activities and methods

In Table 1 below, a high-level description of each intervention/action plan is provided, together with additional notes that need to be taken into consideration. It must be noted that exhaustive guidelines and published case studies on AIP eradication/removal, grassland health and rehabilitation and wetland health and rehabilitation is freely available and accessible (SANBI, 2013; DEA, 2015, etc). This material needs to be referenced when developing methods statements for each action plan.

Table. 1 Description of the three action plans

Action Plan	Proposed method	Additional notes
Remove AIPs	Systematic clearing starting in upper catchment, moving downwards. Stump cut and herbicide application (ensure herbicide is in line with registered list of appropriate and effective herbicides and take care to apply only to the stump) Remove all plant material from the site. There are opportunities for beneficiation such as the sale of fuel wood. During late spring scatter mixture of grass species and herb species into exposed soil. A pilot project may need to be conducted to determine which species establishes the best and use this mix as an initial application to maximise root establishment and	Ensure that care is taken to preserve the fauna that use the site, i.e. that nests are not destroyed, and faunal are given an opportunity to move or be moved out of the area being cleared. Mark trees with nests, and trees may be removed once nest is vacated. Areas are revegetated by terrestrial and aquatic plants species that will bind the soil and prevent soil erosion of exposed soils. Biannual (twice a year in growing season) follow-up clearing of germinated plants from the seedbank is required in all areas that have been cleared of alien invasive plants. Depending on the density of germination from the seed bank: either hand pulling or foliar spray for seedlings/saplings 1 metre or less. In wetlands and riparian zones foliar sprays should not be used no matter how dense the regrowth.

Action Plan	Proposed method	Additional notes
	minimise soil erosion.	A foliar spray in terrestrial grasslands used directly on young alien plants is desirable so as to not disturb the soil. Hand pulling is a preferred method in sensitive environments such as rivers and wetlands. This includes a 20m buffer of these environments. This will be managed by the Environmental Control Officer during clearing. **It is essential that isolated, stand-alone trees that are located within easy access of clearing activities also be removed in order to contain the spread from these point sources.**
Post-alien clearing:		
Grassland rehabilitation	Revegetate with mix of indigenous grass and herb species.	Revegetation will happen naturally over time, but basal cover needs to happen a quickly as possible to avoid soil erosion, and broad-scale seed dispersal will assist. Revegetation will also require a period of livestock exclusion to ensure survival and therefore the successful establishment of vegetation.
	Follow-up eradication of alien plant species: foliar spraying for seedlings/saplings twice a year (late spring and late summer) every year for life of the project as and when seedlings/saplings are observed in cleared areas. Monitoring for germinated AIP seedlings/saplings will form part of the operational EMPr and implemented by the WEF site manager and clearing undertaken by an appointed service provider.	NOTE: Should a run-away fire burn through the area it will trigger large-scale germination of Black Wattle seeds in the soil seedbank. In this circumstance, follow-up eradication of seedlings/saplings during the following growth season will require significantly increased resources but will potentially contribute towards a depletion of the seedbank, and relatively lower resource requirements in subsequent years.
Wetland rehabilitation	Determine condition of the wetland post-alien clearing (i.e. where channels have been created and banks have been eroded).	A report of the post-clearance condition of each mapped wetland within the demarcated restoration and rehabilitation area must be developed. A suitably qualified wetland specialist should be used.
	Use best practice guidelines to determine best approach to wetland restoration (e.g. WET-Rehabplan) and develop a method statement. This will include: • Consideration of the use of	The method statement should outline specific interventions which imitate natural processes to restore the hydrology, geomorphology and vegetative cover of the wetland to a natural state.

Action Plan	Proposed method	Additional notes
	engineered 'plugs' to fill erosion channels and recreate a wetland flow regime. • Revegetation with hydrophilic plants native to the adjacent natural wetlands. Revegetation will require a period of livestock exclusion to ensure survival and therefore the successful establishment of hydrophilic vegetation.	May consider use of excess excavated rock to create wetland 'plugs'. Robust wetland plants should be used to revegetate a wetland. This could be achieved by propagating species from adjacent wetlands for out-planting into degraded wetlands. A suitably qualified wetland rehabilitation service provider should be used.
	Follow-up eradication of alien plant species: seedling pulling. As this needs to be done before the seedling/sapling gets too large, requires significantly more time and effort, and often seedings are missed, more regular plant removal activities are required, at least every 2 months in the growing season for the first 2 years post-clearing.	Caution to act swiftly when seedlings are noticed as the plants grow rapidly and very quickly get out of control. The effectiveness and frequency of the method of hand-pulling in wetlands will need to be assessed after the first growing season post-clearing and may need to be revised.

4.1.2. Area and Location of mapped areas for prioritised restoration and rehabilitation

According to the Terrestrial Biodiversity Impact Assessment, the MNWP will impact approximately = 6.6ha of CBA2 and recommends that an area of ESA2 (areas that would attract a CBA1/2 classification if it was in a natural state) with a 9:1 ratio is mapped for restoration and rehabilitation. This means that a minimum of 59.4ha, or 60 ha (rounded up) is to be identified from the project area and rehabilitated.

This report has mapped areas of alien invasive plants (Black Wattle) located in the upper reaches of the catchment, which overlap with ESA2 areas, and which include wetlands with High ecological importance.

Mapped priority areas for AIP clearing: MNWP

Two areas of priority have been mapped (Figure 1):

1. A VERY HIGH priority preferred site, which is made up of = multiple polygons that add up to approximately 78ha, and
2. A HIGH priority alternative site (but less desirable due it being lower in the catchment) which is approximately 81ha.

Although only 60ha of these mapped areas need to be selected for restoration and rehabilitation (as a minimum), it is recommended to rehabilitate more if possible, and ideally the whole of the "priority" site, i.e. 78ha.

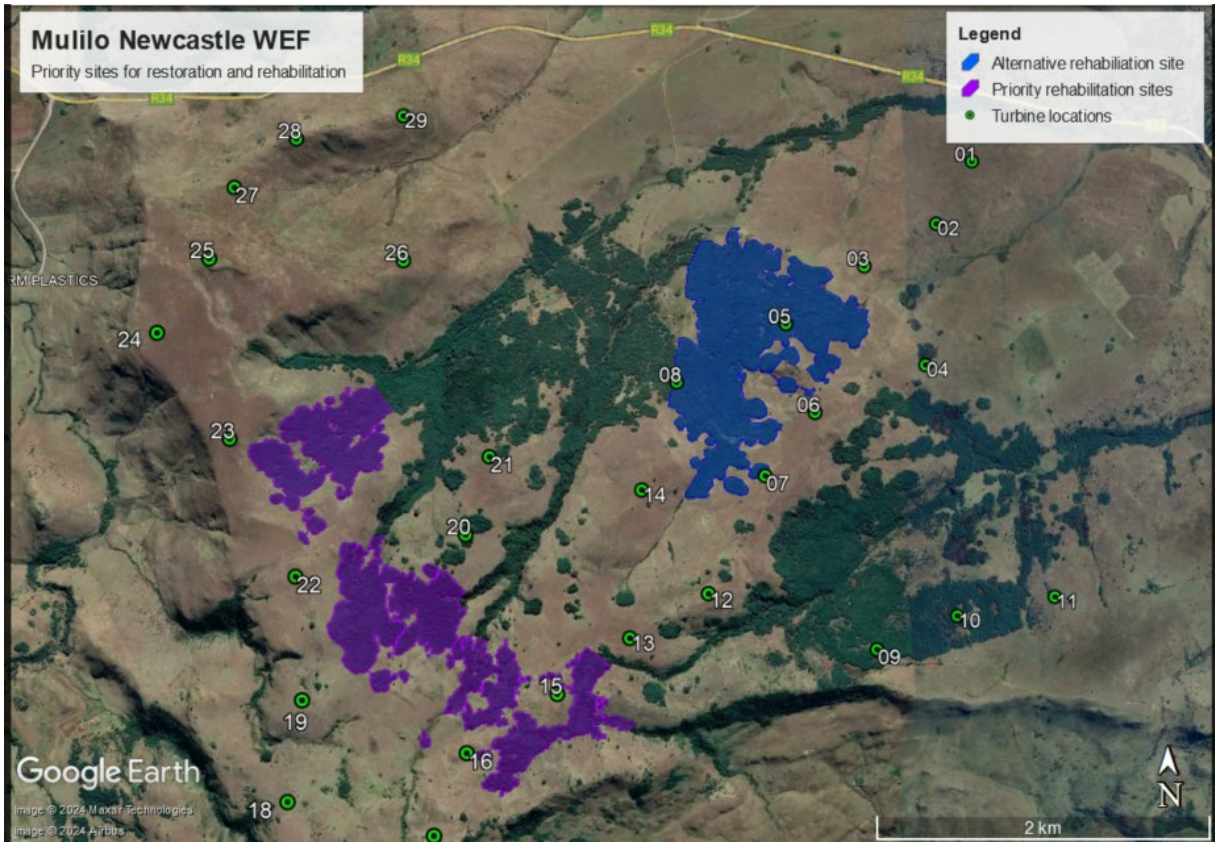

Figure 1 Priority degraded areas available for selection in the restoration and rehabilitation programme.

4.2. Workplan, roles and responsibilities (define roles)

Restoration and rehabilitation in the areas selected for the MNWP includes very little wetland rehabilitation. Most of the work is associated with alien vegetation clearing, reseeding of the exposed soil with indigenous grasses to ensure the establishment of indigenous vegetation, and continuous monitoring and eradication of germinated AIP seedlings for the life of the project. Actions involving wetlands have been included as they may pertain to head cuts and bank erosion in streams.

The work plan for MNWP is provided in Table 2. Detail on the phases of alien plant removal is provided in Section 4.3 below.

Table 2. Proposed workplan for the implementation of action plans

Restoration Action	Participant	Role	Year								
			1	2	3	4	5	6	7	8-11	9-20
Alien Invasive Plant eradication and monitoring	Mulilo Newcastle Wind Power (Pty) Ltd	Implementing agent									
	Independent auditor	Monitor progress of alien tree clearance.									Every 5 years
	Mulilo Newcastle Wind Power (Pty) Ltd	Annual post-clearing monitoring and eradication									
	Environmental Affairs	Enviro authority in KZN									

Restoration Action	Participant	Role	Year								
			1	2	3	4	5	6	7	8-11	9-20
	Working for Water	Co-partner in implementing/resourcing additional alien clearing in the project area under contractual agreement with landowner.									
Grassland rehabilitation	Mulilo Newcastle Wind Power (Pty) Ltd	Implementing agent									
	Independent auditor	Monitor grassland health.									Every 5 years
Wetland rehabilitation	Mulilo Newcastle Wind Power (Pty) Ltd	Implementing agent									
	Independent auditor	Monitor grassland health.									Every 5 years
	Department of Water and Sanitation	Water use authority: advice regarding rehabilitation activities in aquatic ecosystems and licence and method statement approvals.									
	Working for Wetlands	Co-partner in implementing/resourcing additional wetland/riparian restoration in the project area under contractual agreement with landowner.									

4.3. Restoration and rehabilitation targets for MNWP

The proposed MNWP is required to clear, and keep clear, land invested by alien invasive plants amounting to a minimum of 60 hectares in total (based on the current number of turbines and access roads in CBA2 areas). The Terrestrial Biodiversity Impact Assessment requires that at least half of the area (i.e. 30ha) is cleared in the first two years, followed by 5ha per year for the next 6 years (this can be condensed to 10ha per year over 3 years). The proposed phased approach (which is flexible as long as the minimum yearly targets are met) is described below:

4.3.1. Phase 1 (Year 1&2)

Yellow shaded areas (amounting to 30.32ha) have been mapped using the principle that clearing should begin in the highest reaches of a catchment and move downwards.

4.3.2. Phase 2 (Year 3- 8)

Year 3	4	5	6	7	8
Orange area (8.2ha)	Green area (4.64ha)	Purple area (5ha)	Purple area (5ha)	Purple area (5ha)	Purple area (2.7ha)

8.2	4.64	17.7

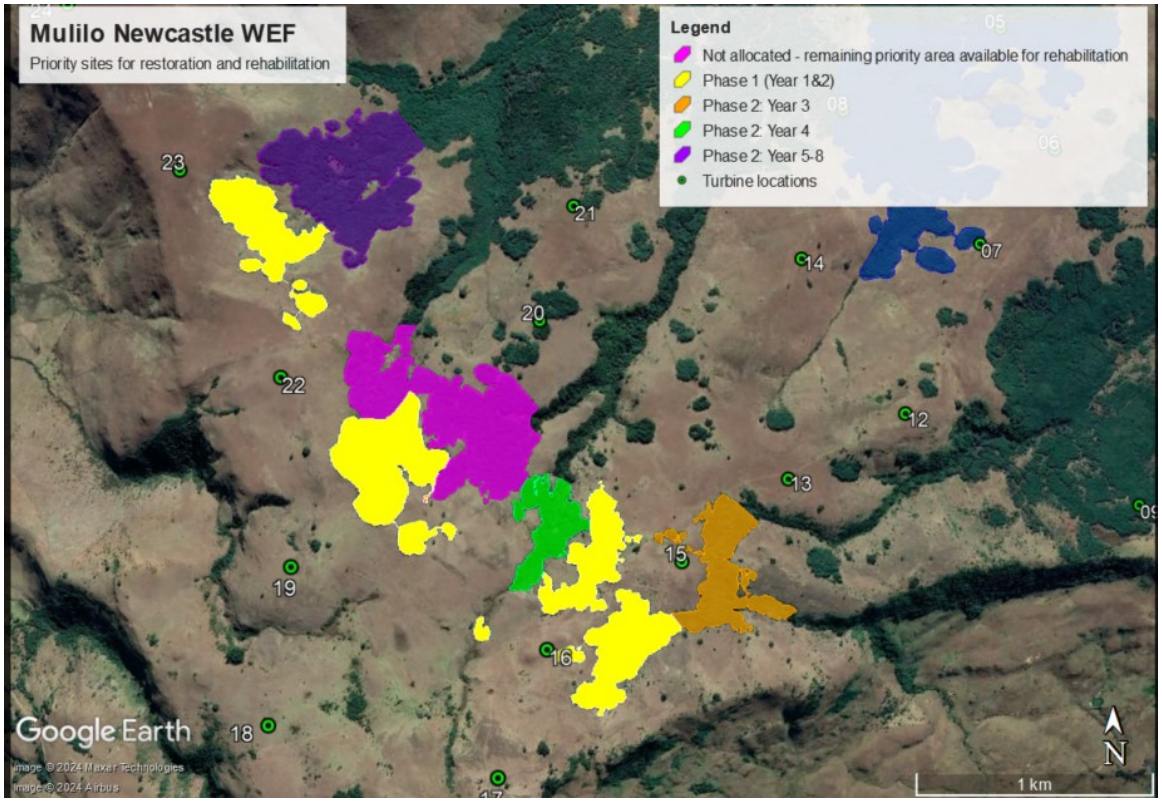

Figure 2. Phases of AIP clearing in MNWP.

4.3.3. Phase 3 (Year 8-20)

Continuous monitoring and eradication of AIPs in these selected areas for the life of the project.

Section 5. Monitoring and Evaluation

There are three aspects of monitoring related to management plans:

1. The first is the monitoring of **implementation of actions** and procedures, as outlined in the schedule for the programme (Table 3) and have activities been actioned according to the workplan (Table 2). Monitoring should take the form of an annual audit by the independent Environmental Control Officer.
2. The second aspect is the monitoring and assessment of whether the **method/approach is appropriate and successful** at achieving the objectives of the programme. This type of monitoring and feedback occurs over relatively short time periods (i.e. quarterly or after a pilot phase) and allows for approaches to be adapted in order to improve programme implementation. Indicators and targets are incorporated into the monitoring of the implementation of the programme (Table 3).
3. The third aspect monitors whether the **goals and objectives of the programme are being achieved**. This monitoring should occur over larger time periods, aligning with programme milestones and reporting frameworks of the WEF facility.

Table 3. Monitoring of the implementation restoration and management programme

Relevant Action(s)	Activity	Indicator	Target	Audit needs
AIP removal	Calculation of restoration and rehabilitation areas (based on surveyed and pegged areas)	The area for restoration and rehabilitation has been calculated based on final project footprint of MNWP.	Six (6) months prior to construction	Annual
	Involvement and input from authorities (EDTEA and DWS)	The relevant authorities have been notified of the alien clearing activities.	Six (6) months prior to construction	Annual
	Explore partnerships to expand on the work being done.	A partnership with Working for Water and Working for Wetlands has been explored, in order to expand the restoration and rehabilitation efforts.	Six (6) months prior to construction and ongoing	Annual
AIP removal Grassland rehabilitation Wetland rehabilitation	Action areas are physically demarcation	Areas for MNWP Year 1 and 2 have been demarcated. Within the areas, wetlands and a 20m buffer need to be demarcated.	Two (2) months prior to construction	Annual
AIP removal Grassland rehabilitation Wetland	Develop method statements with step-by-step actions that will be employed to undertake: Alien clearing,	Method statements been developed for: Alien plant clearing -	No later than four (4) months post-construction	Annual

Relevant Action(s)	Activity	Indicator	Target	Audit needs
rehabilitation		which will include method of clearing, removal of material and type of herbicide that will be used; Grassland revegetation - which will include species mix to be applied, method of application, and how will soil be stabilised while seed is germinating; Wetland rehabilitation – which will include the method and species used for revegetation, stabilisation of eroded banks and use of 'plugs' to recreate wetlands.		
AIP removal Grassland rehabilitation Wetland rehabilitation	Assessment of implementation of action plans	Quarterly site meetings are conducted with contractors and ECO. These meetings need to be held to discuss challenges, hold-ups and ways of improving roll-out of the plans.	Quarterly meetings are held (attendance register, meeting minutes and/or reports). Adaptive management is undertaken for effective implementation.	Annual

Table 4. Monitoring the achievement of goals and objectives of the Restoration and Rehabilitation programme

Objective	Indicator	Target	When to monitor
AIPs are permanently eradicated from the selected areas	An absence of invasive alien plants	Targets for clearing have been set in Section 4.3. Clearing should be complete by Year 8.	Progress, completion and follow-up clearing to be monitored every 5 years for the life of the project.
Grassland function and biodiversity is restored to a healthy natural state	Indicators of grassland health (SANBI, 2013): • High basal cover, which binds the soil and prevents erosion. • A high diversity of growth forms (e.g. soft-leaved herbaceous plants – or forbs, bulbs, etc in addition to grasses). • A high diversity of grass species, rather than dominance by any single species. • Topsoil that is intact, rich in organic matter and uncompacted, with lots of evidence of soil-turning through the action of various animals. • An even grass sward, rather than tussocked veld – tussocked veld is an • indicator that all the palatable species have been eaten, leaving big tufts of unpalatable species.	No bare soil is exposed and all soil is vegetated. A healthy mix of herbs and grasses (comparable to surrounding with control plot in the project area) All areas restored continue to be monitored for signs of alien plant establishment are eradicated.	Begin monitoring immediately after restoration/rehabilitation is complete and assess whether targets have been achieved 24 months (2 years) post completion for each phase (i.e. 2 years after a site has been cleared of AIPs).
Wetland function and biodiversity is restored to a natural state	Score allocated to hydrology, geomorphology and vegetation.	WET Health scores (PES) A or B.	Begin monitoring immediately after restoration/rehabilitation is complete and assess whether targets have been achieved 24 months (2 years) post completion for each phase (i.e. 2 years after a site has been cleared of AIPs).

Section 6. References

DEA (2015) Monitoring, control and eradication plans: guidelines for species listed as invasive in terms of Section 70, and as required by Section 76 of NEMBA, 2004. https://invasives.org.za/wp-content/uploads/2022/02/Monitoring-Control-and-Eradication-Plans.pdf

SANBI. 2013. Grasslands Ecosystem Guidelines: landscape interpretation for planners and managers. Compiled by Cadman, M., de Villiers, C., Lechmere-Oertel, R. and D. McCulloch. South African National Biodiversity Institute, Pretoria. 139 pages.

Van Wilgen, B, Wannenburgh, A and Wilson J. (2022) A review of two decades of government support for managing alien plant invasions in South Africa, Biological Conservation, Volume 274, 2022, 109741, ISSN 0006-3207, https://doi.org/10.1016/j.biocon.2022.109741.

APPENDIX G: ORIBI AND MOUNTAIN REEDBUCK MONITORING AND MANAGEMENT PLAN

MULILO NEWCASTLE WIND POWER WIND ENERGY FACILITY (MNWP WEF)

ORIBI AND MOUNTAIN REEDBUCK MANAGEMENT AND MONITORING PLAN

Prepared for:

MULILO RENEWABLE ENERGY

Prepared by:

CES
ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES

East London

Also in Cape Town, Makhanda, Johannesburg, Gqeberha and Maputo (Mozambique)

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February 2024

REVISIONS TRACKING TABLE

CES Report Revision and Tracking Schedule

Document Title:	Mulilo Newcastle Wind Power Wind Energy Facility: Oribi and Mountain Reedbuck Management and Monitoring Plan			
Client Name & Address:	Mulilo Newcastle Wind Power (Pty) Ltd			
Status:				
Issue Date:				
Lead Author:	Brian Reeves	brian.reeves@cesnet.co.za		
Reviewer:	Greer Hawley Aliénor Brassine	greer@btbio.co.za alienor.brassine@gmail.com		
Report Distribution	***Circulated to***		***No. of hard copies***	***No. electronic copies***
Report Version	***Date***			

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PROJECT TEAM EXPERTISE AND DECLARATIONS

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Contact Details	Brian.reeves@cesnet.co.za
Role on Project	Author
Highest Qualification	M.Sc.
SACNASP Registration No.	400173/10
SACNASP Field of Practice	Ecological Science
Experience (no. of years)	22

Declaration of Independence

This is to certify that the following report has been prepared as per the requirements of:

- Section 32 (3) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) Environmental Impact Assessment Regulations 2017 as per Government Notice No. 40772 Government Gazette, 4 December 2014 (as amended); and

I, **Brian Reeves**, hereby declare that this report has been prepared independently of any influence or prejudice.

Signed:

Date: 22/01/2024

Name of Specialist	Eleanor Brassine
Position	Fauna Specialist
Contact Details	Tel: 076 4946881 email: alienor.brassine@gmail.com
Role on Project	Co-author
Highest Qualification	MSc
SACNASP Registration No.	116197
SACNASP Field of Practice	Ecology
Experience (no. of years)	12

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I, **Eleanor Brassine** hereby declare that this report has been prepared independently of any influence or prejudice.

Signed: 

Date: 19/01/2024

Please refer to the Curricula vitae in Appendix A for more information.

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1 INTRODUCTION

CES Environmental and Social Advisory Services and Big Thorn Environmental were appointed by Mulilo Newcastle Wind Power (Pty) Ltd to develop a management and monitoring programme for oribi *Ourebia ourebi* and southern mountain reedbuck *Redunca fulvorufula fulvorufula* on the site of the Mulilo Newcastle Wind Power Wind Energy Facility (WEF).

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This document is specific to the proposed MNWP WEF, as highlighted in bold above, with DFFE application reference: **14/12/16/3/3/2/2457**

1.1 Purpose and objectives of the plan

This plan is designed to address and mitigate specific threats to oribi and mountain reedbuck on the Mulilo Newcastle WEF. The planning process involved an assessment of the various potential threats facing these species on the site, followed by the development of strategies to manage and minimize those threats.

The primary goal of this plan is to conserve the oribi and mountain reedbuck subpopulations on the Mulilo Newcastle Wind Power WEF site, ensuring not only that the project does not negatively affect them but also that sound management over the lifespan of the proposed development contributes to the persistence and growth of these subpopulations.

Little is known about the status of the two species on the site and a substantial component of this plan aims to establish baseline estimates of the size, characteristics, and distribution of the subpopulations on the site. This plan is presented as an adaptive management framework, which involves developing and implementing management actions, monitoring changes in the status of the subpopulations and the outcome of management actions, and then devising future actions based on the results of monitoring.

1.2 Commencement of the plan

This plan has a five-year planning horizon, which will commence once the project is selected as a Preferred Bidder in a government or private tender programme (this is seen as the initiation of Year 1 according to the timeframes indicated further in this document). Preconstruction monitoring will take place in this year. Construction is assumed to begin in Year 2 and continue into Year 3. Operation is assumed to begin in Year 4, and the facility is expected to have a lifespan of 20–25 years.

2 LITERATURE REVIEW

2.1 Oribi

2.1.1 Status and threats

Oribi is distributed across Africa, with patchy distributions from Senegal to Ethiopia, through eastern and western Africa to Angola and the Eastern Cape, South Africa. The species is classified as Endangered by the regional red list assessment (Shrader et al. 2016) while the IUCN Red List classifies it as Least Concern but notes a declining trend (IUCN SCC 2016).

Between 1996 and 2014, the South Africa population was estimated to have declined by approximately 13%. The population is thought to have less than 2,500 mature individuals, with approximately 75% of these occurring on private land (Grey-Ross et al. 2010). Within KwaZulu-Natal, survey data indicate that most subpopulations are declining.

The primary factor for the decline of oribi populations is loss of suitable grassland habitat (Patel, 2015). This can be attributed to activities such as commercial forestry, intensive commercial farming, and mining, and the deterioration of grasslands due to overstocking, inadequate fire management, and erosion (Coverdale et al. 2006).

Poaching, especially involving domestic dogs, has likely contributed to declines in the country (Shrader et al. 2016, Grey-Ross et al. 2010). The lying-out behaviour of oribi makes them particularly vulnerable to hunting with dogs (O'Connor & Krüger 2003). Although many private landowners hosting oribi claim an absence of poaching on their properties (Grey-Ross et al. 2010), such perceptions may be inaccurate. The practice of 'taxi hunts' has gained popularity in KwaZulu-Natal, where mini-bus taxis transport hunters to private farms during the night or early morning. Hunters release dogs to freely hunt on these farms, often turning the activity into a form of gambling, with participants placing bets on the outcomes. The owner of the first dog to successfully bring down an animal is declared the winner (Grey-Ross et al. 2010). It is crucial to emphasize that these hunts are not driven by subsistence needs - the hunting is mostly a sport, with bushmeat adding value to the sport (Manqele et al. 2018). This practice may have a cultural origin and may have evolved from a Zulu cultural event known as *inqina* – organised hunting by multiple villages with proceeds taken to the king for approval. In certain regions, these hunting groups are well-equipped with weapons and have been known to intimidate law enforcement and conservation authorities. While poverty and unemployment are often cited as a reason for poaching, Manqele et al. (2018) found the majority of illegal oribi hunters were employed, or owned land and livestock, and suggested that employment may fund hunting (e.g., the cost of keeping of dogs). These authors found no seasonal pattern to illegal hunting, but that hunting increased during timber harvesting and suggested this may be linked to migrant labour.

In their study, Manqele et al. 2018 found that the use of dogs was the most prevalent form of hunting (93%), followed by snares (6%). Firearms were only used by approximately 1% of respondents.

2.1.2 Habitat requirements

Optimal habitats for oribi are open grasslands with a high proportion of palatable sweet grasses. Because of their small size and high metabolic rates, they require high quality forage (Grey 2006). They are therefore highly selective and primarily select decreaser grasses, especially *Themeda triandra*, *Andropogon schirensis* and *Monocymbium ceresiiforme* (Grey 2006). Oribi display positive selection for open grassland and hayfields, but avoid pastures, crop lands and plantations. They are water-independent (Hill 2009).

In terms of habitat structure, oribi require a mosaic of tall and short grasses. Short grassland is preferred for feeding while longer grassland is utilised for resting, cover and concealing offspring (Everett et al. 1991, Grey 2006).

Oribi respond positively to recently burnt or mowed grassland (Everett et al. 1991, Grey 2006). This is because older grasslands accumulate dry, moribund material. In the years following fire, the crude fibre content increases, and access to green growth becomes progressively limited as grass tufts grow larger, shading out other tufts and reducing basal cover. Burning benefits oribi because recently burnt grass has much higher crude protein, phosphate, and calcium content. Additionally, without some form of non-selective defoliation (such as burning), shifts in species composition can occur, which are marked by a decrease in the abundance of palatable grasses and an increase in unpalatable grasses. Rowe-Rowe (1982) found that oribi preferred one-year old grassland to two-year old grassland.

During winter, lower temperatures, shorter days and drier conditions cause sourveld grasses to withdraw nutrients from the leaves (Lechmere-Oertel 2014). There is a decrease in the crude protein and energy content of grasses and an increase in crude fibre content, decreasing the quality of forage for oribi. During this time, oribi must utilise fat deposits, causing a loss in condition, and they are more vulnerable to extreme weather conditions, predation, and disease (Everett et al. 1991). In this season, oribi may need to become more selective to meet their need for high-quality forage, potentially requiring them to cover greater distances to locate favourable patches. Consequently, the expenses associated with movement, food selection, ingestion, and digestion rise as the quality of grasslands declines (Everett et al. 1991). Some defoliation of grasslands in autumn, either through burning or mowing, provides high-quality food for oribi in the crucial winter months. Rowe-Rowe (1982) found that after firebreaks had been burned during June, most oribi left areas burned in the previous year to feed on the firebreaks. These animals remained on these firebreaks until the areas burned in the subsequent spring burns began to turn green.

Perrin & Everett (1999) found that oribi preferred north- and east-facing slopes with a gradient of 5-10^{o}. They found that south- and southeast-facing slopes were avoided and that other slopes were used in relation to their availability. Previous studies (Rowe-Rowe 1982, Reilly 1989) also found that oribi selected northerly aspects. Selection for north- and east facing slopes may be due to these slopes being drier and having a higher proportion of sweet grasses. Perrin & Everett (1999) also found that oribi avoided flat land (0-5^{o} slopes) and steep areas (> 15^{o} slopes). They suggested that avoidance of flat areas is related to heavy soils and poor drainage, which affect grass species composition and the presence of preferred forage species. Other studies corroborate the preference for gentle slopes but did not record avoidance of flat lands (Rowe-Rowe 1982, Reilly 1989). This could be because these studies were conducted in the Drakensberg, where the plateaus are well-drained.

In terms of topographic position, Perrin & Everett (1999) found that oribi preferred ridge terraces, avoided lowlands, and used other topographic units in relation to their availability. Selection for ridge terraces may be due to localised increases in soil fertility due to these features collecting soil minerals.

Local densities of oribi are linked to rainfall regularity and the quality and quantity of preferred grasses (Brashares & Arcese 2002). Since oribi have specific habitat requirements and relatively small home ranges, reporting and comparison of density estimates is complicated by the choice of denominator in density calculations (e.g., using the extent of suitable habitat or property size as the denominator). In good habitat, oribi can achieve relatively high densities, ranging from one oribi per 9 ha to one per 30 ha (Everett 1991). Grey-Ross et al. (2009) noted that 22 translocated oribi occupied approximately 30 ha post-release (close to one oribi per ha). Based on this observed post-release high density, these authors stated that it is difficult to estimate carrying capacity and minimum area required for oribi if the habitat is suitable and the property is secure from poaching.

2.1.3 Behaviour

Oribi are normally monogamous in South Africa (Adamczak & Dunbar 2007) but polygyny appears to be more frequent in East Africa. Adamczak & Dunbar (2007) reported that the polygyny rate from six populations in South Africa ranged from 0.04 – 0.26. These authors observed that where polygyny did occur in their study site in northern KwaZulu-Natal, polygynous groups were unstable. The incidence of this mating system may be correlated with population size, the ratio of adult females to males (Arcese et al. 1995), predation risk, and altitude (mostly through its effect on grazing quality; Adamczak & Dunbar 2007).

Oribi group size varies with habitat and mating system. In montane areas, Rowe-Rowe et al. (1992) found that adults occurred in monogamous pairs or as single animals. In lowland areas, oribi are more likely to be found in groups. Mean group size from six populations in South Africa ranged from 1.5 to 2.1 individuals (Adamczak & Dunbar 2007) and the sex ratio (males: females) ranged from 1:0.72 to 1:1.28.

Oribi are normally territorial and territory size varies with season, rainfall, availability of suitable habitat, food quality and the quality of management (Grey-Ross 2009, Brashares & Arcese 2002). Territories appear to be centred in larger home ranges, which include a large area of neutral range. Everett (1991) observed that there does not seem to be strong competition for food and Grey-Ross et al. (2009) found that oribi graze in burnt or mowed fields without aggression to each other. Average published home range of adult males range between 5 and 47 hectares with considerable overlap in home ranges and slight overlap in core areas (Skinner & Chimimba 2005). Mean territory size was calculated at 3.4 hectares for a subpopulation in Mpumalanga Province (Skinner & Chimimba 2005).

Oribi are mostly active during the day and there is very limited information on any nocturnal activity (Tekaling & Bekele 2015). Oliver et al. (1978) found that most feeding occurred during the early morning and late afternoon, with period around midday spent lying down.

Oribi are seasonal breeders, with lambing taking place from October to December (Hill 2009). The young lie out in taller grassland for at least six weeks after birth (Oliver et al. 1978). Anti-predator behaviour of oribi involves sinking to the ground and lying prone (Adamczak & Dunbar 2007).

2.1.4 Conservation management

Everett et al. (1991) state that the optimal management approach for oribi involves conducting a controlled burn every two years during autumn, supplemented by mowed sections. They also recommend an alternative approach of controlled burns in late winter or early spring every two years, coupled with mowed areas and the burning of wide firebreaks in autumn (Everett 1991). Their alternative approach is likely to be a better trade-off between maintaining grassland health and diversity and facilitating oribi. This is because burning in autumn (burning for a “green bite”), reduces plant diversity and basal cover and leads to rangeland deterioration (Tainton & Mentis 1984, Lechmere-Oertel 2014). Out of season growth depletes grass root reserves and affects vigour during the following growth season. This practice also leaves the soil exposed to insolation and erosion throughout the winter period (Trollope 1989). It has been strongly condemned by Trollope (2007).

While burning in early spring is generally regarded as appropriate, this should happen before the start of the growing season. Burning after the start of the growing season is not advised for sub-escarpment grasslands because burning just as new growth is starting leads to reduced vigour and tuft-size, and increased soil erosion (SANBI 2013). This practice will also impact on breeding and recruitment of many faunal groups (Lechmere-Oertel 2014).

Translocations of oribi have occurred throughout South Africa, but there have been few records of the outcomes of these. Grey-Ross et al. (2009) studied the translocation of 15 oribi in KwaZulu-Natal. Only

one death occurred, and all remaining individuals survived. Most remained near the release site. They suggested that translocation could be a viable option. These animals were caught using a professional game capture team using a helicopter and net boma. These authors found that animals were tolerant of each other after translocation and did not immediately establish territories exclusive of one another.

The ecological density for oribi varies with rangeland quality and management. Previously estimated ecological density ranged between one oribi per 5.5 hectares to one oribi per 24.3 hectares for the midlands in KwaZulu-Natal (Skinner & Chimimba 2005).

2.2 Southern mountain reedbuck

2.2.1 Status and threats

Both the regional (Taylor et al. 2016) and IUCN (Taylor et al. 2019) red lists classify southern mountain reedbuck as Endangered. The subspecies is near-endemic to South Africa. It has a wide but patchy distribution, occurring in all provinces but absent in the western part of the country (western part of the Northern and Western Cape Provinces).

Literature has noted a decline in mountain reedbuck since at least the late 1970s (Irby 1977). Between 1998 and 2013, there was a greater than 60% decline of mountain reedbuck populations in protected areas across the entire range of the subspecies. Based on 2013 data, the population size was estimated at between approximately 10,000–14,000 individuals (Taylor et al. 2016). Reasons for the decline are not well understood and research on potential threats to this subspecies is urgently required (Taylor et al. 2016). Current hypotheses include increased predations rates (possibly from elevated black-backed jackal abundances), poor land management, increased frequency of drought, and illegal hunting.

In the Free State and Northern Cape, anecdotal evidence indicates increased predation from higher abundances of mesopredators ((medium sized predators; examples are black-backed jackal and caracal) may be contributing to declines. However, declines have been observed even on properties where mesopredators are controlled (Taylor et al. 2016). It has also been suggested that higher baboon abundance may be resulting in increased lamb predation, but this needs further research (Taylor et al. 2016). Irby (1977) found that study areas with higher lamb to female ratios were generally (medium sized predators; examples are black-backed jackals and caracals) in areas with lower predator densities, but this trend was not consistent, and the effects of predators could not be isolated from other factors (e.g., annual rainfall variation, grazing quality, vegetation physiognomy).

Mountain reedbuck may be particularly vulnerable to increased frequency of droughts, linked to climate change. This may necessitate that they move down from suitable habitat into more open and flat areas to obtain water, making them more vulnerable to predators (Taylor et al. 2016).

Similar to oribi, their lying-out behaviour makes mountain reedbuck vulnerable to being hunted by dogs (O'Connor & Krüger 2003). They are also susceptible to disturbances caused by cattle herders and their livestock (Taylor et al. 2016).

2.2.2 Habitat requirements

Mountain reedbuck have specialised habitat requirements and displayed the least overlap of the five species examined by Rowe-Rowe (1983) in terms of altitude, aspect, slope and topography. They occur on steep slopes on rocky and grassy hillsides, often at high altitudes (Taylor & Skinner 2006, Taylor et

al. 2016, Rowe-Rowe 1983). They often occur in areas with some bush cover and avoid places without bush or long grass cover (Taylor et al. 2016, Dunbar & Roberts 1992).

Rowe-Rowe (1983) found that mountain reedbuck favoured slopes with a gradient of over 20^{o}. In terms of topographic position, their selection for different parts of the slopes appears to vary depending on cover. In areas where cover is more abundant in lower valleys, reedbuck prefer these areas and this preference may be associated with access to water. In areas with high predation risk and low cover density, higher slopes become more important (Rowe-Rowe 1983). The distance between cover or steep slopes and higher-quality food resources may influence home range size (Dunbar & Roberts 1992). Where these key resources are spaced further apart, home ranges may need to be larger. Mountain reedbuck also utilize mountain ridges, although less frequently where cover is sparce (Skinner & Chimimba 2005). Despite this, a survey of mountain reedbuck in the Kuruman mountains of the Northern Cape primarily found Mountain Reedbuck on mountain ridges.

Mountain reedbuck are most frequently recorded on north slopes, but they also utilise south and south-east aspects (Rowe-Rowe 1983). They are water-dependent, and their use of the cooler, more southerly aspects might be related to their water requirements (Taylor et al. 2016).

They are selective grazers (Taylor & Skinner 2006; Rowe-Rowe 1983), generally eating the greenest, softest parts of grasses with the highest nutritive value, (Rowe-Rowe 1983, Taylor et al. 2016). In the Drakensburg they preferentially utilised *Themeda triandra* and *Hyparrhenia* spp (Rowe-Rowe 1983). Like oribi, mountain reedbuck prefer younger grassland to older grassland (Rowe-Rowe 1982).

2.2.3 Behaviour

The mating system of mountain reedbuck is that of resource defence polygyny. Breeding males occupy the same territories throughout the year. Females are not territorial, occurring in small unstable herds comprising 3-8 adults and their young, and moving between the territories of multiple males (Irby 1976, Taylor & Skinner 2006). Young males are chased out of their natal areas before reaching reproductive age (Taylor 2004) and may form small bachelor groups. Groups disperse and coalesce depending on forage availability (Irby 1977, Dunbar & Robers 1992). Larger groups of more than 30 animals do occasionally occur, but this is normally temporary (Taylor & Skinner 2006). Irby (1973) reported average sex ratios (males: females) of 1:1.9.

Male territories have been estimated to range from 5–30 ha while females use areas of up to 100 ha (Taylor 2004). Due to the small size of male territories, adjoining males are often within view of one another. They therefore do not generally scent mark their territories, but rather use visual signals to advertise their presence and warn off other males (Taylor & Skinner 2006).

Males defend areas with steep slopes and many hiding places (long vegetation, boulders). Since females also select steep slopes, likely for predator avoidance (Taylor & Skinner 2006, Dunbar & Roberts 1992), it is thought that males with a greater proportion of steep slopes within their territories have greater access to females and therefore a greater chance of mating (Taylor & Skinner 2006).

Mountain reedbuck forage in the early morning and late afternoon and are also active at night. During the middle of the day, they rest and ruminate (Taylor et al. 2006).

Black-backed jackal, leopard and caracal were the most frequently reported predators of mountain reedbuck (Irby 1977). Antipredator behaviour normally involves lying down and freezing in place or running to cover and freezing (Taylor & Skinner 2006).

Mountain reedbuck are seasonal breeders, with lambing taking place between October and January (Taylor 2004). Newborn lambs remain hidden for the first 3-4 weeks, with mothers only attending to their offspring occasionally to feed them (Taylor & Skinner 2006).

2.2.4 Conservation management

Because both oribi and mountain reedbuck share similar requirements for decreaser grass species, and for younger grasslands for foraging and older grasslands for cover and predator avoidance, the management recommendations outlined for oribi are likely to also support the persistence of mountain reedbuck. Low quality grazing during the dry season has been suggested as a reason for high lamb mortality (Irby 1973, Irby 1977). O'Connor & Krüger (2003) identified protein-rich foliage during winter, such as the post-fire flush found on early winter firebreaks, as a key resource. Irby (1977) states that access to annually-burned firebreaks is a possible reason for the good performance of mountain reedbuck at a sourveld farm in Ohrigstad (Irby 1977)

Cold, wet weather during winter or spring, when animals are in low condition, could cause elevated mortality especially in juveniles but also in adults in extreme cases (Irby 1973). A sequence of years with these conditions could change the trajectory of a population (O'Connor & Krüger 2003).

There is some indication from the literature that success rates of mountain reedbuck translocations may be low. The red list assessment recommends caution when considering translocations for this species (Taylor et al. 2016).

3 CONTEXT AND DESCRIPTION OF THE SITE

3.1 Vegetation

The vegetation on the site falls within the sub-escarpment grassland bioregion. This region is underlain by a mosaic of shallow, poorly-drained soils from sedimentary rocks (shales, sandstones, and mudstones) interspersed with deep, well-drained soils from igneous rocks (basalt and dolerite). Due to high rainfall, the soils are generally well-drained and can become leached, and generally support sourveld.

Two vegetation types occur on the site, namely Low Escarpment Moist Grassland and KwaZulu-Natal Highland Thornveld.

Low Escarpment Moist Grassland is a tall, closed grassland occurring on Karoo Supergroup mudstones and shales. Under sound management, the dominant grasses are *Hyparrhenia hirta* and *Themeda triandra*. Other abundant grasses are *Digitaria tricholaenoides*, *Tristachya leucothrix, Cynodon dactylon*, *Eragrostis racemosa*, *Elionurus muticus*, *Harpochloa falx*, and *Aristida congesta*.

KwaZulu-Natal Highland Thornveld is a tall tussock grassland with occasional woodlands. It occurs on soils derived from Karoo Supergroup rocks of the Dwyka, Ecca and Beaufort Groups. Yellow-brown soils over plinthic subsoils and shallow duplex soils are common. It also occurs on red and black heavy soils derived from dolerites. When this grassland is in good condition, it is dominated by *Hyparrhenia hirta*. Other abundant grasses are *Abilgaardia ovata*, *Andropogon eucomus, Aristida bipartita*, *Aristida congesta*, *Chloris virgata*, *Cynodon dactylon*, *Elionurus muticus, Eragrostis capensis*, *Eragrostis chloromelas*, *Eragrostis plana*, *Eragrostis racemosa*, *Eragrostis superba*, *Heteropogon contortus*, *Hyparrhenia hirta*, *Setaria sphacelate*, *Themeda triandra* and *Tristachya leucothrix*.

In sourveld regions, the grasses are generally most palatable during the growing season and during the dry season grazing is poor. These grasslands are not suited to continuous high-intensity grazing.

Grass species vary in terms of the quantity and quality of material they produce for grazing and how they respond to grazing. Increaser grass species thrive and increase in abundance under grazing

pressure, while decreaser grass species decline in response to grazing and may become less prevalent in grazed areas (see Table 3-1).

Table 3-1: Description of grazing status categories (van Oudtshoorn 2012).

Grazing status	Description
Decreaser	Palatable, climax grasses that decrease in abundance with overgrazing or undergrazing.
Increaser I	Usually unpalatable, robust climax species that can grow without any defoliation. Abundant in underutilised rangelands.
Increaser II	Generally unpalatable pioneer and subclimax species that increase due to the disturbances caused by overgrazing.
Increaser III	Usually unpalatable, dense climax grasses that are commonly found in overgrazed rangelands. These grasses are strong competitors and increase when palatable grasses are weakened through overgrazing. They may also be stimulated by grazing.

The grazing value and status of dominant grasses within Low Escarpment Moist Grassland and KwaZulu-Natal Highland Thornveld is presented in Table 3-1.

Table 3-2: Grazing value and status of grasses found on site.

Species	Grazing value	Grazing Status
Themeda triandra	Highly palatable	Decreaser
Digitaria tricholaenoides	Highly palatable	Decreaser
Cynodon dactylon	Highly palatable	Increaser II
Setaria sphacelata	Palatable	Decreaser
Hyparrhenia hirta	Palatable	Increaser I
Tristachya leucothrix	Palatable	Increaser I
Eragrostis racemosa	Palatable	Increaser II
Chloris virgata	Palatable	Increaser II
Eragrostis capensis	Palatable	Increaser II
Eragrostis chloromelas	Palatable	Increaser II
Eragrostis racemosa	Palatable	Increaser II
Eragrostis superba	Palatable	Increaser II
Heteropogon contortus	Palatable	Increaser II
Harpochloa falx	Unpalatable	Increaser I
Aristida congesta	Unpalatable	Increaser II
Andropogon eucomus	Unpalatable	Increaser II
Aristida bipartita	Unpalatable	Increaser II
Eragrostis plana	Unpalatable	Increaser II
Elionurus muticus	Unpalatable	Increaser III

3.2 Oribi and mountain reedbuck presence on site

Landowners have confirmed the presence of both oribi and mountain reedbuck on the site (see Botanical and Faunal Impact Assessment, CES 2023). In addition, oribi (one sighting of an ewe with her lamb) and mountain reedbuck were observed during bird monitoring on site. Besides the above, little is known about the status of these subpopulations and their distribution on the site.

Areas likely to be preferentially utilised by oribi and mountain reedbuck were modelled based on aspect and slope preferences of the individual species (see Figure 3-1 for oribi and Figure 3-2 for mountain reedbuck). These represent preliminary estimations and should be refined once data on occurrence of these species is collected through the monitoring programme. Already refinements to the mountain reedbuck map have been suggested (i.e., to incorporate ridges, which are known to be utilised by this species).

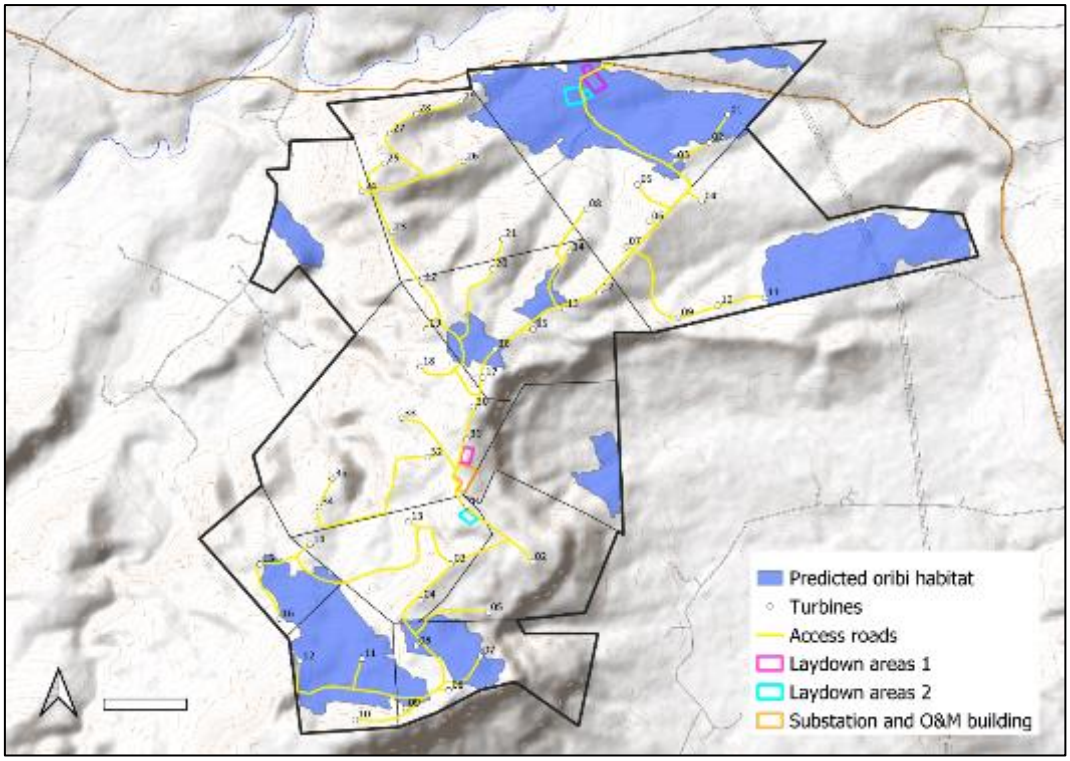

Figure 3-1: Predicted oribi habitat on the Mulilo Newcastle WEF.

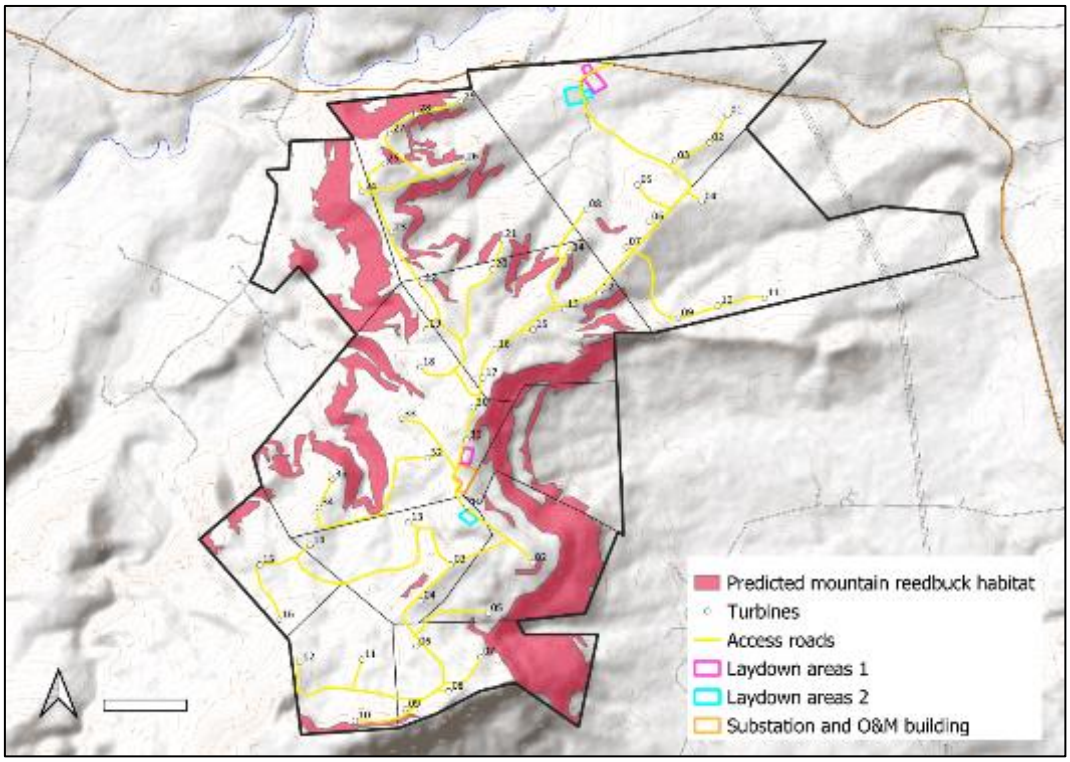

Figure 3-2: Predicted mountain reedbuck habitat on the Mulilo Newcastle WEF.

3.3 Current land use and management practices

A discussion was held with a landowner of several properties within the MNWP WEF site to develop an understanding of current land use and management practices. Insights from this discussion are presented below according to topic.

Oribi and mountain reedbuck:

- The landowner stated that he had never seen oribi or mountain reedbuck on the top of the plateau, and that these species generally occur lower down in elevation.
- Regarding the oribi sighted during the avifaunal survey, the landowner suggested that the oribi may have moved up onto the plateau temporarily to graze on areas that had recently been burned. He stated that they mainly stay below the cliffs.

Grazing:

- Due to the area being sourveld, the properties are mostly used for summer grazing by cattle and not generally grazed in winter.
- The properties are divided into 12 camps of approximately 50 ha per camp (but some camps are much bigger).
- Herd sizes vary, but each camp is typically stocked with a maximum of 100 cows and their calves and five bulls.
- The camps are stocked sequentially, with herders moving the animals up from the lower elevation farms. A camp is stocked until it is deemed to be at capacity and then animals coming up from the lower elevation farms are placed in the next camp.
- Animals are provided with licks and remain in the camps for the remainder of summer, being brought down again once the calves are weaned. Animals are moved down as the nutrient status of the grass begins to deteriorate.
- No camps are rested during the growing season and the landowner believes that they do not have sufficient grazing to do this.
- The landowner believes that sourveld must be grazed hard for four months of the year. If the camps have been grazed heavily and the grass is short, they prefer not to burn. However, unplanned fires generally occur every year, coming in from the west.
- There are generally not areas with long grass on the plateau. The landowner's perception was that, due to the nature of the environment, the grass will not become long even if it is not burned.

Fire:

- Fire in winter is a serious concern. The grasslands generally burn every year, with fires generally coming in from the west.
- The landowners establish extensive firebreaks from the end of summer to the beginning of winter (after first frost).
- Firebreaks are established in the east to control fires moving towards the lower elevation farms. No firebreaks are constructed in the west and the terrain in this area makes it very difficult to do so.
- Any planned burns are generally conducted after the first rain in spring.

- If a portion of a camp is burned by an unplanned fire, the remainder of the camp must be burned to prevent livestock from overutilizing the burned area of the camp.

Damage causing animals:

- The landowner perceives that baboon numbers are high on the plateau.
- Two individual leopards have been observed with camera traps.
- Landowners control jackal whenever possible, due to perceptions of jackal being responsible for killing calves. There is also a perception of lower guineafowl numbers due to jackal abundance.

Security and Poaching:

- The area is very inaccessible (requiring a four-wheel drive vehicle to access) and limits access to the site by outsiders.
- Taxi hunts are not a concern due to the inaccessible nature of the site.
- Hunting with dogs is not prevalent, but the landowner did state that farm dwellers in the west may hunt with dogs.
- The landowner has never witnessed hunting with dogs or poaching on the site and has never found snares.
- There have been incidences of stock theft, but these are very rare.
- Farms workers are well-educated regarding the impacts of hunting with dogs. Every family is only allowed to have one dog. These are watch dogs, and not hunting dogs.
- There is a Farm Watch and a security company operating in the area. The security company conducts patrols in the broader area but does not access the site.

Fencing:

- Standard 5-strand cattle fences, with barbed wire strands, are used throughout. There is no jackal-proof fencing.
- The property previously belonging to Mr Heyneke Meyer had a game fence but after this property was bought by the government, the fence has deteriorated or been removed.

Invasive alien plants:

- The area is heavily infested with black wattle and the landowners have attempted many different forms of control.
- The intention is to clear the area of invasive alien plants and there appears to be no desire to maintain stands.
- There was previously a system where the properties were divided into subunits and a manager his staff would be assigned to manage alien plants within each subunit.
- Farm workers from the lower elevation farms would be sent to the plateaus to control aliens, but this work would often be deprioritised in favour of other more pressing issues.

- Landowners have attempted various methods of control, including using a bulldozer, burning, and clearing by hand. There have been recent experiments with using a drone to apply herbicide, and this seems promising.
- There was a team of people removing invasive alien trees, which would then be transported to Richards Bay for pulp. These people would stay on the plateaus in the areas that they were working. They were reported to create quite a deal of litter and waste within the wattle stands.
- The landowner interviewed expressed doubts that workers conducting invasive alien plant clearing participated in poaching. The disturbance created (e.g., during chainsaw work) would undoubtedly cause oribi and mountain reedbuck to move away from areas that are being worked.

4 LEGISLATION

4.1 Threatened or Protected Species Regulations

The Threatened or Protected Species (ToPS) Regulations identifies restricted activities involving listed threatened or protected species. Oribi is a ToPS species and ToPS permits will be required for any of the restricted activities, which generally include activities relating to the physical manipulation or possession of animals, such as hunting, capture, breeding, keeping in captivity, and trading or transport of protected animals or animal parts.

4.2 KwaZulu-Natal Conservation Management Act (Act 9 of 1997, Kwa-Zulu-Natal)

The KwaZulu-Natal Conservation Management Act (Act 9 of 1997) provides for institutional structures for nature conservation in KwaZulu-Natal and establishes control and monitoring bodies and mechanisms. The Act establishes the KwaZulu-Natal Nature Conservation Board, which is the successor in title to the Natal Parks Board.

The KwaZulu-Natal Nature Conservation Service (Ezemvelo KZN Wildlife) is likewise established in terms of the above Act and essentially comprises the staff compliment of the Nature Conservation authority in KwaZulu-Natal. KZN Wildlife therefore carries out the day-to-day operation of the nature conservation in KwaZulu-Natal and as such is accountable to the Board.

4.3 KwaZulu-Natal Conservation Amendment Act (Act 5 of 1999, KwaZulu-Natal)

Oribi is listed under Schedule 4 as a specially protected indigenous animal. In terms of Section 52, no person may capture, harm, hunt, purchase, release, sell or translocate a specially protected indigenous animal except under authority of a permit issued by Ezemvelo KZN Wildlife.

4.4 Natal Nature Conservation Ordinance

Although the KwaZulu-Natal Nature Conservation Amendment Act, which prescribes the law relating to the protection of flora and fauna, has been passed, until such time as regulations necessary to supplement the Amendment Act are finalised the Amendment Act will not be enacted and the law enforcement provisions are still dealt with by the remaining sections of the Natal Nature Conservation Ordinance 15 of 1974 and the KwaZulu Nature Conservation Act, 1992. Once the Amendment Act is put into operation the above-mentioned Ordinance and the KwaZulu Nature Conservation Act, 1992 will be entirely repealed.

4.5 National Veld and Forest Fire Act (Act 101 of 1998)

The purpose of the National Veld and Forest Fire Act (Act 101 of 1998) is to prevent and combat veld, forest, and mountain fires in South Africa and to provide for a variety of institutions, methods and practices for achieving this purpose. The Act replaces provisions of the Forest Act (Act 122 of 1984) regarding fire management and introduces new provisions that are aimed at filling gaps in the diverse statutes that affect fire management.

Chapter 2 of the Act provides for the establishment of Fire Protection Associations (FPAs) for landowners and land managers to cooperate to manage fire. Only one FPA may be registered for an area and the owner of any State land must join the association.

Chapter 4 of the Act places a duty on landowners to prepare and maintain firebreaks. Landowners must maintain firebreaks on their side of their property boundaries but may, upon agreement with adjacent landowners, develop a common firebreak away from the boundary. If firebreaks are to be prepared by burning, the Act requires that landowners consult with adjoining landowners and notify the FPA. If agreement cannot be reached with adjoining landowners on dates for burning, the landowner must give adjoining landowners and the FPA at least 14 days written notice. Firebreaks may not be prepared by burning if the FPA objects, a warning has been issued based on the national fire danger rating system, or if conditions are not conducive. Landowners burning firebreaks must be present or have an agent attending and ensure that sufficient people are present to prevent the spread of fire. A FPA can amend parts of these provisions, provided that Ministerial approval is obtained.

According to the Act, firebreaks must be wide enough to have a reasonable chance of prevent wildfires from spreading from or to neighbouring land. They must also be reasonably free of flammable material and must not result in soil erosion.

Chapter 5 of the Act deals with responding to fires. This chapter places a duty on all landowners to have equipment and personnel available to fight fires. If a landowner has reason to believe that a fire on his or her land or adjacent properties threatens life, property or the environment, the landowner must take reasonable steps to notify the Fire Protection Officer (FPO) or member of the Fire Protection Association executive committee and adjacent landowners. The landowner must also do everything in his or her power to prevent the spread of the fire. The FPO may take control over firefighting from any person who was previously controlling a fire and order people to assist. Any person acting to control a fire to protect life, property or the environment may enter any land, destroy vegetation, enter or break and enter any premises, prevent a person from entering any premises, forcibly remove obstructing people, and remove any vehicle or other object. Whenever a fire spreads across the boundary of a FPA, the FPO must inform the FPO of the area into which the fire spreads and take steps needed to coordinate the firefighting operation.

5 KEY STAKEHOLDERS

5.1 Ezemvelo KZN Wildlife

The KwaZulu-Natal Nature Conservation Services, known as Ezemvelo KZN Wildlife, is the conservation authority for KwaZulu-Natal. The organisation's mandate is derived from the KwaZulu-Natal Nature Conservation Management Act. Ezemvelo KZN Wildlife manages provincial protected areas, manages the provincial biodiversity stewardship programme, and is involved in conservation of endangered species, ecological research, and environmental education.

Ezemvelo KZN Wildlife has a long history of managing the species considered in this management plan, both through its efforts within protected areas and through collaboration with private landowners.

The organization can provide valuable insights based on its extensive experience. Ezemvelo KZN Wildlife employs District Conservation Officers whose responsibilities include the provision of conservation extension support to landowners.

Ezemvelo KZN Wildlife issues permits in terms of the Threatened or Protected Species Regulations and the Provincial Conservation Management Act. Ezemvelo KZN Wildlife is also affiliated to CITES and as such grants permits for the export and import of CITES listed species to and from the province.

5.2 Oribi Working Group

The Oribi Working Group was formed in 2000 to address threats facing oribi and to collaborate with private landowner custodians of oribi. The working group comprises Ezemvelo KZN Wildlife staff, influential farmers, and representatives of forestry companies and NGOs.

The mission of Oribi Working Group is to promote the long-term survival of the species in its natural grassland habitat, by initiating and coordinating conservation programmes to sustain existing populations and reduce threats to them. A primary goal of the Oribi Working Group is to provide critical monitoring of oribi through an annual citizen-led census, and to consolidate population data in a database that can guide research opportunities and inform management plans.

The working group considers translocation as a possible viable conservation strategy to oribi. The working group identifies small oribi subpopulations that are vulnerable to local extinction. These animals are recommended as candidates for translocation.

5.3 Endangered Wildlife Trust

The Endangered Wildlife Trust (EWT) is a non-governmental, non-profit, conservation organisation, founded in 1973 and operating throughout southern Africa. The EWT conserves threatened species and ecosystems in southern Africa by initiating research and conservation action programmes, implementing projects which mitigate threats facing species diversity and supporting sustainable natural resource management. The EWT furthermore communicates the principles of sustainable living through awareness programmes to the broadest possible constituency for the benefit of the region.

The EWT has a history of being involved with oribi conservation initiatives, and the Oribi Working Group was originally a working group of the EWT. The EWT should be consulted, especially regarding the participation of the site in broader oribi conservation initiatives.

5.4 Sneeuwberg Protected Environment

The Sneeuwberg Protected Environment occurs approximately 5 km to the west of the site, in the north-eastern Free State. It was gazetted in 2016 and is approximately 18,000 ha in extent. Oribi occur within this protected environment and opportunities for collaboration in metapopulation management should be explored.

6 MANAGEMENT IMPLEMENATION PLAN

6.1 Threat analysis

An analysis of threats to the persistence of the oribi and mountain reedbuck subpopulations on the MNWP WEF site is presented in Table 6-1. Threats were identified from the literature and during a project team workshop. The identified threats were grouped into themes and prioritised, and appropriate management responses were considered.

Table 6-1: Threats to oribi and mountain reedbuck on the MNWP WEF site.

Threat	Priority: Oribi	Priority: Mountain reedbuck	Theme	Appropriate management actions and responses
Poor fire management results in unsuitable habitat structure and grass species composition.	High	High	Habitat management	Implement an appropriate burning regime that supports rangeland health and biodiversity but that also meets the requirements of both species.
Poor grazing management impacts on grass species composition and rangeland health.	High	High	Habitat management	Implement a dynamic grazing plan based on a rangeland condition assessment and sound management guidelines. Maintain conservative stocking rates
Alien plant encroachment results in a loss of habitat.	High	High	Habitat management	Conduct invasive alien plant control (focusing on the primary invader, namely black wattle) to prevent the loss of oribi and mountain reedbuck habitat. Rehabilitation of oribi and mountain reedbuck habitat after alien plant control.
The development of the WEF results in loss of habitat.	Low	Low	Habitat management	This aspect has already been considered in the development of the layout for the WEF, turbine numbers have been minimised and, where possible, turbines and infrastructure have avoided oribi and mountain reedbuck habitat.

Threat	Priority: Oribi	Priority: Mountain reedbuck	Theme	Appropriate management actions and responses
Habitat patches become fragmented, leading to isolation of subpopulations.	Mod	Mod	Habitat management	Identify and maintain connected corridors of habitat. Test utilisation of suspected corridors by oribi and mountain reedbuck.
Climate change leads to an increased frequency of droughts and extreme weather.	High	High	Habitat management	Sound habitat management would ameliorate some of this impact, but responses generally require a broader consideration than the scope of this plan. Note: The development of a wind energy facility will contribute to SA's climate change targets)
Organised poaching (e.g., taxi hunts) leads to increased mortality.	High	High	Security and reducing direct mortality	Improve access control and security on the site.
Subsistence poaching with dogs leads to increased mortality.	High	High	Security and reducing direct mortality	Improve access control and security on the site.
Hunting by means of snares leads to increased mortality.	High	High	Security and reducing direct mortality	Improve access control and security on the site. Conduct operations to remove snares.
The presence of domestic animals (especially feral dogs) leads to increased mortality.	High	High	Security and reducing direct mortality	Monitor for presence of domestic animals. Remove feral dogs.
Inappropriate fence design and maintenance leads to increased mortality.	Mod	Mod	Security and reducing direct mortality	Conduct regular maintenance of fencing. Ensure that fencing is porous to wildlife and wildlife-friendly. Monitor fence-line for mortalities.

Threat	Priority: Oribi	Priority: Mountain reedbuck	Theme	Appropriate management actions and responses
High mesopredator density leads to increased mortality.	No info.	No info.	Security and reducing direct mortality	Collect data on mesopredator abundance.
Collisions with motor vehicles leads to increased mortality.	No info.	No info.	Security and reducing direct mortality	Collect information on significance of this source of mortality
Cattle herders and livestock disturb oribi and mountain reedbuck and influence their behaviour and distribution.	High	Mod	Disturbance	Implement conservative stocking rates. Evaluate distribution of grazing and grazing frequency on oribi and mountain reedbuck areas.
The construction of the WEF creates disturbances which influence oribi and mountain reedbuck behaviour and distribution.	Mod	Mod	Disturbance	Limit construction during peak activity periods (early morning and late afternoon hours / night) for both species. Monitor responses by oribi and mountain reedbuck during the construction phase.
The operation of the WEF creates disturbances which influence oribi and mountain reedbuck behaviour and distribution.	Mod	Mod	Disturbance	Monitor population to determine tolerance to operational wind turbines. Develop mitigation measures based on how the species respond.
Small, unconnected subpopulations results in genetic isolation and inbreeding depression.	Mod	Mod	Metapopulation management	Collaborate in broader conservation initiatives. Examine connectivity in the broader landscape. Ensure that fences are porous. Conduct research on population genetics
Small population size results in lower productivity (e.g., Allee effects).	Mod	Mod	Metapopulation management	Establish population size. Conduct research on the impacts of small population size on these species.

Threat	Priority: Oribi	Priority: Mountain reedbuck	Theme	Appropriate management actions and responses
Translocations result in genetic contamination (genetically distinct subpopulations within South Africa have been mixed).	Low	Low	Metapopulation management	Any translocations to or from the MNWP WEF site should consider this aspect.
Population growth leads to the population exceeding carrying capacity, leading to reduced growth rate.	Low	Low	Metapopulation management	Not likely to be an issue during the timeframe of this plan. Maintain corridors to allow for dispersal from the site. Consider translocations should carrying capacity be reached.

Four broad themes emerged: ensuring sound habitat management, improving security and reducing direct mortality, minimising disturbance to the two species, and participating in metapopulation management and broader conservation initiatives. The threat identification process informed the development of management objectives for the conservation of the oribi and mountain reedbuck on the MNWP WEF site.

6.2 Management objectives

The primary goal of this plan is to conserve the oribi and mountain reedbuck subpopulations on the Mulilo Newcastle Wind Power WEF site, ensuring not only that the project does not negatively affect them but also that sound management contributes to the persistence and growth of these subpopulations.

To achieve this goal, the following management objectives have been set:

1. Manage oribi and mountain reedbuck habitat to promote the persistence of these subpopulations, including through:
    a. Fire management
    b. Livestock management
    c. Control of invasive alien plants
2. Prevent increased oribi and mountain reedbuck mortality from anthropogenic sources, including through:
    a. Proactive implementation of security measures (including anti-poaching patrols and snare removal)
    b. Appropriate responses to incursions
    c. Ensure that fencing in and around the site safe for oribi, mountain reedbuck and other wildlife
    d. Efforts to reduce the potential for road mortality
3. Minimise disturbance to oribi and mountain reedbuck subpopulations, especially:

a. Disturbance caused by the construction of the WEF
b. Disturbance during the operation of the WEF
c. Disturbance from other forms of land use on the site (e.g., predator control operations, invasive alien plant control operations)

4. Monitor the status of the population by estimating baseline population parameters and conducting ongoing monitoring.
    a. Conduct initial monitoring to determine how oribi and mountain reedbuck utilise the site and to obtain a baseline estimate of population size and demographics.
    b. Conduct ongoing monitoring, including annual counts and camera trap surveys to track changes in habitat use and population parameters and reference these to the impact of the construction and operation of the WEF and to management actions.
    c. Consider opportunities to expand the monitoring programme to incorporate other aspects and to utilise emerging technologies.
5. Contribute to broader oribi and mountain reedbuck conservation initiatives
    a. Report on monitoring results to EKZNW / Oribi Working Group (participate in annual oribi census).
    b. Register as an Oribi Custodian Site.
    c. Support research on oribi and mountain reedbuck conservation ecology and management.

6.3 Design and cost

6.3.1 Fire management

In order to maintain oribi and mountain reedbuck populations, the objective should be to maintain a patchy landscape in terms of post-fire age so that there is structural heterogeneity at a fine scale (i.e., at scale of individual oribi and mountain reedbuck home ranges, there should be good representation of short grass and long grass areas).

To achieve this, general fire management recommendations for sub-escarpment grasslands should be followed (see Lechmere-Oertel 2014, SANBI 2013) but these should be tailored to meet the specific requirements for oribi and mountain reedbuck. The following recommendations are provided:

- The area should be protected from burning every year by unplanned fires entering the site.
- In the absence of fire, planned burns should occur so that all grassland areas within the WEF site are burned every 2-4 years, depending on rainfall and fuel load (higher frequencies during high rainfall and fuel load conditions, lower frequencies during low rainfall and fuel load conditions).
- No less than 30% and no more than 60% of the grassland areas within the WEF site should be burnt within a given year.
- Planned burns should occur in late winter or early spring (before the commencement of the growing season)
- To promote patchiness, planned fires should be from single-point ignitions.

- A system of wide firebreaks should be implemented, which will serve two functions – protection from frequent fires entering the site and provision of green areas to support oribi and mountain reedbuck through winter. For the latter purpose, firebreaks should be prepared in autumn.
- The incidence of planned and unplanned fires should be monitored.

While these recommendations are provided as general guidelines, some variation in the fire regime is desirable and beneficial to biodiversity.

There is considerable distance between the fire management guidelines presented here for oribi and mountain reedbuck and current management practices. Substantial engagement with the landowners will be required to determine how practices can be adapted to accommodate these species. The most pressing issue is extending fire intervals so that the grasslands do not burn every year and so that patches of longer grass can be maintained within oribi and mountain reedbuck habitat. The absence of fire is unlikely to be a cause for concern in the short-term. Verification of adherence to compatible fire management practices should be the responsibility of the Environmental Control Officer.

Sound fire management is a dynamic process that requires ongoing observation and assessment of rangeland condition and biomass. If planned fires are to be implemented, the landowners should conduct such assessments in mid-winter before a decision is made on whether to burn sections of grassland in late winter or early spring.

6.3.2 Grazing management

The objective should be to manage grazing in a manner that is compatible with the persistence of oribi and mountain reedbuck. This generally entails avoiding undesirable changes in grass species composition (i.e., avoiding highly selective grazing by stock that result in a substantial reduction in abundance of decreaser species), maintaining sufficient fuel loads to support fires according to the guidelines presented above, and maintaining areas in oribi and mountain reedbuck with long grass. In addition, the management of livestock should be done in a way that minimises disturbance, since the presence of excessive stock numbers and herders can influence oribi and mountain reedbuck habitat use.

The development of a detailed grazing plan for the site is beyond the scope of this plan, but the following recommendations and guidelines are presented:

- The farmers should be consulted in developing a carrying capacity assessment and grazing plan for the site that takes oribi and mountain reedbuck requirements into consideration.
- In general, stocking rates should be conservative (e.g., 70% of agricultural carrying capacity), and grazing pressure should be adaptively managed based on rangeland condition, climate (particularly rainfall), and plant diversity.
- Bulk grazers (cattle) are preferred over selective grazers (sheep).
- Cattle should not be allowed to fully graze oribi and mountain reedbuck habitat so that only short grass remains.
- Camps should be allowed a full growing season of rest on a rotational basis.
- Grazing should not occur on steep slopes during the wet season as this can lead to soil erosion.

As for burning, landowners should commit to compatible grazing practices, based on these guidelines and compliance should be verified by the Environmental Control Officer.

6.3.3 Invasive alien plant control

The site is currently heavily infested with invasive alien plants, which reduces available habitat and may affect connectivity between habitat patches. The presence of dense stands of alien plants along the drainage lines, especially in the north-east, could be particularly problematic in terms of reducing habitat connectivity.

While control measures are already taking place, these should be refocused to support oribi and mountain reedbuck conservation objectives.

The following guidelines and recommendations are provided:

- Invasive alien plant clearing operations should be strategic and the goal should be the eradication of invasive alien plant stands.
- Drainage areas (particularly on Geelhoutboom 3350 and Byron 9448) between oribi and mountain reedbuck habitat patches should be prioritised for clearing to promote connectivity between patches (see Appendix 8.1).
- The stand in the south-west (on Franzhoek 8800) bisects suitable oribi habitat and should be prioritised for clearing
- Due to the potential for disturbance and displacement of oribi and mountain reedbuck, the focus should be on one of these areas at a time and clearing should be done as quickly as possible.
- The use of contractors for clearing alien plants introduces security risks related to poaching. Contractors should be monitored, and stringent control measures should be enforced.
- Felled trees should be treated with herbicide to prevent coppicing and regrowth.

6.3.4 Security

Many of the threats to oribi and mountain reedbuck relate to illegal activities. Although landowners perceive this threat to be low, evidence of hunting with dogs was observed during the avifaunal surveys. Illegal activities should be controlled through a combination of proactive and reactive measures.

Proactive measures relating to increasing the security of the site include:

- Development of a security plan in conjunction with the security company contracted to the WEF. This security plan should include identification of current security threats and potential poaching hotspots.
- Establishing a security presence on the site in the form of regular patrols by rangers, potentially from horseback. These rangers could have multiple roles and in addition to their security function, and could also collect valuable data (e.g., observations of oribi and mountain reedbuck, road mortalities, carcass management for the removal of dead livestock to prevent attracting vultures, locating mortalities of birds and bats due to collisions with turbines).
- Maintaining fencing in a good state, and refurbishment of old, collapsed fencing. Ensuring adequate boundary markings and installation of signs that the land is private property and that trespassing is prohibited.
- Establishing a gate to control access at the intersection of the R34 regional road and the D401 district road. While it may not be possible to restrict access, it would be beneficial to be able monitor individuals or vehicles using this road (e.g., installation of camera and gate).
- Installation of security cameras, particularly along the R34.

- Installation of dummy cameras to deter illegal access to the site.
- Collaboration with neighbouring farmers to detect and monitor the presence of intruders.
- Ensuring that any records of illegal access to the site from camera traps used for ecological monitoring is forwarded to the security team.
- Employing drones for security and surveillance purposes.
- Developing a relationship with the South African Police Service and understanding legislation (Trespass Act, Fencing Act, Cattle Identification Act) and response procedures. Understanding procedures for impounding of illegally grazed livestock.

Reactive measures include:

- Collecting evidence of incursions (photographs, witness statements) to maximise the prospects of successful prosecution.
- Reporting incursions to the SAPS.
- Keeping a record of incursions to facilitate the prediction of hotspots and to understand where security measures should be improved.

6.3.5 Fencing

To allow gene flow between the oribi and mountain reedbuck subpopulations on the Mulilo Newcastle WEF and other subpopulations in the landscape, fencing of the site should be porous to the movement of these species.

The following recommendations are provided:

- Standard 5-strand cattle fences are suitable. Bonnox fencing should not be used as this type of fencing is impermeable to oribi and mountain reedbuck.
- Barbed wire fencing should be avoided because of the potential for injury to oribi and mountain reedbuck, and to other wildlife. Existing barbed wire fences, if not removed during the project's construction, should be retrofitted with non-barbed wire fencing accordingly.
- Regular patrols of the boundary fence-line should be conducted to monitor the condition of the fence, detect incursions, and to check for and remove snares.
- Boundary and internal fences should be maintained in a good state.
- No attempt should be made to facilitate movement of animals by creating holes in the fence as these are frequently used by poachers setting snares. Rather it is better if the entire fence-line is permeable to small animals.

6.3.6 Disturbance

Avoidance of habitat by wildlife due to human presence can be considered a form of habitat loss. Wild herbivores generally perceive human presence as a risk, and they tend to modify their behaviour accordingly. Studies have shown that antelope may avoid habitats with high levels of human activity, even if such habitats are otherwise optimal (Jha & Isvaran 2021). The susceptibility of oribi and mountain reedbuck to disturbance from the construction and operation of the WEF may be related to their previous encounters with humans. It is plausible that populations exposed to a high-level of anthropogenic threat may have lower tolerance to the presence of humans and may display greater avoidance behaviour.

The greatest disturbance is likely to occur during construction of the WEF. To minimise disturbance during foraging periods, the most disruptive construction activities should occur outside of the most active periods for oribi and mountain reedbuck (early morning, late afternoon and at night).

There is no literature on the impact of operational wind turbines on oribi and mountain reedbuck. An initial focus of the monitoring programme will be to determine how the presence of operational wind turbines affect behaviour and habitat use. Recommendations will need to be developed based on the findings of this aspect of monitoring. If necessary, the effectiveness of mitigation measures (such as curtailment during certain periods) can be tested and an adaptive management approach will need to be adopted.

6.3.7 Predator control

Although high density of mesopredators has been suggested as a potential reason for the decline of both oribi and mountain reedbuck, in the absence of scientific information to support this, predator control specifically to promote oribi and mountain reedbuck subpopulation on the Mulilo Newcastle WEF is not advocated. In addition, the process of controlling mesopredators can have impacts due to the disturbance caused (especially if control is done using dogs).

6.3.8 Population monitoring

Monitoring of the oribi and mountain reedbuck subpopulations is crucial to understand their status and the impact of management interventions. However, ecological systems are complex and isolating the effects of management interventions from the influence of extrinsic factors (e.g., climate) will be difficult. Also, without monitoring additional variables (forage availability, predator density, poaching rates, stocking rates) it is not possible to know which factor is causing a response in the population. In addition, given natural variability, changes from one year to the next might not be significant and trends may need to be considered over the longer periods.

Oribi and mountain reedbuck are notoriously difficult to count (Taylor et al. 2016) due to their small size, muted colouration, and tendency to lie down. Resource limitations necessitate a compromise between costs of monitoring and collecting sufficient data to be able to make valid inferences.

The initial priority is to understand the size of the subpopulations and their distribution across the site. This will be the focus of the first year of monitoring (initiated after the project is selected as a Preferred Bidder) and is necessary to establish a baseline to monitor against. Thereafter a review of the monitoring programme is proposed, and the programme can be expanded to incorporate additional aspects. For the first year of monitoring **a camera trap survey and transect counts are proposed**.

The objective of the initial camera trap study is to determine distribution of the two species across the site and to record habitat variables associated with occupancy. The outcomes of this will be used to refine the understanding of how the animals utilise the site and to establish temporal activity patterns. In addition, camera trap capture rates will be calculated as indices of abundance for predators and for other species.

Camera trap survey (baseline occupancy estimates):

- Camera models used must have high quality images, fast trigger speed and adjustable sensitivity. The recommendation is to use Spartan SR3-CX Lumen (Dual Flash) or Cuddeback Xchange Color – Strobe Flash (1279) with interchangeable flash modules (black/IR/strobe).

- It is proposed that a total of 15 cameras be deployed, rotated across 45 sites, with a minimum deployment duration of 45 days at each of the sites. To facilitate estimates of occupancy, camera locations will be placed within a grid constructed across the site (see Appendix 8.1 for a 1.25 km x 1.25 km grid example). Distance between cameras will be greater than 1 km and a targeted approach will be used to maximise detections whilst including different features in the landscape, including mountain slopes, mountain ridges, water points (mountain reedbuck are water-dependent) and valleys.
- Cameras will be deployed in winter to maximise detectability (due to maximal differences in ambient temperature and animal body temperature which facilitates triggering of camera trap sensors and the lack of grass growth, which could obscure cameras, in this season).
- Single-season occupancy models will be fitted using packages such as unmarked in R to estimate detection probability, calculate naïve occupancy and station use (naïve occupancy adjusted for detection probability), and to determine environmental variables correlated with occupancy.

Transects counts (baseline density estimates):

- A transect covering as much of the potential habitat for oribi and mountain reedbuck site as possible will be established. The transect will be driven, walked, or traversed on horseback and the perpendicular distance to any individuals of the detected target species observed will be recorded, along with habitat variables.
- Data will be analysed using distance sampling methods in R, models will be fitted to estimate detection probability, and density estimates and confidence intervals will be obtained.
- Density estimates will be converted to population estimates by multiplying density by area of suitable habitat.
- Group size and demographic data (age structure, sex structure, reproductive success) will be recorded for each species.
- Transect counts should also coincide with expected lambing season to assess recruitment rates.
- Point count survey to be conducted concurrently. Point transects involve an observer remaining at one fixed point for a set period of time and recording the number of individual animals detected (Greenwood 1998; Farnsworth et al. 2002). This method is particularly useful when estimating a population of animals in a relatively large area (Farnsworth et al. 2002). The distance from the observer to the animal is taken using a rangefinder. Duration of count must be sufficient for all animals in the area to be detected, for example some antelopes may be hidden in grass or behind vegetation (Greenwood 1998). Survey points are chosen haphazardly, such that transect points are sufficiently spaced from each other for observations to remain statistically independent (Hutto et al. 1986). Areas surveyed need to be in open and slightly elevated such that animals can be more easily detected. Where feasible, this method can potentially be combined with the Vantage Point Surveys required for the live bird operational phase monitoring. If this is done, the individuals conducting the bird monitoring will need to be trained (e.g., how to identify the species, alarm calls, dung identification).

These surveys should be repeated in the following years and changes in occupancy and density from the baseline values obtained in these surveys should be tracked to provide an indication of the status of the subpopulations.

In addition to the structured surveys, any incidental observations of the target species (e.g., animals encountered during security patrols) should be recorded.

Beyond the first year of monitoring, the possibility of incorporating additional components should be evaluated, including:

- The understanding of habitat variables associated with oribi and mountain reedbuck presence and density obtained from the first year of monitoring can be used to model habitat suitability across the site.
- Use of camera traps to test putative corridors for oribi and mountain reedbuck movement through the site and through the surrounding landscape.
- The use of indirect monitoring techniques, such as dung counts. Dung counts can be converted to density estimates (by using conversion factors for rates of production and decay), which make this method suitable for long-term monitoring. The use of scent detection dogs trained to find oribi and mountain reedbuck dung could potentially increase sampling efficiency, making this a cost-effective monitoring method. Dung presence also provides a measure of occupancy and distribution.
- The utility of drones for monitoring oribi and mountain reedbuck populations. This method is appealing considering the inaccessible nature of much of the site. One of the authors (AB) has had some initial success in detecting mountain reedbuck with this method. The possibility of using drones fitted with thermal cameras to increase detection probability could be explored. It may be beneficial to consult with the Endangered Wildlife Trust since this organisation has a wildlife drone unit which has experience in this type of monitoring.

Although a component of the monitoring programme is to understand the impact of the WEF, it is not proposed to have control sites (i.e., areas outside of the influence of the WEF used to compare against data collected from areas within the influence of the WEF), but rather to focus all available resources into obtaining an understanding of the dynamics of the subpopulations on site.

6.3.9 Research

The Mulilo Newcastle WEF should contribute to understanding of oribi and mountain reedbuck ecology and conservation. At this stage, it is recommended that MNWP (Pty) Ltd attempt to establish a relationship with a tertiary research institution (e.g., University of KwaZulu-Natal) to further oribi and mountain reedbuck research. A target of at least one research project initiated by the end of Year 4 of this management plan's cycle has been set.

Research priorities include:

- Impacts of construction and operation of wind energy facilities on the habitat use and behaviour of the species.
- Direct and indirect causes of mortality of these species.
- Impacts of different land use management practices (especially burning and grazing) on population performance.

Techniques that could be utilised to investigate these topics include:

- Fitting satellite or radio collars to oribi and mountain reedbuck to obtain estimates of movement, home range and habitat use. Mortality sensors fitted to collars could yield insight into mortality rates and causes.
- Analysis of DNA (from dung) could yield insights on diet, stress levels. DNA methods could also be used to identify individuals and obtain estimates of population size.
- Visual ear tags could be used to track individuals (estimates of home range, habitat use).

6.4 Workplan, roles and responsibilities

A workplan, with roles, responsibilities and targets for each management objective is provided in the tables below. An annual schedule of management actions is presented in Table 6-2.

Objective: Manage oribi and mountain reedbuck habitat to promote the persistence of these subpopulations										
Subobjective	Actions	Responsibility	Time Frames (Years)					Key Outcomes	Key Verifiers	Target
			1	2	3	4	5			
Manage fire to promote the persistence of oribi and mountain reedbuck	Before fire season, evaluate vegetation post-fire age within oribi and mountain reedbuck areas. Implement planned burns in late winter or early spring for vegetation >2 years post-fire age with the goal of maintaining 30-60% young vegetation.	MNWP (Pty) Ltd Landowners	X	X	X	X	X	Vegetation age structure is assessed within oribi and mountain reedbuck areas. Planned burns are conducted to ensure sufficient short grass areas for oribi and mountain reedbuck.	Maps of post-fire vegetation age. Records of planned burns.	Annual assessment of post-fire age by July each year. Planned burns implement between August and September. Maintain 30-60% young vegetation in any given year.
	Burn or mow boundary firebreaks in autumn to protect site from runaway wildfires entering the site and to provide winter grazing for oribi and mountain reedbuck.	MNWP (Pty) Ltd Landowners	X	X	X	X	X	Reduced probability of unplanned fires entering the property. Increased winter grazing for oribi and mountain reedbuck.	Records of firebreak work.	Firebreaks burned or mowed between April and May each year.

Objective: Manage oribi and mountain reedbuck habitat to promote the persistence of these subpopulations									
Subobjective	Actions	Responsibility	Time Frames (Years)					Key Outcomes	Key Verifiers	Target
			1	2	3	4	5			
	Burn or mow internal firebreaks in autumn to reduce probability of runaway fires creating a homogenous post-fire age structure on the site and to provide winter grazing for oribi and mountain reedbuck	MNWP (Pty) Ltd Landowners	X	X	X	X	X	Reduced probability of the entire site burning during a single fire. Increased winter grazing for oribi and mountain reedbuck.	Records of firebreak implementation.	Firebreaks burned or mowed between April and May each year.
	Develop a fire response strategy and respond to unplanned fires.	MNWP (Pty) Ltd Landowners	X	X	X	X	X	Prevention of the entire site burning during an unplanned fire.	Records of responses to fire and post fire damage.	Fire response strategy by end of Year 1.
Manage livestock to promote the persistence of oribi and mountain reedbuck	In consultation with the farmers, develop a grazing strategy that takes oribi and mountain reedbuck requirements into consideration.	MNWP (Pty) Ltd Landowners	X					Grazing practices do not compromise oribi and mountain reedbuck conservation objectives. Grazing supports maintenance of habitat structural heterogeneity.	Grazing strategy	Grazing strategy developed by end of Year 1.

Objective: Manage oribi and mountain reedbuck habitat to promote the persistence of these subpopulations										
Subobjective	Actions	Responsibility	Time Frames (Years)					Key Outcomes	Key Verifiers	Target
			1	2	3	4	5			
								Grazing is non-selective and does not change grass composition.		
Manage invasive alien plants to promote the persistence of oribi and mountain reedbuck	Conduct invasive plant clearing operations, prioritising oribi and mountain reedbuck habitat patches and connectivity between patches.	MNWP (Pty) Ltd Landowners	X	X	X	X	X	Connectivity between habitat patches established and maintained.	Records of control operations.	Initial clearing of priority areas by end of Year 1. Ongoing maintenance of cleared areas.

Objective: Prevent increased oribi and mountain reedbuck mortality from anthropogenic sources										
Subobjective	Actions	Responsibility	Time Frames (Years)					Key Outcomes	Key Verifiers	Target
			1	2	3	4	5			
Increase security presence and detect and respond to incursions.	Develop a security plan that identifies security weak points, predicts potential hotspots for illegal activities, examines required security	MNWP (Pty) Ltd Security contractor	X					Security measures are implemented in a systematic manner.	Security plan.	To be developed and implemented as

Objective: Prevent increased oribi and mountain reedbuck mortality from anthropogenic sources									
Subobjective	Actions	Responsibility	Time Frames (Years)					Key Outcomes	Key Verifiers	Target
			1	2	3	4	5			
	infrastructure, examines required security personnel and their deployment.									soon as possible.
	Install surveillance cameras at key points.	MNWP (Pty) Ltd Security contractor	X					Ability to detect incursions is improved. Surveillance cameras act as a deterrent.	Number of cameras installed	Cameras installed within 2 months of project reaching Financial Close.
	Monitor surveillance footage to detect incursions.	Security contractor	X	X	X	X	X	Incursions are detected and responded to.	Reports	Immediate response by security company to detected incursions. Incidents reported to MNWP (Pty) Ltd within 24 hours Quarterly summary of incidents.

Objective: Prevent increased oribi and mountain reedbuck mortality from anthropogenic sources									
Subobjective	Actions	Responsibility	Time Frames (Years)					Key Outcomes	Key Verifiers	Target
			1	2	3	4	5			
	Conduct regular patrols of the oribi and mountain reedbuck areas and along the fence-line.	MNWP (Pty) Ltd Farmers Security contractor	X	X	X	X	X	Incursions by people and animals (dogs, cattle) are detected. Snares are detected and removed. Additional information is gathered (oribi and mountain reedbuck sightings).	Number of patrols and distance covered (verified through log sheets, pocket books, GPS tracks)	Daily fence-line patrols conducted. Patrols of oribi and mountain reedbuck areas twice per week. Incidents reported to MNWP (Pty) Ltd within 24 hours
Reduce road mortality.	Install precautionary wildlife signage on R34	MNWP (Pty) Ltd	X					Probability of road mortality along R34 reduced.	Location of signs.	One sign on each side of the R34
	Enforce speed limits along internal roads (30 km/h)	MNWP (Pty) Ltd Security contractor Landowners	X	X	X	X	X	Probability of road mortality along internal roads reduced.	Incident reports.	Zero oribi and mountain reedbuck road mortalities within site. Any road mortalities reported to

Objective: Prevent increased oribi and mountain reedbuck mortality from anthropogenic sources									
Subobjective	Actions	Responsibility	Time Frames (Years)					Key Outcomes	Key Verifiers	Target
			1	2	3	4	5			
										MNWP (Pty) Ltd with 24 hours.
	Installation of speed humps along sections of road that intersect with oribi and mountain reedbuck habitat.	MNWP (Pty) Ltd	X					Probability of road mortality along internal roads reduced.	Location of speed humps.	By end of Year 1.
Reduce probability of injury or mortality due to fence collisions or entanglement.	Inspect condition of fences and conduct maintenance. Remove and/or replace barbed wire fences if deemed unsafe by specialist.	MNWP (Pty) Ltd Security contractor Landowners	X	X	X	X	X	Reduced probability of injury or mortality due to fences	Records of work undertaken.	Fences continually maintained in a good state of repair.
Reduce probability of mortality due to farm management actions.	Ensure that dogs are not utilised (e.g., for control of damage causing animals) within oribi and mountain reedbuck areas.	Landowners	X	X	X	X	X	No incidental mortality of oribi and mountain reedbuck from damage causing animal control.	Landowner agreement.	All landowners agree to this.

Objective: Minimise disturbance to oribi and mountain reedbuck subpopulations									
Subobjective	Actions	Responsibility	Time Frames (Years)					Key Outcomes	Key Verifiers	Target
			1	2	3	4	5			
Minimise disturbance during the construction of the WEF	Where possible, limit intense disturbance-causing construction activities during peak activity periods for oribi and mountain reedbuck (early morning, late afternoon). Use findings of baseline survey to adjust understanding of peak activity times for oribi and mountain reedbuck at the site (this will vary seasonally)	MNWP (Pty) Ltd		X	X			Disturbance during times of peak oribi and mountain reedbuck activity is minimised.	Construction logs.	Where possible, intense disturbance-causing construction activity should occur outside of the hours from 08:00 to 17:00. Peak period adjusted based on monitoring data.
	Confine construction activity to identified footprints and treat oribi and mountain reedbuck habitat as no-go areas.	MNWP (Pty) Ltd		X	X			Disturbance during times of peak oribi and mountain reedbuck activity is minimised.	No evidence of construction activity outside of footprint areas.	Construction workers confined to operational areas.
Minimise disturbance during the operation of the WEF	Ensure that any maintenance activities near oribi and mountain reedbuck habitat happen outside periods of	MNWP (Pty) Ltd				X	X	Disturbance during times of peak oribi and mountain reedbuck activity is minimised.	Maintenance logs	No maintenance activity outside of the hours from 08:00 to 17:00 in oribi

Objective: Minimise disturbance to oribi and mountain reedbuck subpopulations									
Subobjective	Actions	Responsibility	Time Frames (Years)					Key Outcomes	Key Verifiers	Target
			1	2	3	4	5			
	peak oribi and mountain reedbuck activity.									and mountain reedbuck areas.
Minimise disturbance caused by farm management activities.	Develop a set of rules for farm staff operating in oribi and mountain reedbuck areas.	Landowners	X	X	X	X	X	Farm activities cause minimal disturbance to oribi and mountain reedbuck subpopulations.	Set of rules for farm staff operating in oribi and mountain reedbuck areas.	All landowners agree to this.

Objective: Monitor the status of the population by estimating baseline population parameters and conducting ongoing monitoring									
Subobjective	Actions	Responsibility	Time Frames (Years)					Key Outcomes	Key Verifiers	Target
			1	2	3	4	5			
Conduct pilot monitoring programme to obtain a baseline understanding of population size,	Conduct camera trap survey	MNWP (Pty) Ltd	X					Improved understanding of oribi and mountain reedbuck distribution, population structure, minimum	Camera trap data	Before construction commences.

Objective: Monitor the status of the population by estimating baseline population parameters and conducting ongoing monitoring										
Subobjective	Actions	Responsibility	Time Frames (Years)					Key Outcomes	Key Verifiers	Target
			1	2	3	4	5			
demographics, and distribution								population size and activity patterns.		
	Conduct transect counts	MNWP (Pty) Ltd	X					Improved understanding of oribi and mountain reedbuck population size and structure	Transect count data	Before construction commences.
	Present an overview of population status and demographics and refine oribi and mountain reedbuck distribution maps for the site.	MNWP (Pty) Ltd	X					Monitoring outcomes accessible and informs site management. Greater understanding of the significance of the site's oribi and mountain reedbuck subpopulations.	Monitoring report.	Before construction commences.
Refine monitoring programme and	Review outcomes of pilot monitoring programme and refine monitoring programme.	MNWP (Pty) Ltd		X				Strategy for ongoing monitoring developed.	Refined monitoring programme.	Before construction commences.

Objective: Monitor the status of the population by estimating baseline population parameters and conducting ongoing monitoring									
Subobjective	Actions	Responsibility	Time Frames (Years)					Key Outcomes	Key Verifiers	Target
			1	2	3	4	5			
conduct ongoing monitoring.								Additional monitoring aspects considered.		
	Conduct ongoing monitoring.	MNWP (Pty) Ltd		X	X	X	X	Trends in oribi and mountain reedbuck subpopulations recorded.	Monitoring reports.	Annual monitoring reports for the first five years, thereafter every second year for the lifespan of the facility.

Objective: Contribute to broader oribi and mountain reedbuck conservation initiatives									
Subobjective	Actions	Responsibility	Time Frames (Years)					Key Outcomes	Key Verifiers	Target
			1	2	3	4	5			
Contribute to the broader understanding of oribi and monitoring	Report on monitoring results to EKZNW and Oribi Working Group and participate in annual oribi census.	MNWP (Pty) Ltd	X	X	X	X	X	Monitoring of Mulilo Newcastle subpopulations informs efforts to understand the	Submissions to EKZNW and Oribi Working Group.	Annual submissions.

Objective: Contribute to broader oribi and mountain reedbuck conservation initiatives									
Subobjective	Actions	Responsibility	Time Frames (Years)					Key Outcomes	Key Verifiers	Target
			1	2	3	4	5			
reedbuck population status.								status of the species.		
	Develop relationship with EKZNW District Conservation Officer.	MNWP (Pty) Ltd	X					Improved communication with EKZNW. Extension support.	Correspondence with EKZNW DCO.	Before construction commences.
	Register as an Oribi Custodian Site.	MNWP (Pty) Ltd		X				Recognition of contribution the site is making to oribi conservation. Opportunities to communicate and collaborate with other Oribi Custodian Sites. Extension support.	Submission	Before COD.
Contribute to oribi and mountain reedbuck research	Develop relationships with tertiary research institutions and make the site available for oribi and mountain reedbuck research.	MNWP (Pty) Ltd		X	X	X	X	Research on the ecology and management of oribi and mountain reedbuck facilitated, which	Records of correspondence with researchers.	At least one research project registered by end of Year 4.

Objective: Contribute to broader oribi and mountain reedbuck conservation initiatives									
Subobjective	Actions	Responsibility	Time Frames (Years)					Key Outcomes	Key Verifiers	Target
			1	2	3	4	5			
								leads to improved understanding of potential for coexistence of these species and WEFs and on how to manage the species.		

Table 6-2: Annual schedule of activities

Biological/Natural Event	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Growing season	X	X	X							X	X	X
Nutritional stress							X	X	X			
Calving (oribi)										X	X	X
Calving (mtn reedbuck)	X									X	X	X
Fire season						X	X	X	X	X		
Planned activities												
Planned mosaic burning							X	X	X			
Establish fire-breaks				X	X							
Patrols	X	X	X	X	X	X	X	X	X	X	X	X
Camera trap survey						X	X	X				
Transect counts											X	

6.5 Management plan review

This plan should be reviewed after the first year of monitoring, at the end of the five-year planning period, and thereafter every five years. The review process should consider the outcomes of the monitoring programme and be informed by an improved understanding of oribi and mountain reedbuck population dynamics and habitat utilisation on the site. The review process should include a re-evaluation of threats to both species, an evaluation of the achievement of objectives, and any lessons-learned from implementation during the first five years.

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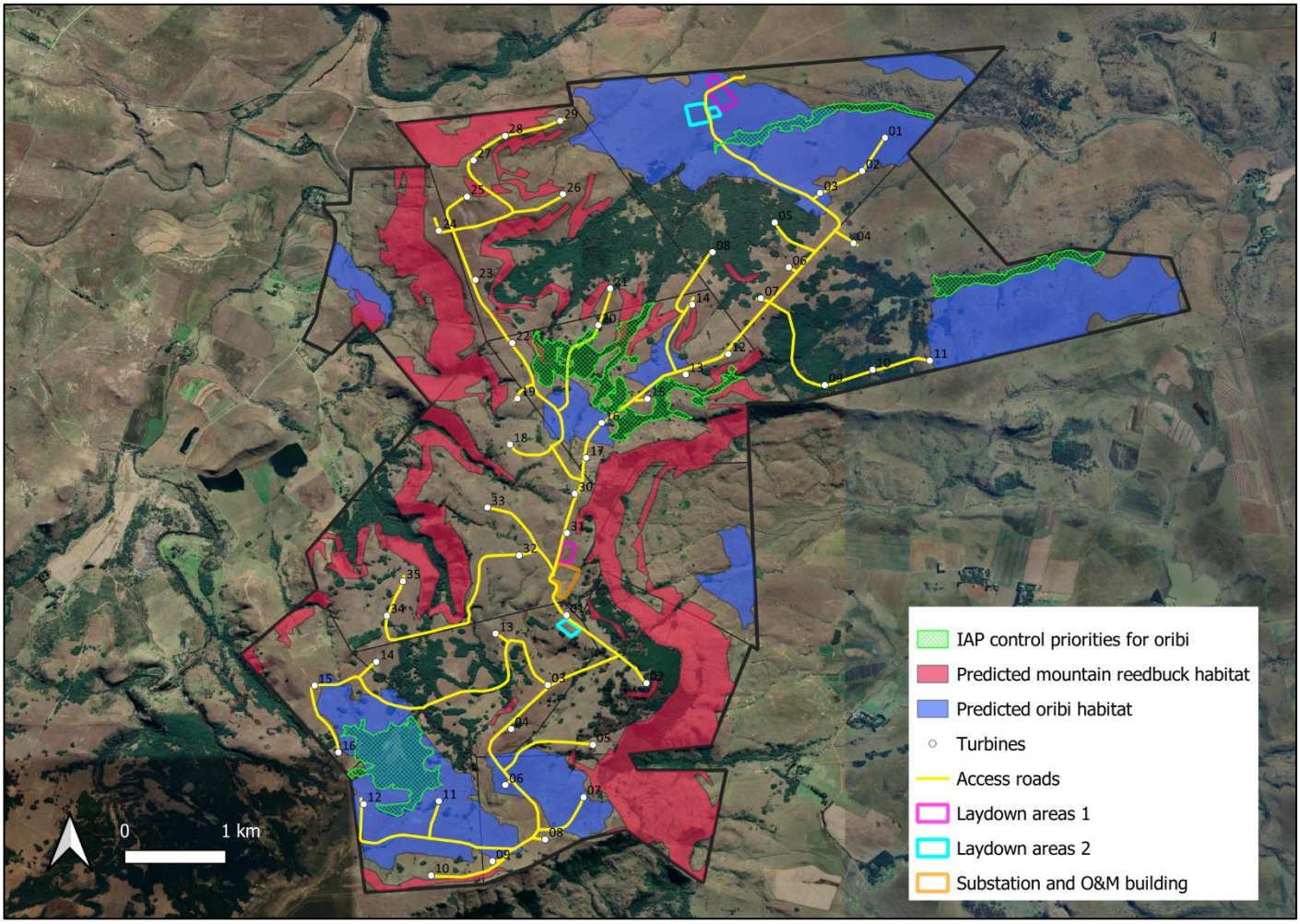
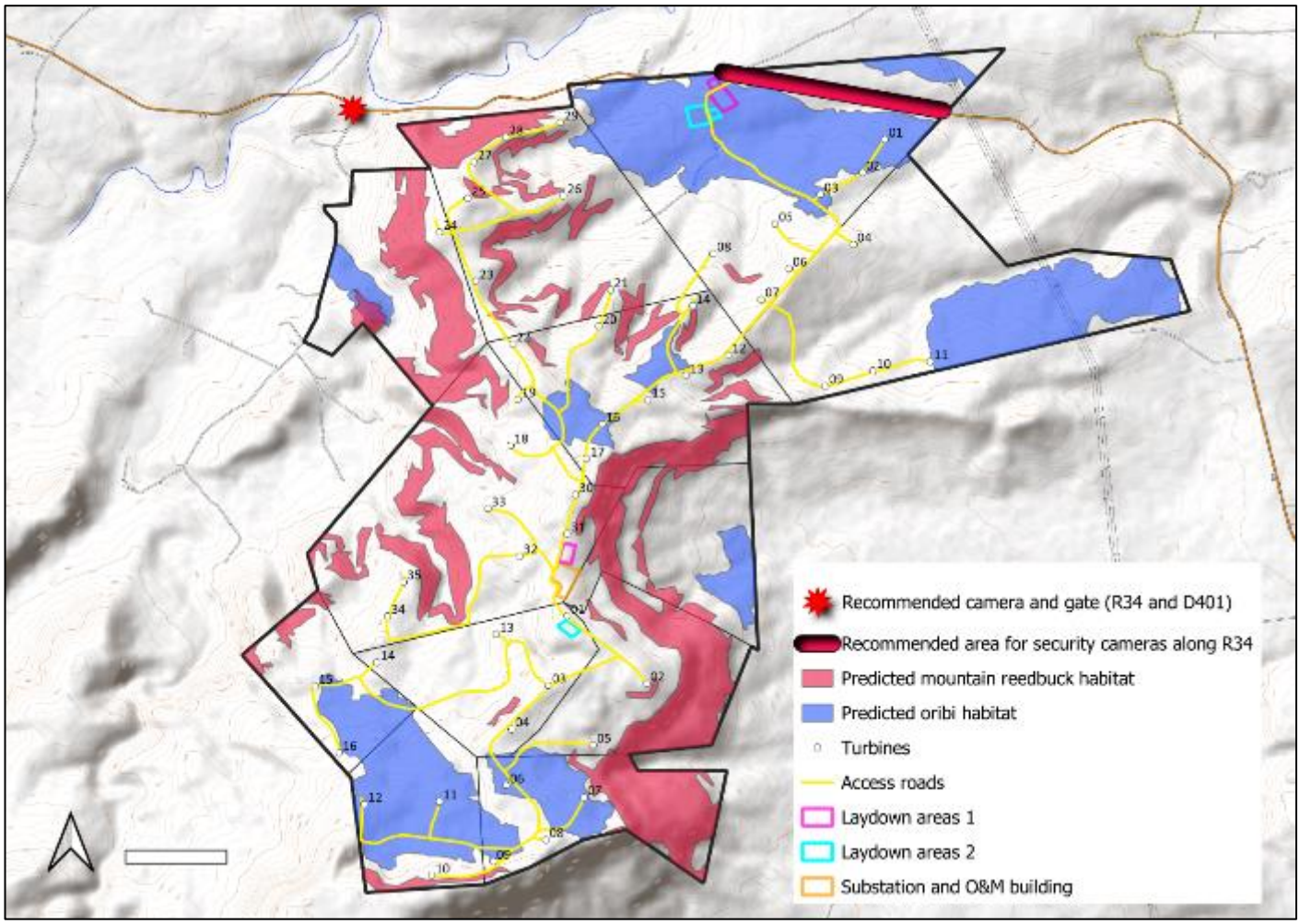
8 APPENDICES

8.1 Invasive alien plant clearing priorities for oribi habitat connectivity



8.2 Recommended security infrastructure



8.3 Draft camera trap grid