



DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR)

**UMSOBOMVU SUBSTATIONS, CONCRETE TOWER MANUFACTURING
FACILITIES AND TEMPORARY LAYDOWN AREA, SITUATED IN THE
UMSOBOMVU LOCAL MUNICIPALITY (NORTHERN CAPE PROVINCE) AND
THE INXUBA YETHEMBA LOCAL MUNICIPALITY (EASTERN CAPE
PROVINCE).**

DFFE REFERENCE NUMBER: TBA

FEBRUARY 2022

PROPOSED UMSOBOMVU SUBSTATIONS, CONCRETE TOWER MANUFACTURING FACILITIES AND TEMPORARY LAYDOWN AREA, SITUATED IN THE UMSOBOMVU LOCAL MUNICIPALITY (NORTHERN CAPE PROVINCE) AND THE INXUBA YETHEMBA LOCAL MUNICIPALITY (EASTERN CAPE PROVINCE).

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DEFINITIONS

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

TERMS	DESCRIPTION
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.
Cement-laden water	Cement laden water refers to water containing cement or concrete arising from the Contractor’s activities.
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 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.
Environment	Environment refers to the surroundings within which humans exist and that could be made up of:- <ul style="list-style-type: none"> (i) The land, water and atmosphere of the earth; (ii) Micro-organisms, plant and animal life; (iii) Any part or combination of (i) and (ii) and the interrelationships among and between them; and (iv) 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.
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 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.

TERMS	DESCRIPTION
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, <i>“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.”</i>
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.
External Auditor	An External Auditor is a suitably qualified and experienced independent expert as per the required auditor qualifications (ISO 14012).
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.
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>(i) Any person, groups of persons, organisation interested in or affected by an activity, and;</i> <i>(ii) Any organ of state that may have jurisdiction over any aspect of the activity.</i>
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.
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 must 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.
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, <i>“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”.</i>
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.
Reasonable	Reasonable means reasonable in the opinion of the ECO, after consultation with the ESO - unless the context indicates otherwise.
Rehabilitation	Rehabilitation refers to re-establishing or restoring something to its original state or to a healthy, sustainable capacity or state.

TERMS	DESCRIPTION
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).
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).
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.

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1 INTRODUCTION

Umsobomvu Wind Power (Pty) Ltd is proposing the development of infrastructure to supplement the development of the authorised Wind Energy Facilities (WEFs) in proximity to the infrastructure site. The proposed infrastructure is situated on Portion 8 of Uitzicht Farm 3, the Remaining Extent (RE) of Winterhoek Farm 118, and the RE of Elands Kloof Farm 135. These properties are situated within the Umsobomvu Local Municipality in the Northern Cape Province and the Inxuba Yethemba Local Municipality in the Eastern Cape Province. Table 1.1 below lists the proposed properties which will be affected by the proposed Umsobomvu Development.

Table 1.1: 21-Digit Surveyor General (SG) Codes of the affected properties.

FARM NAME	21 DIGIT SG NUMBER	PORTION AND FARM NUMBER	LOCAL MUNICIPALITY
Uitzicht	C0480000000000300008	Portion 8 of Farm 3	Umsobomvu Local Municipality and Inxuba Yethemba Local Municipality
Elands Kloof	C03000000000013500000	Remaining Extent of Farm 135	Umsobomvu Local Municipality
Winterhoek	C03000000000011800000	Remaining Extent of Farm 118	Umsobomvu Local Municipality

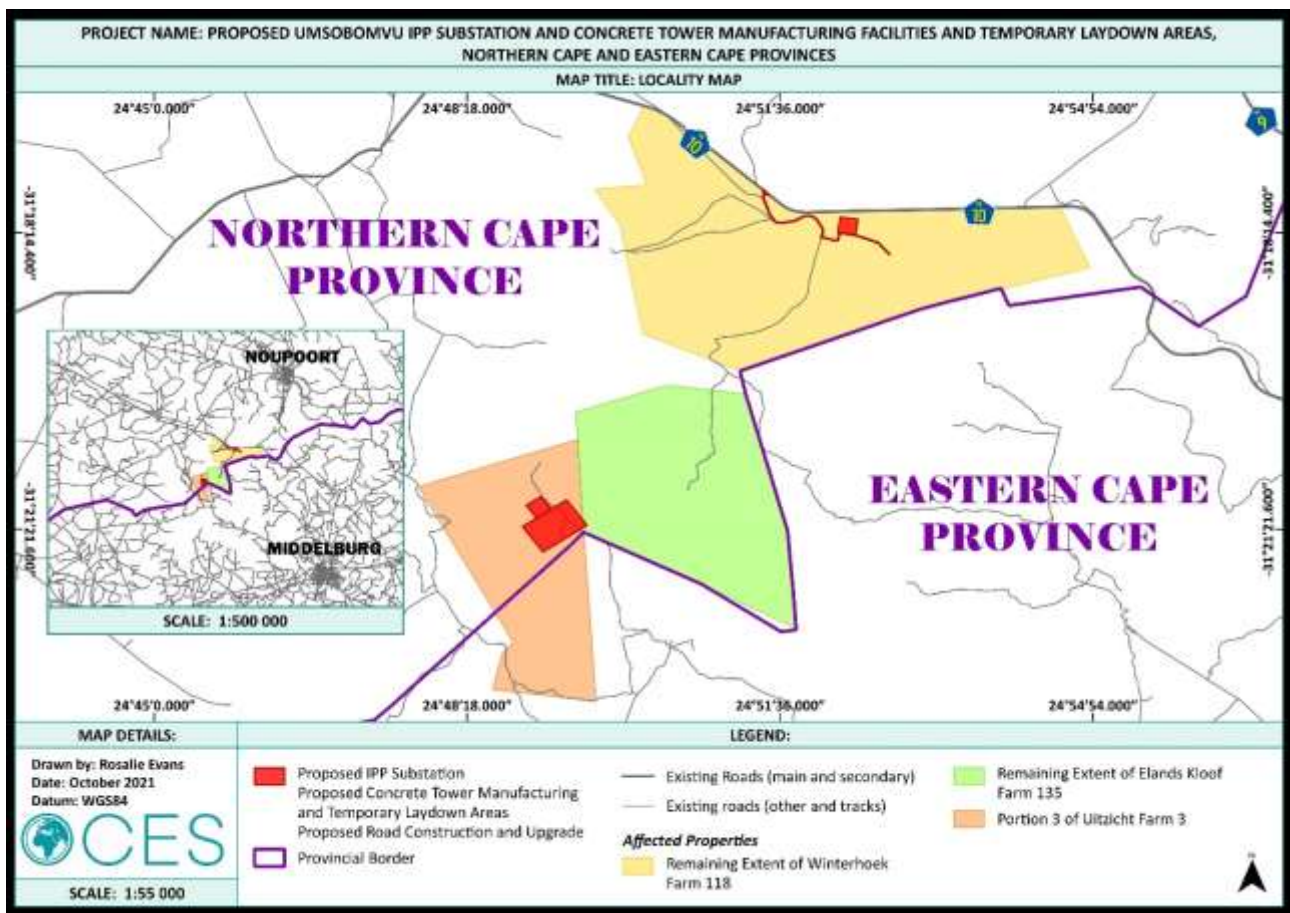


Figure 1.1: Locality Map of the proposed Umsobomvu Development site.

1.1 OBJECTIVES OF THE EMPR

This Environmental Management Programme (EMPr) has been compiled to provide mitigation measures, management actions, monitoring and institutional measures to be taken during the various phases of the Umsobomvu Development, situated within both the Northern Cape and Eastern Cape Provinces. These measures aim to eliminate, offset 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 Umsobomvu Wind Power (Pty) Ltd at the site, of their duties in the fulfilment of the legal requirements for the construction and operation of the Umsobomvu Development, with particular reference to the prevention, mitigation and management of anticipated potential environmental 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 and management actions to reduce and mitigate the potential impacts to minimal or insignificant levels;
- Detail specific actions deemed necessary to assist in mitigating the potential environmental and social impacts of the project;
- Identify measures which could enhance beneficial impacts;
- Create management structures which address the concerns and complaints raised by Interested and/or Affected Parties (I&APs) with regards 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 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 and the social setting 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 various phases 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 various phases of the Umsobomvu Development. 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, and subsequent amendments), as stipulated below.

Table 1.2: NEMA EIA Regulations Appendix 4 Requirements.

REQUIREMENTS OF AN ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT IN TERMS OF GN R. 982 APPENDIX 4
<p>(1) An EMPr must comply with Section 24(N) of the Act and include -</p> <p>(a) Details of –</p>

- (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 LEGISLATIVE 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 of their duties in the fulfilment of the project objectives, with particular reference to the prevention and mitigation of environmental and social impacts caused by the activities of the various phases associated with the Umsobomvu Development. The Contractor 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. In the event that any rights and obligations contained in this document contradict those specified in the standard or project specifications, then the latter must prevail.

The Contractor must identify and comply with all relevant 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 project must be complied with during the relevant phases. The list of applicable legislation provided below is intended to serve as a guideline only and is not exhaustive:-

Table 1.3: Relevant Legislation, Policies and Guidelines.

LEGISLATION, POLICIES AND GUIDELINES	RELEVANCE TO THE PROPOSED UMSOBOMVU DEVELOPMENT
The Constitution Act (Act No. 108 of 1996)	The Developer is obligated to ensure that the proposed Umsobomvu Development will not result in pollution and ecological degradation. In addition, the Developer must ensure that the Umsobomvu Development is ecologically sustainable and that it contributes to economic and social development.
National Environmental Management Act (NEMA) (Act No. 107 of 1998 and subsequent amendments) Environmental Impact Assessment Regulations (2014, and subsequent amendments)	The construction of the proposed Umsobomvu Development triggers listed activities in terms of Listing Notice 1 and Listing Notice 3 of the NEMA EIA Regulations (2014, and subsequent amendments). Environmental Authorisation (EA) is required from the National Department of Forestry, Fisheries and the Environment (DFFE) prior to the commencement of construction.
National Environmental Management: Biodiversity Act (NEM:BA) (Act No. 10 of 2004)	The proposed Umsobomvu Development will require the clearance of sections of vegetation, specifically Besemkaree Koppies Shrubland and Eastern Upper Karoo (Mucina and Rutherford, 2018/9) which will impact on the biodiversity of the area. The relevant permits for any identified plant Species of Conservation Concern (SCC) must be obtained prior to the clearance of vegetation. The DFFE Biodiversity Conservation has been registered on the Stakeholder and I&AP Database and Terrestrial Biodiversity Specialists (including both botanical and faunal specialists) for part of the assessment team.
National Environmental Management: Protected Areas Act (NEM:PAA) (Act No. 57 of 2003)	The proposed Umsobomvu Development will require the clearance of vegetation within a National Protected Areas Expansion Strategy (NPAES) Focus Area. Sections of the proposed Umsobomvu Development are situated within the Karoo Escarpment Grassland Focus Area.
National Water Act (NWA) (Act No. 36 of 1998)	The proposed Umsobomvu Development occurs within 100 meters of a few watercourses and within 500 meters of a wetlands. Water use authorisation is required from the Department of Water and Sanitation (DWS) prior to the commencement of the construction phase. The DWS is registered on the Stakeholder and I&AP Database.
Mineral and Petroleum Resources Development Act (MPRDA) (Act No. 28 of 2002)	The Department of Mineral Resources and Energy (DMRE) should be made aware of the proposed development and, should any activities associated with the construction of the proposed Umsobomvu Development require the excavation/extraction of sand or hard rock for construction purposes, the necessary approvals and/or permits must be obtained from the DMRE prior to the commencement of these activities. The DMRE is registered on the Stakeholder and I&AP Database.
National Heritage Resources Act (NHRA) (Act No. 25 of 1999)	The proposed Umsobomvu Development could impact sensitive heritage resources. The South African Heritage Resource Agency (SAHRA) and the Eastern Cape Provincial Heritage Resources Authority (ECPHRA) have been registered on the Stakeholder and I&AP Database, a Heritage Specialist forms part of the assessment team and the relevant authorisation and/or permits must be obtained prior to the commencement of the construction phase.
National Environmental Management: Waste Act (NEM:WA) (Act No. 59 of 2008)	The Developer must ensure that all activities associated with the proposed Umsobomvu Development address waste-related matters in compliance with the requirements on the NEM:WA. The Developer should communicate with the affected Local Municipalities (LMs) to ensure that waste is disposed of at a suitable registered landfill site. Mitigation measures and management actions have been included in the EMPs for the proposed development.
National Forestry Act (NFA) (Act No. 84 of 1998) Provincial Nature and Environmental Conservation Ordinance (No. 19 of 1974)	The proposed Umsobomvu Development footprints could contain SCC, specifically protected trees. The necessary permissions and/or permits must be obtained prior to the clearance of vegetation. The DFFE Biodiversity

Northern Cape Nature Conservation Act (Act No. 9 of 2009)	Conservation has been registered on the Stakeholder and I&AP Database and Terrestrial Biodiversity Specialists (including both botanical and faunal specialists) for part of the assessment team. An invasive species monitoring, control and eradication plan for land/activities under their control should be developed as part of the environmental plans in accordance with CARA.
Conservation of Agricultural Resources Act (CARA) (Act No. 43 of 1983)	
Electricity Regulation Act (Act No. 4 of 2006)	The proposed Umsobomvu Development must be in line with the Electricity Regulation Act. The DMRE and Eskom have been registered on the Stakeholder and I&AP Database.
Occupational Health and Safety Act (OHSA) (Act No. 85 of 1993)	The Developer must be mindful of the principles and broad liability and implications associated with the OHSA and mitigate any potential impacts which are identified prior to the construction phase. Mitigation measures and management actions have been included in the EMPs for the proposed development.
National Environmental Management: Air Quality Act (NEM:AQA) (Act No. 39 of 2004)	No major air quality issues are expected due to the proposed Umsobomvu Development; however, the Developer should be mindful of the impacts associated with increased dust generation during the construction phase. Mitigation measures and management actions have been included in the EMPs for the proposed development.
National Road Traffic Act (NRTA) (Act No. 93 of 1996)	The Developer must comply with all the requirements in terms of the NRTA during the construction and operational phases of the proposed Umsobomvu Development.
National Veld and Forest Fire Act (NVFFA) (Act No. 101 of 1998)	The Developer must ensure that appropriate firefighting equipment, protective clothing, and trained personnel (for extinguishing fires) are present onsite during the construction of the Umsobomvu Development. Mitigation measures and management actions have been included in the EMPs for the proposed development.
Pixley Ka Seme District Municipality (Northern Cape)	The Umsobomvu Development must comply with/be in line with all relevant municipal by-laws, the Spatial Development Frameworks (SDFs) and the Integrated Development Plans (IDPs). Representatives from the affected District Municipalities and Local Municipalities have been included in the Stakeholder and I&AP Database.
Umsobomvu Local Municipality (Northern Cape)	
Chris Hani District Municipality (Eastern Cape)	
Inxuba Yethemba Local Municipality (Eastern Cape)	

1.4 ENVIRONMENTAL AUTHORISATION

In accordance with the requirements of the NEMA EIA Regulations (2014, and subsequent amendments), the proposed Umsobomvu Development triggers a Basic Assessment (BA) Process. The Basic Assessment Report (BAR) identified potentially significant environmental and social impacts and is the main report in the BA Process. Additional specialist assessments serve to supplement the assessment contained in the BAR. This EMPr interprets the findings of the BAR, and the associated specialist assessments, and prescribes project-specific specifications to be achieved. The EMPr is a progressive working document which must be updated based on the relevant conditions stipulated in the Environmental Authorisation (EA). The EMPr must then be submitted to DFFE (along with the final layout) for approval prior to the commencement of construction.

2 DETAILS OF THE ENVIRONMENTAL TEAM

2.1 EXPERTISE OF THE ENVIRONMENTAL TEAM

Project EAP: Dr Alan Carter, *Pri.Sci.Nat*, Registered EAP - EAPASA

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DR ALAN CARTER

Dr Alan Carter is an Executive Director of the East London CES office and has extensive training and over 30 years of 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 (marine). He is also a certified ISO14001 EMS auditor with Exemplar Global (formerly Registrar Accreditation Board, USA). Alan is a registered professional with the South African Council for Natural Scientific Professionals (SACNASP) and through Environmental Assessment Practitioners Association of South Africa (EAPASA). See full CV in Appendix F.

MS CAROLINE EVANS

Ms Caroline Evans is a Principal Environmental Consultant with more than eight (8) years' experience, and she is based in the Makhanda (Grahamstown) branch. She holds a BSc with majors in Environmental Science (distinction) and Zoology, as well as a BSc (Hons) in Environmental Science (distinction) both from Rhodes University. Her undergraduate degree included both commerce and natural sciences. Caroline's honours dissertation evaluated the economic impacts of degradation of the xeric subtropical thicket through farming practices, focusing on the rehabilitation potential of the affected areas in terms of carbon tax. She has a broad academic background including statistics, economics, management, climate change, wetland ecology, GIS, rehabilitation ecology, ecological modelling and zoology. Caroline has a strong focus on renewable energy and South African policy and legislation related to development. See full CV in Appendix F.

MS LUNGA MBULANA

Ms Lunga Mbulana is an Environmental Consultant in the East London branch of CES. In addition, Lunga holds a BSc degree with majors in environmental and water science, geology and biodiversity and conservation as well as a BSc Honours degree in Environmental and Water Science from the University of the Western Cape. Lunga's research provided an understanding of geomorphic processes of hillslope-channel relationships in the Silvermine valley catchment, Western Cape. She is a registered scientist with SACNASP. Lunga has experience assisting in the compilation of Basic Assessment Reports, Environmental Management Plans as well as experience in the Public Participation Processes. Lunga is interested in all aspects of environmental quality management. See full CV in Appendix F.

3 PROPOSED ACTIVITY

Umsobomvu Wind Power (Pty) Ltd is proposing the development of infrastructure to supplement the development of the authorised Wind Energy Facilities (WEFs) in proximity to the infrastructure site. The proposed Umsobomvu Development is situated near Middelburg and Noupoort in the Eastern Cape and Northern Cape Provinces.

The proposed development includes the following and will require up to 18.75 ha (187 500 m²) of vegetation clearance within the three (3) assessment areas:

- The assessment of one (1) 600 m x 900 m area which will include:
 - An IPP 132 kV Substation up to 22 500 m²;
 - 132 kV Distribution Collector Substation up to 22 500 m²;
 - Operation and Maintenance (O&M) Building up to 22 500 m²; and
 - Two (2) 132 kV Overhead Lines (OHL) of up to 500 m in length.
- The assessment of two (2) 300 m x 300 m areas which will include:
 - Area 1: A Concrete Tower Manufacturing Facility (CTMF) and Temporary Laydown Area of up to 60 000 m²; and
 - Area 2: A CTMF and Temporary Laydown Area of up to 60 000 m².
- The construction of an up to 3.5 km new access road, including a new intersection, with sections of the road route requiring the widening of existing roads to 12 m in width during construction which will then be rehabilitated to 8 m in width during operation.

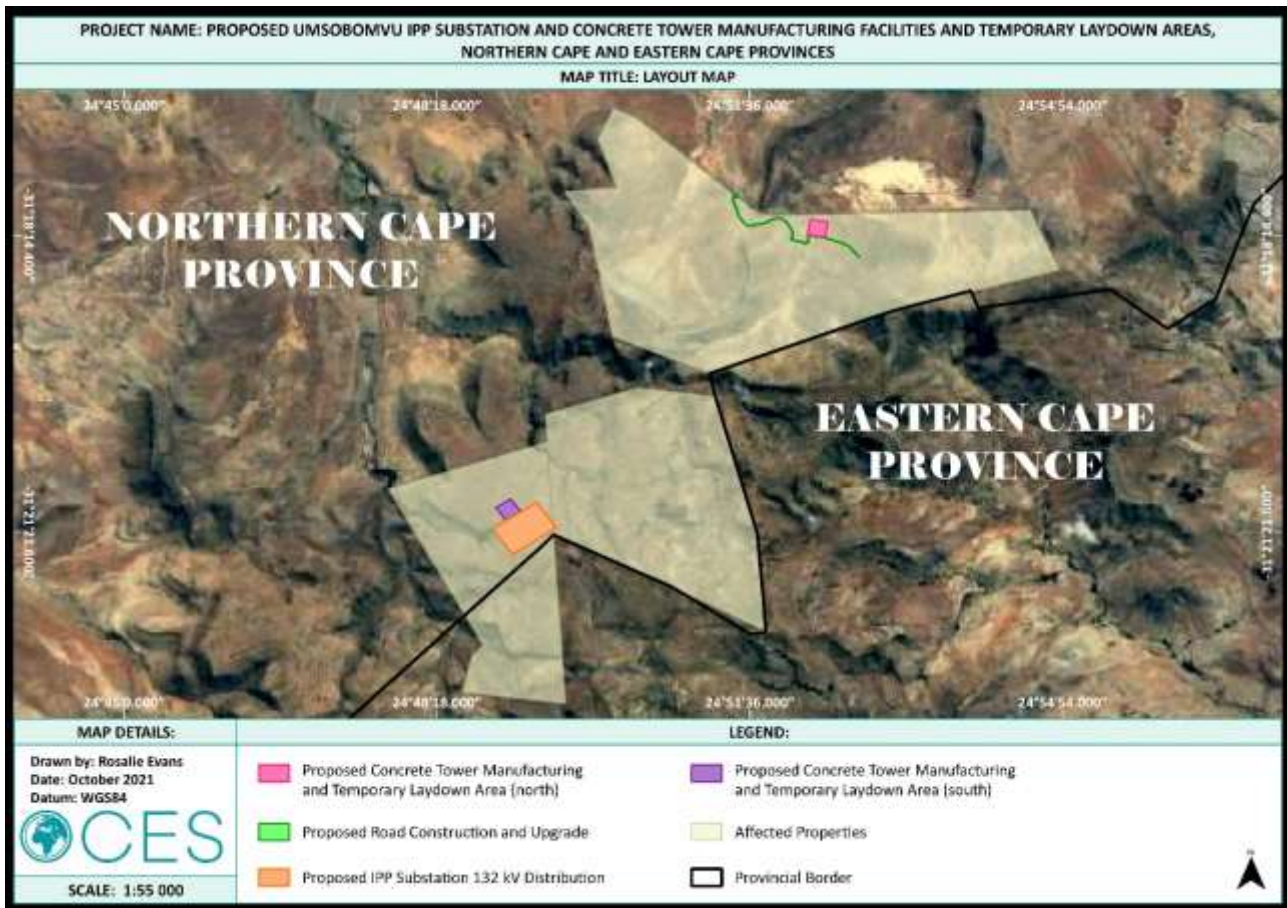




Figure 3.1: Layout Map of the proposed Umsobomvu Development site.

Table 3.1: Coordinates of the proposed Umsobomvu Development components.

NUMBER & COLOUR IN FIGURES A, B AND C		COORDINATES (DEGREES AND DECIMAL MINUTES)			
ASSESSMENT AREA 1					
1.	31° 18.072'S	24° 52.237'E	3.	31° 18.256'S	24° 52.397'E
2.	31° 18.096'S	24° 52.423'E	4.	31° 18.233'S	24° 52.209'E
					
ASSESSMENT AREA 2					
1.	31° 21.105'S	24° 48.927'E	3.	31° 21.147'S	24° 49.187'E
2.	31° 21.013'S	24° 49.080'E	4.	31° 21.239'S	24° 49.035'E
ASSESSMENT AREA 3					
1.	31° 21.330'S	24° 48.884'E	3.	31° 21.315'S	24° 49.563'E
2.	31° 21.049'S	24° 49.349'E	4.	31° 21.597'S	24° 49.102'E
					
NEW INTERSECTION, ROAD CONSTRUCTION AND ROAD UPGRADE					
1.	31° 17.824'S	24° 51.441'E	8.	31° 18.283'S	24° 52.042'E
2.	31° 17.857'S	24° 51.422'E	9.	31° 18.321'S	24° 52.199'E

NUMBER & COLOUR IN FIGURES A, B AND C	COORDINATES (DEGREES AND DECIMAL MINUTES)				
3.	31° 18.132'S	24° 51.569'E	10.	31° 18.242'S	24° 52.235'E
4.	31° 18.109'S	24° 51.756'E	11.	31° 18.259'S	24° 52.386'E
5.	31° 18.061'S	24° 51.910'E	12.	31° 18.344'S	24° 52.634'E
6.	31° 18.102'S	24° 51.991'E	13.	31° 18.467'S	24° 52.756'E
7.	31° 18.199'S	24° 52.051'E			



4 LAYOUT OF THE EMPR

In order to ensure a holistic approach to the management of environmental and social impacts during the planning and design, construction, operational and decommissioning phases of the proposed Umsobomvu Development, this EMPr sets out the methods by which proper environmental controls are to be implemented by the Contractor and all other parties involved. These phases of development are discussed in more detail below and each phase has specific potential 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, environmental consultants and specialists to ensure that the engineers are aware of the environmental and social constraints which must be considered and incorporated into the final design 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 final 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 of final design.

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 conditions which contain detailed specifications which will need to be undertaken or adhered to by the Contractor. The Construction Phase section will need to be developed parallel to the final design stages, 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, the final EMPr will need to be signed off after input from the selected Contractor prior to the initiation of construction activities. It should, however, be noted that the Contractor must tender on the existing document and that in areas of uncertainty, a precautionary approach to the environmental guidelines and specifications must be adopted.

4.3 OPERATIONAL PHASE

The Operational Phase section provides specific guidance related to operational activities associated with a particular development. By taking pro-active 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 DECOMMISSIONING PHASE

The proposed CTMFs and Laydown Areas will be temporary and decommissioned after the construction phase of the authorised Umsobomvu WEF. However, it is unlikely that the proposed substations, OHL and access road will be decommissioned in the near future. Should the substations, OHL and access road be decommissioned, this EMPr must be updated prior to Decommissioning Phase and it must consider the relevant legislation, policies and guidelines at the time of decommissioning.

5 IMPACT MANAGEMENT ACTIONS

5.1 GENERAL CONSTRUCTION PHASE MITIGATION AND MANAGEMENT MEASURES

In addition to the mitigation measures and impact management actions which are stipulated in the Umsobomvu Development BAR, and included in Section 5.2 of this report, the following general Construction Phase mitigation and management measures will apply.

GENERAL CONSTRUCTION PHASE		
ACTIVITY	MITIGATION MEASURES, MANAGEMENT ACTIONS AND RECOMMENDATIONS	
1.	SITE DEMARCATION	<p>The location, layout and method of establishment of the construction camp, including the following, must be clearly indicated and demarcated prior to the commencement of construction:</p> <ul style="list-style-type: none"> • All Contractors' offices; • Laydown areas; • Vehicle wash areas (if any); • Workshops and drip trays; • Fuel storage areas (including filling and dispensing from storage tanks); • Cement/concrete mixing areas (including the methods employed for the mixing of concrete and particularly the containment of runoff water from such areas and the method of transportation of concrete); and • Other infrastructure required for the running of the project. <ul style="list-style-type: none"> • Where required, the Contractor must erect and maintain permanent and/or temporary fences in the locations directed by the ECO. Such fences must, if so specified, be erected before undertaking designated activities; and • Should "no-go" areas exist on the site, the Contractor must ensure that, insofar as he/she has the authority, no person, machinery, equipment or materials enter the "no-go" areas at any time.
2.	SITE ACCESS	<p>Details, including a drawing, showing where and how the access points and routes will be located and managed, must be submitted to the ECO and the Developer. These should be supported by the following management requirements:</p> <ul style="list-style-type: none"> • On the site and within such distance of the site as may be stated, the Contractor must control the movement of all vehicles, including vehicles of suppliers so that they remain on designated routes, are distributed so as not to cause an undue concentration of traffic and that all relevant laws are complied with. In addition, such vehicles must be routed and operated in a manner that minimises the disruption to regular users of the routes; • On gravel or earth roads onsite and within 500 m of the site, the Contractor's vehicles as well as the suppliers' must not exceed a speed of 40 km/h or as directed by the ECO; and • The Contractor must supply the ECO with a Method Statement detailing the location and management of all access points and roads.
3.	MATERIALS HANDLING, USE AND STORAGE	<ul style="list-style-type: none"> • The Contractor must ensure that any delivery drivers are informed of all procedures and restrictions (including identified "no-go" areas) required to comply with this EMPr; • The Contractor must ensure that these delivery drivers are supervised during offloading, by someone with an adequate understanding of the requirements of the EMPr; • Materials must be appropriately secured to ensure safe passage between destinations. Loads including, but not limited to, sand, stone chip, fine vegetation, refuse, paper and cement, should have appropriate cover to prevent them spilling from the vehicle during transit; • The Contractor will be responsible for any clean up resulting from the failure by his/her employees or suppliers to properly secure transported materials;

GENERAL CONSTRUCTION PHASE		
ACTIVITY		MITIGATION MEASURES, MANAGEMENT ACTIONS AND RECOMMENDATIONS
		<ul style="list-style-type: none"> All manufactured and/or imported material must be stored within the Contractor's camp and, if necessary, out of the rain; All laydown areas outside of the construction camp will be subject to the ECO's approval; and Imported gravel, fill, soil and sand materials should be free of weeds, alien invasive seed matter, plant material, litter and contaminants and must be obtained from sources approved by the ECO.
4.	STOCKPILING	<ul style="list-style-type: none"> Any stockpiling of gravel, cut, fill or any other material including spoil must only be in areas that have been approved by the ECO, within the defined working area; The Contractor should ensure that the material does not blow or wash away. If the stockpiled material is at risk of being washed or blown away, the Contractor should spray it with Dustex or cover it with a suitable material, such as hessian or plastic. However, the stockpiles of topsoil must not be covered with plastic; and Stockpiling of any material must not be located within 20 m of any "no-go" areas (if applicable).
5.	SOLID WASTE MANAGEMENT	<ul style="list-style-type: none"> Burning, burying or dumping of any waste materials, litter or refuse must not occur within the site; The Contractor must provide vermin and weatherproof bins with lids of sufficient number and capacity to store the solid waste produced on a daily basis. The lids must be kept firmly on the bins at all times; Bins must not be allowed to become overfull and must be emptied daily; The waste from bins may be temporarily stored onsite in a central waste area which is weatherproof, scavenger proof, and which the ECO has approved; Recyclable waste must be disposed of in separate skips/bins and removed offsite for recycling; All solid waste must be disposed of offsite at an approved registered landfill site. The Contractor must supply the ECO with the appropriate disposal certificates; and The Contractor must submit a solid waste management plan, as part of the Pollution Control Method Statement, to the ECO.
6.	WATER USE	<ul style="list-style-type: none"> All sources of water for construction purposes must be approved by the ECO in writing before any such sources may be used to obtain water; and All wash water should be recycled for use as wash water again or for dust suppression, where applicable.
7.	HAZARDOUS SUBSTANCES	<ul style="list-style-type: none"> 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 and regulations relating to 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 Material Safety Data Sheets (MSDS) must be available onsite; Procedures detailed in the MSDSs must be followed in the event of an emergency situation; The Contractor must be responsible for the training and education of all personnel onsite who will be handling hazardous materials about their proper use, handling and disposal; and If potentially hazardous substances are to be stored or used onsite, the Contractor must submit a Method Statement to the ECO which details the substances/materials to be used, together with the transport, storage, handling and disposal procedures for the substances.
8.	CEMENT AND MIXING OF CONCRETE	<ul style="list-style-type: none"> The proposed location of cement mixing areas (including the location of cement stores and sand and aggregate stockpiles) must be indicated on the site layout plan and approved by the ECO;

GENERAL CONSTRUCTION PHASE	
ACTIVITY	MITIGATION MEASURES, MANAGEMENT ACTIONS AND RECOMMENDATIONS
	<ul style="list-style-type: none"> All wastewater generated from the operation and cleaning of concrete mixing equipment and other sources of concrete must be passed through a concrete wastewater settlement system if they are to be reused; The Contractor must ensure that minimal water is used for washing of concrete and cement mixing equipment; Used cement bags must be disposed of in weatherproof bins onsite to prevent the generation of wind-blown cement dust and to prevent the bags from blowing away; The Contractor must ensure that concrete is mixed on mortar boards. All visible remains of concrete must be removed and disposed of as waste, and all surplus aggregate should be removed; and As part of the Pollution Control and Concrete Mixing Method Statement, a plan detailing all actions to be taken to comply with the requirements must be submitted by the Contractor to the ECO.
9.	<p style="text-align: center;">FUELS AND OIL</p> <p><u>Fuel Storage</u></p> <ul style="list-style-type: none"> All construction materials, including fuels and oil, must be stored in demarcated areas that 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 must ensure that all liquid fuels and oils are stored in tanks with lids, which are kept firmly shut and locked. The capacity of the tank must be clearly displayed, and the product contained within the tank clearly identified using the emergency information system detailed in SABS 0232 part 1. Fuel storage tanks capacity must not exceed 9 000 litres and must be kept onsite only for as long as fuel is needed for construction activities, on completion of which they must be removed; Tanks onsite must 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 banded areas must be covered by a roofed structure, taken offsite to a disposal site approved by the ECO, and the material that absorbs, breaks-down or encapsulates minor hydrocarbon spillage 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; and 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. <p><u>Refuelling</u></p> <ul style="list-style-type: none"> Where reasonably practical, the plant must be refuelled at a designated re-fuelling area/depot or at a workshop as applicable. If this is not reasonably practical, then the

GENERAL CONSTRUCTION PHASE		
ACTIVITY	MITIGATION MEASURES, MANAGEMENT ACTIONS AND RECOMMENDATIONS	
	<p>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;</p> <ul style="list-style-type: none"> • 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 must 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 must be able to handle a minimum of 200 litres of hydrocarbon liquid spill. Prior to any refuelling or maintenance activities, the ECO must approve this material; • Used oil must be stored at a central location onsite prior to removal offsite for disposal at an approved disposal or recycling site; and • Old oil filters and oil, petrol and diesel-soaked material must be treated as hazardous waste. The Contractor must remove all oil, petrol, and diesel-soaked sand immediately and must dispose of it as hazardous waste or treat it onsite with material that breaks down or encapsulates such spillages as approved by the ECO. 	
10.	WORKSHOP, EQUIPMENT MAINTENANCE AND STORAGE	<ul style="list-style-type: none"> • The Contractor must ensure that the workshop and other plant maintenance facilities, including those areas where, after obtaining the ECO's approval, the Contractor carries out emergency plant maintenance, does not contaminate the soil or vegetation. The workshop must have a smooth impermeable (concrete or thick plastic covered with sand) floor; • The floor should be bunded and sloped towards an oil trap or sump to contain any spillages. When servicing equipment, drip trays should be used to collect the waste oil and other lubricants. Drip trays must also be provided in construction areas for stationary plant (such as compressors) and for "parked" plant (such as scrapers, loaders and vehicles); • All vehicles and equipment must be kept in good working order and serviced regularly. Leaking equipment must be repaired immediately or removed from the site; • All vehicle and equipment washing must be undertaken in the workshop or maintenance areas, and these areas must be equipped with a suitable impermeable floor and sump/oil trap. The use of detergents for washing must be restricted to low phosphate and nitrate products and low sudsing-type detergents; and • As part of the site layouts, a plan must be submitted to the ECO detailing the design of the bunding of the workshop and how runoff from the workshop will be managed as well as how drip trays, used under plant, will be managed.
11.	ABLUTION FACILITIES	<ul style="list-style-type: none"> • Washing, whether of a person or of personal effects, and acts of excretion and urination are strictly prohibited other than at the facilities provided. The Contractor must provide the necessary ablution facilities for their personnel prior to the commencement of work; • Ablution facilities must be supplied by the Contractor for the workers at a ratio of at least one (1) toilet per twenty (20) workers in areas approved by the ECO. Toilets must be situated approximately 200 m of any area where work is taking place in numbers which are sufficient to meet the ratio depicted above for the workers in the area; • The facilities must be maintained in a hygienic state and serviced regularly and toilet paper must be provided. Temporary/portable toilets must be secured to the ground to prevent them toppling due to wind or any other cause, to the satisfaction of the ECO; and • Discharge into the environment and burial of waste is strictly prohibited. The Contractor must ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from the site. Toilets must be emptied before any temporary site closure.

GENERAL CONSTRUCTION PHASE		
ACTIVITY		MITIGATION MEASURES, MANAGEMENT ACTIONS AND RECOMMENDATIONS
12.	EATING AREAS	<ul style="list-style-type: none"> The Contractor must designate eating area(s), subject to the approval of the ECO. No cooking is allowed outside of the Contractor’s site camp; All workers must eat in designated, suitable shaded, eating areas during; Sufficient bins must be present in the designated eating area(s). All disposable food packaging must be disposed of in the bins after each meal; and The feeding- or leaving of food for animals is strictly prohibited.
13.	SITE STRUCTURES	<ul style="list-style-type: none"> All site establishment components and equipment should be positioned to limit visual intrusion on neighbouring areas. The type and colour of roofing and cladding materials of the Contractor’s temporary structures should be selected to reduce reflection; and The Contractor should supply and maintain adequate and suitable sheds for the storage of materials. Sheds for the storage of materials that may deteriorate or corrode if exposed to the weather should be weatherproof, adequately ventilated and provided with raised floors.
14.	LIGHTING	<ul style="list-style-type: none"> The Contractor should ensure that any lighting installed on the site for their activities does not cause a reasonably avoidable disturbance to neighbouring residents or the naturally occurring fauna.
15.	NOISE	<ul style="list-style-type: none"> The Contractor must take precautions to minimise noise generated onsite; The Contractor must comply with the Noise Induced Hearing Loss Regulations published under the Occupational Health and Safety Act (Act No. 85 of 1993); Appropriate directional and intensity settings are to be maintained on all hooters and sirens; and No amplified music must be allowed onsite. The Contractor must not use sound amplification equipment on site unless in emergency situations.
16.	DUST CONTROL	<ul style="list-style-type: none"> The Contractor must be responsible for the continued control of dust arising from their operations. The Contractor must take all reasonable measures to minimize the generation of dust as a result of construction activities to the satisfaction of the ECO. Appropriate dust suppression measures include spraying or dampening with water, using a commercial dust binder (such as Hydropam or Dustex), rotovating straw bales, planting of open cleared space and the scheduling of dust-generating activities. If the conditions are such that the Contractor cannot satisfactorily dampen the dust, then the ECO may halt operations until such time as the conditions are more suitable for lower dust generating construction activities; Areas which will have the topsoil stripped for construction purposes must be limited and only stripped when work is about to take place; Other activities and situations that may result in a dust nuisance include site clearance and other earth moving operations, open cleared space, stockpiles of topsoil or sand, and activities associated with concrete mixing; and The appropriate health and safety equipment (e.g. dust masks) must be worn by workers during the phases of dust-producing construction activity.
17.	ENVIRONMENTAL AWARENESS TRAINING	<ul style="list-style-type: none"> Environmental awareness training courses must be run for all personnel onsite (See Annexure A for a proposed Basic Environmental Education Course). At least two (2) courses should be run, one (1) for the Contractor’s and Subcontractors’ management and one (1) for all site staff and labourers. Courses should be run in the morning during normal working hours at a suitable venue provided by the Contractor. All attendees should remain for the duration of the course and sign an attendance register on completion, that clearly indicates participant’s names, a copy of which must be handed to the ECO for inclusion in the Environmental File; The size of each session must be limited to a maximum of (30) people, depending on the size of the venue. The Contractor should allow for sufficient sessions to train all personnel. Subsequent sessions should be run for any new personnel entering the site. A Method Statement with respect to the organisation of these courses should be submitted to the ECO; and

GENERAL CONSTRUCTION PHASE		
ACTIVITY	MITIGATION MEASURES, MANAGEMENT ACTIONS AND RECOMMENDATIONS	
		<ul style="list-style-type: none"> Notwithstanding the specific provisions of this clause, it is compulsory for the Contractor to convey the sentiments of the EMP to all personnel and Subcontractors involved with the Works.
18.	FIRE CONTROL	<ul style="list-style-type: none"> 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, fuel storage areas and any areas where the vegetation or other material is such as to support the rapid spreading of an initial flame; The Contractor must appoint a Fire Officer who will be responsible for ensuring immediate and appropriate actions in the event of a fire and to ensure that employees are aware of the procedures to be followed. The Contractor must forward the name of the Fire Officer to the ECO for approval within seven (7) days of being onsite; The Contractor must ensure that there is basic firefighting equipment available onsite at all times. This must include at least rubber beaters and at least one (1) fire extinguisher of the appropriate type when welding or other “hot” activities are undertaken; and The Contractor must be liable for any expenses incurred by any organisations called to assist with fighting fires which were started as a result of the Contractor’s activities or personnel, and for any cost relating to the rehabilitation of burnt areas, or consequential damages.
19.	EMERGENCY PROCEDURES	<ul style="list-style-type: none"> Emergency procedures, including the names and contact details of responsible personnel and emergency services must be made available to all staff and must be clearly displayed at relevant locations at the site. The Contractor must advise the ECO of any emergencies onsite, together with a record of action taken, within 24 hours of the emergency occurring; and The Contractor must submit a Method Statement covering the procedures for the following emergencies: <ul style="list-style-type: none"> (a) <u>Fire</u> <ul style="list-style-type: none"> The Contractor must advise the relevant authority of a fire as soon as one starts and must not wait until it is out of control; and The Contractor must ensure that all employees are aware of the procedures to be followed in the event of a fire. (b) <u>Accidental leaks and spillages</u> <ul style="list-style-type: none"> The Contractor must ensure that all employees are aware of the procedures to be followed for dealing with spills and leaks, which must include notifying the ECO and the relevant authorities. The Contractor must ensure that all the necessary materials and equipment for dealing with spills and leaks are available onsite at all times. Treatment and remediation of the spill areas must be undertaken to the reasonable satisfaction of the ECO; In the event of a hydrocarbon spill, the source of the spillage must be isolated, and the spillage contained. The area must be cordoned off and secured. The Contractor must ensure that there is a sufficient supply of absorbent material readily available to absorb, breakdown or, where possible, encapsulate minor hydrocarbon spillages. The quantities of such materials must be able to handle a minimum of 200 litres of hydrocarbon liquid spill; and Any spills must be cleared, and the contaminated soil or sludge disposed of in an appropriate manner, approved by the ECO, or at a licensed hazardous waste disposal site.
20.	PROTECTION OF NATURAL FEATURES	<ul style="list-style-type: none"> The Contractor must not deface, paint, damage or mark any natural features (e.g. rock formations or trees) situated in or around the site for survey or other purposes unless agreed upon beforehand with the ECO. Any features affected by the Contractor in

GENERAL CONSTRUCTION PHASE	
ACTIVITY	MITIGATION MEASURES, MANAGEMENT ACTIONS AND RECOMMENDATIONS
	<p>contravention of this clause must be restored/rehabilitated to the satisfaction of the ECO; and</p> <ul style="list-style-type: none"> The Contractor and onsite staff must not enter dense, intact vegetation without written approval from the ECO.
21.	<p>PROTECTION OF FAUNA AND FLORA</p> <ul style="list-style-type: none"> A suitably qualified Botanical Specialist must identify the need for plant search and rescue (prior to construction) to identify Species of Conservation Concern (SCC) to be relocated; Protected plant species must then be removed from the designated construction footprint and relocated to adjacent areas of similar habitat that must not be affected by construction activities. The plants should be used in landscaping once construction is complete (if applicable); Except to the extent necessary for the carrying out of the works, vegetation should not be removed, damaged or disturbed; The removal and stockpiling of topsoil must be carried out in accordance with this EMPr; Trapping, poisoning and/or shooting of animals by the construction team is strictly forbidden. No domestic pets or livestock are permitted onsite; The use of chemicals of all forms must be carefully controlled and monitored to avoid contamination of surrounding areas; and Construction staff must be educated on the significance of plant and animal SCC.
22.	<p>PROTECTION OF HERITAGE FEATURES</p> <ul style="list-style-type: none"> Prior to the commencement of construction activities, the construction managers and/or foremen must be informed of the possible types of heritage sites and cultural material they may encounter and the procedures to follow should they find such sites; If concentrations of palaeontological and/or archaeological heritage material and human remains are uncovered during construction, all work must cease immediately and be reported to the Eastern Cape Provincial Heritage Resources Authority (ECPHRA) and/or the South African Heritage Resources Agency (SAHRA) to ensure that systematic and professional investigation/excavation can be undertaken; and Any person who causes intentional damage to archaeological or historical sites and/or artefacts could be penalised or legally prosecuted in terms of the National Heritage Resources Act (Act No. 25 of 1999).
23.	<p>VEGETATION CLEARANCE</p> <ul style="list-style-type: none"> Vegetation clearing and trampling must be avoided in areas demarcated as “no-go” areas (if any); Temporary infrastructure such as the site camp, laydown areas and storage areas must only be placed in authorised locations which have been approved by the ECO; The Contractor must work according to a plan, which demarcates areas to be cleared. The plan should be part of the Project Layout Plan which should be developed during the Planning and Design Phase; The minimum amount of vegetation clearance must take place; and Collection of, or wilful damage to, any plants outside of the areas demarcated for clearing must not be allowed.
24.	<p>TOPSOIL</p> <ul style="list-style-type: none"> Topsoil should only be stripped from the areas as indicated below: <ul style="list-style-type: none"> Any area which is to be used for temporary storage of materials; Areas which could be polluted by any aspect of the construction activity; and Areas designated for the dumping of soil. Stripping of topsoil must be undertaken in such a manner as to minimise erosion by wind or runoff; Outside of the development footprint, topsoil will be stripped to a depth not exceeding 150 mm from the original ground level; Areas from which the topsoil is to be removed must be cleared of any foreign material which could form part of the topsoil during removal including bricks, rubble, any waste material, litter, excess vegetation and any other material which could reduce the quality of the topsoil;

GENERAL CONSTRUCTION PHASE		
ACTIVITY		MITIGATION MEASURES, MANAGEMENT ACTIONS AND RECOMMENDATIONS
		<ul style="list-style-type: none"> The Contractor must ensure that subsoil and topsoil are not mixed during stripping, excavation, reinstatement and rehabilitation. If mixed with clay sub-soil, the usefulness of the topsoil for rehabilitation of the site will be lost; Soils must be exposed for the minimum time possible once cleared; Topsoil must be temporarily stockpiled, separately from (clay) subsoil and rocky materials; Topsoil must only be stockpiled in areas designated by the ECO; Stockpiles should either be vegetated with indigenous grasses or covered by a suitable fabric to prevent erosion and invasion of weeds; and Stockpiled topsoil must not be compacted.
25.	STORMWATER MANAGEMENT	<ul style="list-style-type: none"> Stormwater must be managed using suitable structures, such as swales, gabions and rock rip-wrap, to ensure that runoff from the development is attenuated prior to discharge. Silt and sedimentation must be kept to a minimum, through the use of the above-mentioned structures; and Natural runoff must be diverted to stormwater drains, where these are available.
26.	EROSION AND SEDIMENTATION CONTROL	<ul style="list-style-type: none"> The Contractor must take all reasonable measures to limit erosion and sedimentation due to construction activities and must comply with such detailed measures as may be required by this EMPr; Revegetate areas that have been disturbed as soon as possible; Where erosion and/or sedimentation occur, whether on or off the site, despite the Contractor complying with the aforementioned, rectification must be carried out in accordance with details specified by the ECO. Where erosion and/or sedimentation occur due to the fault of the Contractor, rectification must be carried out to the reasonable requirements of the ECO and at the expense of the Contractor; and Actions must also be taken in the event of heavy rains and potential flooding, whereby diversion barriers must not cause excessive erosion.
27.	AESTHETICS	<ul style="list-style-type: none"> The Contractor must take reasonable measures to ensure that construction activities do not have an unreasonable impact on the aesthetics of the area.
28.	COMMUNITY RELATIONS	<ul style="list-style-type: none"> The Contractor must keep a "Complaints Register" onsite. The Complaints Register must contain the contact details of any person who lays a complaint, and information regarding the complaint itself, including the date and time that the complaint was resolved; The ECO and/or the Community Liaison Officer (CLO) should be responsible for responding to queries and/or complaints and may request assistance from the Contractor's Management Staff; and Construction materials and other purchases relating to the project should be done, where possible, within the nearby community and at local shops.
29.	TEMPORARY SITE CLOSURE	<ul style="list-style-type: none"> If the site is closed for a period exceeding five (5) calendar days, the Contractor's Safety, Health and Environment (SHE) Officer in consultation with the ECO must carry out the following checklist procedure and ensure that the following conditions apply and report on compliance with this clause: <ul style="list-style-type: none"> (a) <u>Fuels / flammables / hazardous materials stores</u> <ul style="list-style-type: none"> Fuel stores are as low in volume as practicable; There are no leaks; The outlet is secure and locked; The bund is empty; Fire extinguishers are serviced and accessible; The area is secure from accidental damage through vehicle collision and the like; Emergency and contact numbers are available and displayed; and There is adequate ventilation in enclosed spaces. (b) <u>Safety</u>

GENERAL CONSTRUCTION PHASE	
ACTIVITY	MITIGATION MEASURES, MANAGEMENT ACTIONS AND RECOMMENDATIONS
	<ul style="list-style-type: none"> • Check that site safety checks have been carried out in accordance with the Occupational Health and Safety Act (No. 85 of 1993) prior to site closure; • An inspection schedule and log for use by security or contracts staff is developed; • All trenches and manholes are secured; • Applicable notice boards are in place and secured; • Emergency and Management contact details are prominently displayed; • Security personnel have been briefed and have the facilities to contact or be contacted by relevant management and emergency personnel; • Night hazards such as reflectors, lighting, traffic signage etc. have been checked; • Fire hazards identified and the local authority notified of any potential threats e.g. large brush stockpiles, fuels etc.; • Pipe stockpiles are wedged / secured; • Scaffolds are secure; and • Structures vulnerable to high winds are secure. <p>(c) <u>Erosion</u></p> <ul style="list-style-type: none"> • Wind and dust mitigation measures such as straw, brush packs, irrigation etc. are in place; • Excavated and filled slopes and stockpiles are at a stable angle; • Re-vegetated areas have a watering schedule and the supply to such areas is secured; and • There are sufficient detention ponds or channels in place. <p>(d) <u>Water contamination and pollution</u></p> <ul style="list-style-type: none"> • Hazardous fuel stores are secure; • Cement and materials stores are secure; • Toilets are empty and secured; • Refuse bins are empty and secured; • Bunding is clean and treated with appropriate material that will absorb / breakdown and where possible be designed to encapsulate minor hydrocarbon spillage; and • Drip trays are empty and secure.

5.2 BAR AND SPECIALIST MITIGATION AND MANAGEMENT MEASURES

The following table sets out the potential environmental, social and specialist issues which could occur during the lifespan of the Umsobomvu Development, as identified during the BA Process. The BAR and the associated specialists provided mitigation measures, management actions, 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 Umsobomvu Development.

PLANNING & DESIGN PHASE		
POTENTIAL IMPACT	IMPACT DESCRIPTION	MITIGATION MEASURES, MANAGEMENT ACTIONS AND RECOMMENDATIONS
1. COMPLIANCE WITH RELEVANT LEGISLATION	During the planning and design phase, failure to obtain the necessary authorisations and/or permits, as well as failure to adhere to existing policies and legal obligations, could lead to the project conflicting with local, provincial and national policies	<ul style="list-style-type: none"> • Activities, which trigger listed activities in terms of the NEMA (Act No. 107 of 1998, as amended) EIA Regulations (2014, and subsequent amendments), must not commence prior to receipt of an EA from the national DFFE. • All identified water uses in terms of Section 21 of the NWA (Act No. 36 of 1998, as amended) must not commence prior to receipt of the

		and legislation. This could result in a lack of institutional support for the project, overall project failure and undue social and environmental impacts.	<p>necessary water use authorisation(s) from the DWS.</p> <ul style="list-style-type: none"> All additional permitting and authorisation requirements, including plant removal permits, must be obtained prior to the commencement of any vegetation clearance and/or construction activities. A suitably qualified ECO must be appointed prior to the commencement of the construction phase to monitor compliance with the conditions of all the relevant permits and authorisations. All phases of the Umsobomvu Development must comply with the relevant municipal by-laws and should consider the available best practice guidelines.
CONSTRUCTION PHASE			
POTENTIAL IMPACT		IMPACT DESCRIPTION	MITIGATION MEASURES, MANAGEMENT ACTIONS AND RECOMMENDATIONS
2.	INCREASE IN AIR EMISSIONS (SUCH AS DUST)	During the construction phase, the dust created as a result of the construction activities, such as vegetation clearance, grading and levelling of the exposed land and the transport of construction materials could be a nuisance during the construction phase.	<ul style="list-style-type: none"> Exhaust emissions from construction vehicles must be minimised by ensuring that all vehicles are properly equipped and serviced. Vegetation clearance must be limited to the approved and demarcated development footprints. If fine building materials, such as sand, are to be transported on the back of trucks, they must be adequately covered. Excavations and other clearing activities must only be done during the agreed-upon working hours and on the agreed-upon days. A speed limit of 40 km per hour must not be exceeded on gravel roads.
3.	INCREASE IN NOISE LEVELS	Noise will be created on the site during the construction phase due to the operation of construction equipment, noise generated by construction vehicles both onsite and during travel to and from the site, and noise generated by the construction workers which are all likely to result in an increase in localised noise levels which could potentially be a nuisance to individuals in proximity to the site.	<ul style="list-style-type: none"> All construction vehicles must be in sound working order and meet the necessary noise level requirements. All relevant municipal by-laws, with regards to noise control, must apply. Construction workers must not make use of portable radios, vehicle radios, whistles, and other items which generate excessive noise, while they are on the construction site.
4.	STORMWATER MANAGEMENT	Sediment is likely to be created during the construction phase of the Umsobomvu Development. This could be carried into nearby watercourses during rainfall events due to runoff. In addition, inadequate stormwater management could result in increased soil erosion within the proposed site and surrounds.	<ul style="list-style-type: none"> A Stormwater Management Plan must be compiled and implemented during the construction phase. Vegetation must be retained, where possible, to avoid soil erosion. Where necessary along the proposed road upgrade and the new section of road, suitable culverts must be installed at water crossings.

			<ul style="list-style-type: none"> • If slopes are cleared during construction, they must be rehabilitated as soon as possible to minimise soil erosion losses. • Construction activities must be demarcated, with vegetation clearing and topsoil removal (if required) limited to these areas. • Stockpiled materials must not be stored within 100 m 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 nearby watercourses.
5.	CONTAMINATION DUE TO THE STORAGE AND HANDLING OF HAZARDOUS SUBSTANCES	<p>During the construction phase, onsite maintenance of construction vehicles and/or machinery and equipment could result in oil, diesel and other hazardous chemicals contaminating surface and groundwater. Surface and groundwater pollution could arise from the spillage or leaking of diesel, lubricants and cement during the storage and handling of hazardous substances for construction activities.</p>	<ul style="list-style-type: none"> • Fuels and hazardous materials must not be stored within 100 m of a watercourse. • All hazardous substances, including fuel, oil, and cement, must be stored in a bunded area. • The recommendations of the Stormwater Management Plan must be implemented throughout the construction phase. • Spill kits must be readily available onsite throughout the construction phase. • Drip trays must be placed under all stationary plant. • If a spill occurs on a permeable surface (such as soil), a spill kit must be used to reduce the potential spread of the spill immediately. The spill must be remedied to the satisfaction of the ECO. • If a spill occurs on an impermeable surface (such as concrete), the surface spill must be contained using oil absorbent materials. The spill must be remedied to the satisfaction of the ECO. • Contaminated remediation materials must be carefully removed from the area of the spill, to prevent the further release of hazardous chemicals to the environment and stored in adequate containers until appropriate disposal at a suitably licenced landfill site.
6.	LOSS OF RIPARIAN VEGETATION	<p>During the construction phase, the upgrade of the existing roads and the construction of new sections of road are likely to require the removal of riparian vegetation, which will have adverse effects on the associated aquatic ecosystems.</p>	<ul style="list-style-type: none"> • The removal of riparian vegetation must take place under the supervision of the ECO and must be demarcated prior to removal. The clearance of riparian vegetation should be restricted to the amount required for the upgrade of the existing roads and the construction of the new sections of road. • Where necessary along the proposed road upgrade and the new section of road, suitable culverts must be installed at water crossings. • The removal of the alien invasive vegetation must be prioritised.
7.	FIRE RISK	<p>The proposed construction of the Umsobomvu Development could increase the risk of fires, which could potentially result in the loss of crops, grazing and livestock</p>	<ul style="list-style-type: none"> • Open fires must not be permitted within the proposed Umsobomvu Development site during the construction phase.

		during the construction phase. In addition, fires could result in injury to employees within the site and the potential damage to or loss of property.	<ul style="list-style-type: none"> Smoking must be restricted to designated smoking areas which have easy access to firefighting equipment. The Contractor, or the appointed fire marshal, must take all reasonable steps to prevent the accidental occurrence of fires and the spreading of fires. The Contractor, or the appointed fire marshal, must ensure that there is adequate firefighting equipment available onsite throughout the construction phase. The Contractor, or the appointed fire marshal, must ensure that all site personnel are aware of the risk of fires, the procedure to be followed in the event of a fire and must ensure that all site personnel have access to the relevant contact details of the nearest Fire and Emergency Services.
8.	SOCIO-ECONOMIC BENEFITS	During the construction phase of the Umsobomvu Development, direct short-term employment opportunities will be created. These employment opportunities will contribute to the skills development of individuals and a short-term income which will benefit individuals and their families.	<ul style="list-style-type: none"> Where suitable, preference should be given to the employment of individuals residing in the communities which are located close to the site. A Community Liaison Officer (CLO) should be appointed for the duration of the construction phase. This individual should have knowledge of the local communities and assist with the employment processes. The CLO should be available and accessible to the general public, the Developer and all individuals employed by the Developer during the construction phase.
9.	LOSS OF AGRICULTURAL LAND DUE TO DEVELOPMENT	The vegetation clearing required for the construction of the Umsobomvu Development will result in the direct and cumulative (due to the vegetation clearing required for the Umsobomvu WEF) loss of grazing land, which is currently used for livestock and wildlife grazing, and the loss of potential agricultural land.	<ul style="list-style-type: none"> Vegetation clearance must be limited to the demarcated development footprint.
10.	WASTE MANAGEMENT	The inadequate management of waste which is produced during the construction phase is likely to result in the pollution of the study area and immediate surrounds.	<ul style="list-style-type: none"> All general waste, which is temporarily stored, onsite must be done so in windproof/sealable containers before being disposed of at a registered landfill site. Waste must not be burned onsite. Construction workers must be informed that littering is prohibited within the construction site and surrounding areas. A Waste Management Plan should be compiled and implemented for the duration of the construction phase.
11.	VISUAL AND AESTHETIC IMPACTS	The construction activities associated with the Umsobomvu Development are likely to have an adverse impact on the visual and aesthetic quality of the study area and immediate surrounds.	<ul style="list-style-type: none"> All general waste, which is temporarily stored, onsite must be done so in windproof/sealable containers before being disposed of at a registered landfill site.

		<p>Although the construction of the Umsobomvu Development will primarily be visible to landowners and surrounding landowners (northern and southern sections) as well as National Route N10 road users (northern section), the construction of the Umsobomvu Development paired with the simultaneous construction of the authorised Umsobomvu WEF is likely to have a cumulative adverse impact on the visual and aesthetic quality of the study area and surrounds.</p>	<ul style="list-style-type: none"> • Vegetation clearance must be limited to the authorised and demarcated development footprints. • The development footprints of temporary construction areas must be rehabilitated as soon as practically possible.
<p>12.</p>	<p>LOSS OF NATURAL VEGETATION DUE TO THE VEGETATION CLEARING</p>	<p>The clearing of land for the construction of the proposed northern CTMF, Temporary Laydown Area, and Access Road will result in the direct loss of approximately 8.8 ha of Eastern Upper Karoo vegetation while the southern CTMF and IPP Substation will result in the direct loss of approximately 12.75 ha of Besemkaree Koppies Shrubland. Given the small footprint of the proposed development, which has been placed within the authorised footprint of the Umsobomvu and Coleskop WEFs, as well as the extent of remaining intact Eastern Upper Karoo vegetation and Besemkaree Koppies Shrubland outside of and surrounding the project area, it is unlikely that the loss of vegetation associated with the proposed development will impact on the extent and long-term conservation of these vegetation types, which is classified as Least Threatened. The overall significance of the loss of natural vegetation due to vegetation clearing at the sites for the proposed development, provided the recommended mitigation measures are implemented, is classified as moderate negative. Minor portions of these vegetation types have already been lost mainly due to agriculture, grazing by livestock, and the construction of roads. However, the footprint of the proposed development is</p>	<ul style="list-style-type: none"> • The clearance of vegetation at any given time should be kept to a minimum and vegetation clearance must be strictly limited to the development footprint. • Employees must be prohibited from making fires and harvesting plants. • As far as practically possible, existing access roads should be utilised. • The development footprint/construction area must be demarcated to prevent encroachment of construction activities into surrounding areas. • Ensure that roads on slopes incorporate storm water diversion. • Where possible, reserve and store natural vegetation for re-vegetation post-construction. • Only indigenous plant species must be used for rehabilitation purposes. • Topsoil must be carefully removed and used to rehabilitate the site.

		relatively small compared to the approved authorised WEFs. The additional (cumulative) loss of vegetation as a consequence of the construction of the Umsobomvu Substation, CTMFs and Temporary Laydown Area is therefore classified as moderate negative.	
13.	LOSS OF PLANT SCC	The clearance of vegetation for the construction of the proposed development could result in the loss of plant SCC. However, it should be noted that no threatened SCC have been recorded or are likely to occur within the project area. SCC have likely already been lost as a result of the existing developments within and surrounding the broader area. As such, the loss of SCC associated with the proposed development will likely contribute to the cumulative loss of non-threatened SCC within the region. However, if the mitigation measures as described in this report are implemented and adhered to, this impact can be reduced to low negative.	<ul style="list-style-type: none"> • A botanical micro-siting of the development footprint, by an experienced botanist with knowledge of the SCC that have been identified as possibly occurring within the site, must be undertaken in peak flowering season prior to construction. In the unlikely event that population of endangered SCC are found, infrastructure should be shifted to avoid these. Where this is not possible, SCC that are known to survive translocation, must be translocated to the nearest available habitat on the same property. • If the translocation or removal of SCC is required, a permit must be obtained from the relevant issuing authority.
14.	DISTURBANCE OF FAUNAL SPECIES AND LOSS OF FAUNAL HABITAT	During the construction phase, vegetation clearance and associated construction activities (including noise and vehicular movement) could result in the mortality or disturbance of faunal species and the subsequent movement of species out of the area. Additionally, the loss of vegetation coincides with the loss of faunal habitat, reducing feeding, breeding and rearing locales. Other mammal SCC are likely to move away from the areas during construction. The addition of the proposed development will exacerbate the impact on faunal species caused by existing developments and activities (including the traffic, farming, amongst others).	<ul style="list-style-type: none"> • Faunal Search and Rescue to be undertaken directly prior to vegetation clearance. • The appointed ECO must be trained in snake removal techniques. • The ECO should walk ahead of clearing construction machinery and move slow moving species e.g. tortoises and cryptic species out of harm's way and into suitable neighbouring habitat. • Any faunal species that may die as a result of construction must be recorded (photographed, GPS coordinates) and if somewhat intact, preserved and donated to SANBI. • Any faunal species observed onsite must be recorded (photographed, GPS coordinates) and loaded onto iNaturalist. • Staff and contractors are not permitted to capture, collect or eat any faunal species onsite. • It is illegal to remove or kill any of the frogs, toads, tortoises, lizards, chameleons and snakes within the proposed project area that are listed as either Schedule I or II on the NCNCA List. Not all areas can be avoided, but it is recommended that construction staff are educated with regards to herpetofauna conservation and that all staff employed by the

			<p>Developer ensure that any herpetofauna encountered are not harmed or killed.</p> <ul style="list-style-type: none"> • Amphibians and/or reptiles encountered must be allowed to move away from the construction area and a permit is required to remove or relocate these species. Amphibians must be released in the same catchment areas while reptiles must be relocated to directly adjacent areas of the proposed development. • Speed restrictions (40 km per hour is recommended) must be in place 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.
15.	WILDLIFE POACHING	<p>During the construction phase, the increase in individuals accessing the project area for the proposed development could result in an increase in wildlife poaching (particularly of reptile species). Wildlife poaching, particularly of reptile species, is a serious problem in the Northern Cape Province. Should the increase in individuals associated with the construction of the proposed development lead to the increase in wildlife poaching, this will exacerbate the loss of faunal species within the broader project area.</p>	<ul style="list-style-type: none"> • All individuals should sign a register prior to accessing the construction site, including construction workers. • Construction workers must not be housed onsite. • Animals must not be killed or injured as a result of the construction of the proposed development and presence of construction staff. • The appointed ECO should inquire and undertake an overview inspection of the site for the evidence of snares during the construction phase. • Hunting, baiting and/or trapping must not be allowed within the affected properties or surrounding properties by construction staff.
16.	DISTURBANCE OF SENSITIVE AREAS [IN TERMS OF ECOLOGICAL SENSITIVITY]	<p>During the construction phase, negligent construction activities within the 100 m regulatory buffer of a drainage line (non-perennial river) could cause the erosion, sedimentation, or subsequent degradation of nearby watercourses and the associated riparian vegetation. However, considering the footprint of the proposed development, impact associated therewith has been classified as moderate. Disturbance of sensitive areas such as watercourses has already occurred within the broader project area due to the construction of roads, agricultural practises which have caused erosion and degradation of watercourses (including drainage lines) and riparian vegetation,</p>	<ul style="list-style-type: none"> • It is recommended that the construction area is demarcated and fenced off, where possible, to prevent the encroach of construction activities into nearby sensitive areas. • Stormwater must be managed in accordance with the recommendations outlined in this EMP to ensure that runoff does not enter nearby surrounding watercourses or drainage lines. • All erosion control mechanisms should be regularly maintained. The appointed ECO must conduct regular checks for signs of erosion. • Re-vegetation of disturbed surfaces must occur immediately after the construction activities have been completed.

		amongst others. Therefore, should the proposed development lead to the further disturbance of sensitive areas such as watercourses, this could impact the characteristics of the greater catchment area. However, considering the footprint of the proposed development, the cumulative impact associated therewith has been classified as moderate.	
17.	ESTABLISHMENT OF ALIEN PLANT SPECIES	The removal of existing natural vegetation creates ‘open’ habitats which favours the establishment of undesirable vegetation in areas that are typically very difficult to eradicate which could pose a threat to surrounding ecosystems. Failure to successfully rehabilitate land to its natural state will exacerbate this impact. Scattered alien invasive species have already established in the broader area surrounding the proposed development footprint. Therefore, should the proposed development lead to the further establishment of alien invasive species in the project area, the invasion by alien species could be exacerbated.	<ul style="list-style-type: none"> • The site must be checked regularly for the presence of alien invasive species. • The Alien Invasive Management Plan compiled for the authorised Umsobomvu and Coleskop WEFs must be implemented and adhered to. • The ECO must create a list with accompanying photographs of possible alien invasive species that could occur on site prior to construction. This photo guide must be used to determine if any alien invasive species are present. • Any alien seedlings which establish within the construction area must be removed and disposed of as per the Working for Water Guidelines relating to the management of invasive alien plants.
18.	FOSSIL HERITAGE RESOURCES	Potential impacts on palaeontological heritage resources due to the proposed Umsobomvu Development are likely to be of low to very low significance. Pending the discovery of significant new fossil finds before or during construction, no further specialist palaeontological studies, monitoring or mitigation are recommended for these developments. Provided that the Chance Fossil Finds Protocol tabulated in Appendix 1 [Site Sensitivity Verification Report: Palaeontological Heritage (Natura Viva, 2021)] is incorporated into the EMPr and fully implemented during the construction phase of the infrastructure developments, there are no objections on palaeontological heritage grounds to their authorisation.	<ul style="list-style-type: none"> • Monitoring of all substantial bedrock excavations for fossil remains by the ECO, with reporting of new palaeontological finds (notably fossil vertebrate bones and teeth) to ECPHRA (Eastern Cape) or SAHRA (Northern Cape) for possible specialist mitigation. • A Chance Fossil Finds Procedure is recommended by the Palaeontological Specialist and appended to Appendix D of this EMPr.

19.	SENSITIVE HERITAGE RESOURCES	<p>The proposed access road upgrade and construction will affect a newly recorded stone knapping site (UMZ026) that was noted during the September heritage walkthrough: UMZ026. The farm Winterhoek and the related stone walled kraal will not be affected. UMZ026 is a new site located near the N10. The site appears to be a stone tool knapping site that extends for about 30m around a hornfels outcrop. The outcrop overlooks the top of a small kloof on the opposite side of the N10. UMZ026 was noted due to the recent fire clearing the undergrowth. A few tools in the track had previously been noted and seemed to be part of the colluvial deposits of the general area. However, the fire shows that it is restricted to a small area and related to the hornfels outcrop. The stone tools consist of MSA cores, various (utilized) flakes and points (spear heads). Several of these MSA flakes have been re-utilised in the LSA. The knapping area is of low-medium significance. Several have been reported by Sampson (1985) in the general area, e.g. SAM1 (see Anderson 2014).</p>	<ul style="list-style-type: none"> • Should the proposed road upgrade and construction affect the UMZ026 heritage site (SAHRA Rating: 3B), a permit will be required prior to the commencement of the construction phase. • The necessary permit must be obtained from SAHRA prior to the commencement of vegetation clearing. • The identified heritage site and any other identified heritage sites must be monitored by an archaeologist during the construction phase.
20.	HABITAT DESTRUCTION DURING CONSTRUCTION [IN TERMS OF AVIFAUNAL SENSITIVITY]	<p>During construction phase, vegetation is altered or moved for the project footprint. This destroys avifauna habitat, makes it less useful to birds, or less attractive to sensitive species.</p>	<ul style="list-style-type: none"> • No unnecessary alteration or removal of any remaining natural vegetation should take place during construction. • All construction activities should be strictly managed according to generally accepted environmental best practice standards, to avoid any unnecessary impact on the receiving environment. • All temporary disturbed areas should be rehabilitated according to the site's rehabilitation plan, following construction.
21.	DISTURBANCE OF BIRDS DURING CONSTRUCTION AND OPERATION	<p>Birds are disturbed by construction or operations activities and their survival or reproduction is compromised. This is most applicable with breeding sensitive bird species.</p>	<ul style="list-style-type: none"> • All construction activities should be strictly managed according to generally accepted environmental best practice standards, to avoid any unnecessary impact on the receiving environment.
OPERATIONAL PHASE			
POTENTIAL IMPACT	IMPACT DESCRIPTION	MITIGATION MEASURES, MANAGEMENT ACTIONS AND RECOMMENDATIONS	

22.	STORMWATER MANAGEMENT AND SOIL EROSION	The creation of impermeable surfaces during the operation of the Umsobomvu Development is likely to contribute to increased runoff during rainfall events. The increased runoff and inadequate stormwater management could lead to increased soil erosion within the proposed site and surrounds.	<ul style="list-style-type: none"> • The Stormwater Management Plan, compiled and implemented during the construction phase, must include operational phase management measures for implementation throughout the operational phase. • The site must be monitored for signs of erosion and remedial action must be taken at the first signs of erosion.
23.	FIRE RISK	The operation of the Umsobomvu Development could result in an increased fire risk in the area.	<ul style="list-style-type: none"> • The maintenance personnel, or the appointed fire marshal, must take all responsible steps to prevent the accidental occurrence and the spreading of fires. • The maintenance personnel, or the appointed fire marshal, must ensure that there is firefighting equipment available onsite during the operational phase. • The maintenance personnel must be aware of the risk of fires, the procedure to be followed in the event of a fire and they must have access to the relevant contact details of the nearest Fire and Emergency Services.
24.	SOCIO-ECONOMIC BENEFITS	The operation of the Umsobomvu Development will create long-term employment opportunities. These will primarily be employment opportunities involving general maintenance and servicing of the infrastructure. These employment opportunities will contribute to the skills development of individuals and a long-term income which will benefit individuals and their families.	<ul style="list-style-type: none"> • Where suitable, preference should be given to the employment of individuals residing in the communities which are located close to the site.
25.	WASTE MANAGEMENT	The inadequate management of waste, which is produced during the operational phase, such as litter, is likely to result in the pollution of the study area and immediate surrounds.	<ul style="list-style-type: none"> • Maintenance staff must be informed that littering is prohibited within the development site and surrounding areas.
26.	VISUAL AND AESTHETIC IMPACTS	The operation of the Umsobomvu Development could have an adverse impact on the visual and aesthetic quality of the study area and immediate surrounds. However, proposed the Umsobomvu Development will only be visible to a limited number of individuals due to the location of the development. Although the operation of the Umsobomvu Development will primarily be visible to landowners and surrounding landowners (northern and southern sections)	<ul style="list-style-type: none"> • All general waste, including litter, must be stored in windproof/sealable containers before being disposed of at a registered landfill site. • The rehabilitation of disturbed areas must be monitored to ensure successful rehabilitation and the resultant decrease in the visual impact. • The components of the Umsobomvu Development must be maintained to reduce the risk of degradation of the infrastructure.

		as well as National Route N10 road users (northern section), the operation of the Umsobomvu Development paired with the operation of the authorised Umsobomvu WEF is likely to have a cumulative adverse impact on the visual and aesthetic quality of the study area and surrounds.	
27.	SUPPORT FOR THE FUNCTIONING OF RENEWABLE ENERGY INFRASTRUCTURE	The operation of the Umsobomvu Development components will contribute to the construction and operation of the authorised Umsobomvu WEF.	<ul style="list-style-type: none"> The Umsobomvu Development components must be maintained to reduce the risk of degradation and to ensure that the infrastructure adequately contributes to the construction and functioning of the Umsobomvu WEF.
28.	ESTABLISHMENT OF ALIEN PLANT SPECIES	During the operational phase, failure to remove and manage alien vegetation could result in the permanent establishment of alien vegetation in the study area. Failure to successfully rehabilitate land to its natural state will exacerbate this impact and lead to the permanent degradation of ecosystems as well as allow invasion by alien plant species. Scattered alien invasive species have already established in the broader area surrounding the proposed development footprint. Therefore, should the proposed development lead to the further establishment of alien invasive species in the project area, the invasion of alien species could be exacerbated.	<ul style="list-style-type: none"> The site must be checked regularly for the presence of alien invasive species. The Alien Invasive Management Plan compiled for the authorised Umsobomvu and Coleskop WEFs must be implemented and adhered to during the operational phase. Monitoring of the establishment of alien seedlings within the boundaries of the proposed development should continue throughout the operational phase. Any alien seedlings should be removed and disposed of as per the Working for Water Guidelines relating to the management of invasive alien plants. The Rehabilitation Management Plan, compiled for the authorised Umsobomvu and Coleskop WEFs, must be implemented and adhered to during the operational phase.
29.	IMPACTS OF NOISE AND LIGHTING ON FAUNAL POPULATIONS	During the operational phase, noise and lighting associated with the proposed development (including maintenance activities) could cause a disturbance to surrounding faunal populations within the project area. The addition of the noise and lighting associated with the proposed development will exacerbate the impact on faunal species caused by existing developments and activities (including the traffic).	<ul style="list-style-type: none"> Regular maintenance and checks of the infrastructure must be undertaken. The mitigation measures specified in the Noise Impact Assessment conducted for the Coleskop and Umsobomvu WEFs 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. Where possible, minimise access to the site.
30.	DISTURBANCE OF BIRDS DURING CONSTRUCTION AND OPERATION	Birds are disturbed by construction or operations activities and their survival or reproduction is compromised. This is most applicable with breeding sensitive bird species.	<ul style="list-style-type: none"> All operational activities should be strictly managed according to generally accepted environmental best practice standards, to avoid any unnecessary impact on the receiving environment.
31.	ELECTROCUTION OF BIRDS ON OVERHEAD	During the operational phase, large birds are likely to be	<ul style="list-style-type: none"> The powerline must be built on an Eskom approved bird-friendly pole structure which

	POWERLINE AND IN SUBSTATIONS	electrocuted whilst perched on pylons or in the substations, by bridging the critical clearances between phases or phase–earth hardware.	provides ample clearance between phases and phase-earth to allow large birds (such as Verreaux’s and Martial Eagle) to perch on them in safety.
32.	COLLISION OF BIRDS WITH OVERHEAD POWERLINES	Birds in flight collide with overhead cables (conductors or earth wires) whilst in mid-flight. This occurs when they don’t see the cables until too late to take evasive action.	<ul style="list-style-type: none"> No mitigation provided.

DECOMMISSIONING PHASE

The proposed CTMFs and Laydown Areas will be temporary and decommissioned after the construction phase of the authorised Umsobomvu WEF. However, it is unlikely that the proposed substations, OHL and access road will be decommissioned in the near future. Should the substations, OHL and access road be decommissioned, the impacts associated with the decommissioning phase would be similar to those for the construction phase and most of the mitigation measures stipulated for the construction phase will, therefore, be relevant. This EMPr must include additional decommissioning phase recommendations and mitigation measures relating to the ecological environment based on case studies of the decommissioning of the relevant infrastructure components and it must consider the relevant legislation, policies and guidelines at the time of decommissioning of the the substations, OHL and access road.

POTENTIAL IMPACT		IMPACT DESCRIPTION	MITIGATION MEASURES, MANAGEMENT ACTIONS AND RECOMMENDATIONS
33.	INCREASE IN AIR EMISSIONS	During the decommissioning of the temporary infrastructure, dust is likely to be created as a result of decommissioning activities, such as grading and levelling of the exposed land and the use of heavy machinery, which could be a nuisance during the decommissioning phase.	<ul style="list-style-type: none"> Exhaust emissions from heavy vehicles must be minimised by ensuring that all vehicles are properly equipped and serviced. Decommissioning activities must only be done during the agreed-upon working hours and agreed-upon days. A speed limit of 40 km per hour must not be exceeded on gravel roads.
34.	INCREASE IN NOISE LEVELS	Noise will be created on the site during the decommissioning of the temporary infrastructure due to the operation of machinery, noise generated by heavy vehicles both onsite and during travel to and from the site as well as noise generated by the workers which are all likely to result in an increase in noise levels and potentially be a nuisance to individuals in proximity to the site.	<ul style="list-style-type: none"> All vehicles must be in sound working order and meet the necessary noise level requirements. All relevant municipal by-laws, with regards to noise control, must apply. Workers must not make use of portable radios, vehicle radios, whistles, and other items which generate excessive noise, while they are on the site.
35.	SITE CONTAMINATION DUE TO THE STORAGE AND HANDLING OF HAZARDOUS SUBSTANCES	During the decommissioning of the temporary infrastructure, onsite maintenance of vehicles and/or machinery, and equipment could result in oil, diesel and other hazardous chemicals contaminating surface and groundwater. Surface and groundwater pollution could arise from the spillage or leaking of fuel	<ul style="list-style-type: none"> The storage of fuels and hazardous materials must be located away from all identified sensitive water resources. All hazardous substances, including fuel and oil, must be stored in a bunded area. Spill kits must be readily available on site throughout the decommissioning phase. Drip trays must be placed under all stationary plant.

		and oil during the decommissioning activities.	<ul style="list-style-type: none"> • If a spill occurs on a permeable surface (e.g. soil), a spill kit must be used to reduce the potential spread of the spill immediately. • If a spill occurs on an impermeable surface such as cement or concrete, the surface spill must be contained using oil absorbent materials. • Contaminated remediation materials must be carefully removed from the area of the spill, to prevent the further release of hazardous chemicals to the environment and stored in adequate containers until appropriate disposal at a suitably licenced landfill site.
36.	FIRE RISK	The decommissioning of the temporary infrastructure could increase the risk of fires, which could potentially result in the loss of crops, grazing and livestock. In addition, fires could result in injury to employees within the site and the potential damage to or loss of property.	<ul style="list-style-type: none"> • Open fires must not be permitted within the proposed site during the decommissioning phase. • Smoking must be restricted to designated smoking areas which have easy access to firefighting equipment. • The Contractor, or the appointed fire marshal, must take all responsible steps to prevent the accidental occurrence and the spreading of fires. • The Contractor, or the appointed fire marshal, must ensure that there is firefighting equipment available onsite during the decommissioning phase. • The Contractor, or the appointed fire marshal, must ensure that all site personnel are aware of the risk of fires, the procedure to be followed in the event of a fire and that all site personnel have access to the relevant contact details of the nearest Fire and Emergency Services.
37.	SOCIO-ECONOMIC BENEFITS	The decommissioning of the temporary infrastructure, which forms part of the Umsobomvu Development, will create short-term employment opportunities. These employment opportunities will contribute to the skills development of individuals and a short-term income which will benefit individuals and their families.	<ul style="list-style-type: none"> • Where suitable, preference should be given to the employment of individuals residing in the communities which are located close to the site.
38.	WASTE MANAGEMENT	The inadequate management of waste which is produced during the decommissioning phase is likely to result in the pollution of the study area and immediate surrounds.	<ul style="list-style-type: none"> • All general waste, which is temporarily stored, on site must be done so in windproof/sealable containers before being disposed of at a registered landfill site. • Waste must not be burned on site. • Workers must be informed that littering is prohibited within the site and surrounding areas. • The Waste Management Plan should include relevant decommissioning waste management measures, and it should be implemented for the duration of the decommissioning phase.

39.	VISUAL AND AESTHETIC IMPACTS	The activities associated with the decommissioning of the temporary infrastructure, which forms part of the Umsobomvu Development, are likely to have an adverse impact on the visual and aesthetic quality of the study area and immediate surrounds. However, the construction site will only be visible to a limited number of individuals due to the location of the development.	<ul style="list-style-type: none"> • All general waste, which is temporarily stored, on site must be done so in windproof/sealable containers before being disposed of at a registered landfill site. • Rehabilitation of the decommissioned footprints must take place as soon as practically possible.
40.	INADEQUATE REHABILITATION	The inadequate rehabilitation of the development footprint could result in unsuccessful site re-vegetation and resultant long-term ecological degradation. Minor ecological degradation has already taken place due to agriculture, grazing by livestock, and the construction of roads within the project area. The additional (cumulative) ecological degradation as a consequence of inadequate rehabilitation of temporary disturbed areas is therefore classified as moderate negative.	<ul style="list-style-type: none"> • A portion of the Operational Phase earnings should be set aside for costs associated with the landscaping and re-vegetation of the development footprint. • All temporary disturbed areas that do not form part of development, must be rehabilitated using only indigenous vegetation. • All impacted areas must be restored as per the requirements of this EMPr. • The Rehabilitation Management Plan, compiled for the authorised Umsobomvu and Coleskop WEFs, must be implemented and adhered to during the Decommissioning Phase.
41.	INFESTATION OF ALIEN PLANT SPECIES	Disruption of habitats often results in the infestation of alien species unless these are controlled. Should this happen, the impact will be of moderate significance as the alien species could result in the displacement of indigenous species and possible local extinctions of plant SCC. Scattered alien invasive species have already established in the broader area surrounding the proposed development footprint. Therefore, should the decommissioning of the proposed development lead to the further establishment of alien invasive species in the project area, the invasion of alien species could be exacerbated.	<ul style="list-style-type: none"> • The site must be checked regularly for the presence of alien invasive species. Any alien seedlings which establish within the site must be removed and disposed of as per the Working for Water Guidelines relating to the management of invasive alien plants. • The Alien Invasive Management Plan compiled for the authorised Umsobomvu and Coleskop WEFs must be implemented and adhered to. • The ECO must create a list with accompanying photographs of possible alien invasive species that could occur on site prior to construction. This photo guide must be used to determine if any alien invasive species are present. • The project site must be rehabilitated in accordance with the approved EMPr and a Rehabilitation Plan.
42.	IMPACTS OF DECOMMISSIONING NOISE ON SURROUNDING FAUNAL POPULATIONS	Faunal species will be disturbed during decommissioning due to noise and vibrations of heavy plant and machinery. Faunal Species that vacate the immediate area may return following completion of the decommissioning phase or new individuals or species may inhabit	<ul style="list-style-type: none"> • Vehicles and machinery must meet best practice standards. • Staff and Contractors' vehicles must comply with speed limits of 40 km/hr. • Decommissioning activities must start and be completed within the minimum timeframe. i.e. may not be started and left incomplete. • The mitigation measures specified in the Noise Impact Assessment conducted for the Coleskop

		<p>the area. Heavy plant or machinery may cause unintentional mortalities of faunal species. The addition of the noise associated with the decommissioning of the development will exacerbate the impact on faunal species caused by existing developments and activities (including the traffic).</p>	<p>and Umsobomvu WEFs must be implemented and adhered to during the decommissioning phase of the proposed development.</p> <ul style="list-style-type: none"> • External lighting should be avoided where possible. However, if required, lighting should be down lighting and low wattage. • Where possible, minimise access to the site.
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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, need to be channelled according to the organisation structure.

6.2 ROLES AND RESPONSIBILITIES

6.2.1 *The Developer (Applicant)*

Umsobomvu Wind Power (Pty) Ltd (referred to as the Applicant or Developer) is a Special Purpose Vehicle (SPV) established by EDF Renewables (Pty) Ltd for the sole purpose of developing, owning and operating the proposed Umsobomvu Development. The Developer is the responsible entity for monitoring the implementation of the EMPr(s) and compliance with the EA. However, if the Developer appoints a Contractor to implement the project, and hence implement the proposed mitigation measures and management actions documented in this EMPr on their behalf, then the successful Contractor's responsibilities are outlined as per the section that follows. The Developer 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 finalisation of this EMPr in terms of methodologies which are required to be implemented to achieve the environmental specifications contained herein and the relevant requirements contained in the EA;
- 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 Umsobomvu Development; and
- Ensure that the appointment(s) of the ECO, the CLO and the Environmental Site Officer (ESO) are subject to the approval of the Developer.

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 this EMP and other pertinent site specifications. The RE must also be familiar with the specifications of the EMP(s) and further monitor the Contractor's compliance with the environmental specifications on a daily basis, through a Site Diary, and enforce compliance.

6.2.4 The Environmental Site Officer (ESO)

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

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

- Ensuring that all the environmental authorisations and permits, required in terms of the applicable legislation, have been obtained prior to construction commencing;
- Reviewing and approving construction Method Statements (MS) 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 onsite;
- Assisting the ECO and CLO with the maintenance of a register of complaints and recording community comments and issues, and the actions taken in response to these complaints;
- 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 Umsobomvu Development.

The ESO must have:

- The ability to manage public communication and complaints;
- The ability to think holistically about the structure, functioning and performance of environmental systems;
- The ESO must be fully conversant with the BAR, EMPs, EA, relevant environmental legislation and any other relevant documents relating to the Umsobomvu Development; and
- The ESO 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 must 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.

6.2.5 Environmental Control Officer (ECO)

For the purpose of implementing the conditions contained herein, the Developer must appoint an ECO for the contract. The ECO must be the responsible person for ensuring that the provisions of the EMP(s) 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 and/or social 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 competent authority (the 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 relevant authorisation and permits required in terms of the applicable legislation have been obtained prior to construction commencing;
- Monitoring and verifying that the EMPr(s), EA and Contract are adhered to at all times and taking action if specifications are not followed;
- Monitoring and verifying that environmental and social impacts are kept to a minimum;
- Reviewing and approving construction Method Statements with input from the ESO and RE, where necessary, in order to ensure that the environmental specifications contained within this EMPr and the EA are adhered to;
- Inspecting the site and surrounding areas on a regular basis to monitor compliance with the EMPr(s), EA and Contract;
- Monitoring the undertaking by the Contractor of environmental awareness training for all new 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 authority for review and approval, as applicable;
- Checking the register of complaints kept onsite and maintained by the ESO and ensuring that the correct actions are/were taken in response to these complaints;
- Checking that the required actions are/were undertaken to mitigate or manage the impacts resulting from non-compliance;
- Reporting all incidences of non-compliance to the Developer;
- The ECO must also submit compliance audit reports to the national DFFE, in accordance with the requirements of the EA. Such reports must be reviewed by Developer prior to submission;
- 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 must ensure that the ESO understands the task at hand;
- Recommending additional environmental and/or social protection measures, where necessary; and
- Providing feedback on any environmental and/or social 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;
 - Monitoring and evaluation of impacts; and
 - Environmental Management Systems.

The ECO must be fully conversant with the Umsobomvu Development BAR, EA, the EMPrs 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 or 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 the EMPr must be viewed as a breach of appointment Contract for which the construction Contractor(s) will be held liable. The latter is deemed NOT to have complied with the EMPr if:

- There is evidence of contravention with the EMPr(s), its 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 Contractor(s) are liable for any construction rehabilitation costs associated with their non-compliance with this EMPr. This rehabilitation will be undertaken to the satisfaction of the ECO. The construction Contractor(s) 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 which must consider the following requirements:

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

Construction activities have the potential to impact on a range of biophysical habitats as well as neighbouring communities. The monitoring programme which requires development by the Developer, ECO and Contractor should, *inter alia*, allow for analysis of:

1. Air emissions (such as dust);
2. Hydrocarbon pollution;
3. Success of local labour employment;
4. Success of local procurement policies;
5. Ambient and workplace noise;
6. Health and safety incidents;
7. Success of traffic management measures; and

8. Contamination and soil erosion.

6.6 EMERGENCY PREPAREDNESS

The Contractor must develop environmental emergency response procedures to ensure that there are appropriate responses to unexpected or accidental actions or incidents that could cause environmental or social 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/or
- Specific environmental and ecosystem effects from accidental releases or incidents.

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

6.7 ENVIRONMENTAL INCIDENT MANAGEMENT

The construction Contractor(s) 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 MANAGEMENT REVIEW

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 the EMPr(s) and their implementation, and to decide on potential modifications to the EMPr as and when necessary. The process of management review will be to keep to the principle of continual improvement.

Management review should take place when the liaison committee, consisting of representatives from the Contractor, construction Subcontractors (as appropriate), ECO and other parties 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, management review should 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 this EMP 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 EMP and/or will produce results in accordance with EMP.”

The Method Statement 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 onsite;
- 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;
- 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; and
- 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 with 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 should 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 as a whole. 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 must issue the Contractor with a notice of non-compliance whenever transgressions are observed. The ECO must 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 must be documented and reported to the Developer in the monthly reports. These reports must be made available to the national DFFE when requested.

7.4 DOCUMENT CONTROL

The Contractor is responsible for establishing a procedure for electronic document control. The document control procedure must 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 five (5) year period.

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 Contractor(s) must ensure that their employees and any third party, who carries out all or part of the Contractors' obligations, is adequately trained with regards to the implementation of this EMPr and the general environmental legal requirements and obligations.

Environment and health awareness training programmes must 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 and the summarised content of each training course; and
- 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 contents of this EMPr. The presentation should be conducted in the language of the employees to ensure it is understood. 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 and management actions 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 phase;
- 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 the
- Details regarding archaeological and/or palaeontological sites which may 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 must be called to the site to further explain aspects of environmental or social behaviour that are unclear. Toolbox talks are recommended.

9 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.

9.1 POST-CONSTRUCTION AUDIT

A post-construction audit must be carried out and submitted to the national DFFE at the expense of the Developer. Objectives must 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 onsite and have not been dealt with in the current document.

9.2 GENERAL REVIEW OF THE EMPr

The EMPr must be reviewed by the ECO on an ongoing basis. Based on observations made during site inspections and issues raised at site meetings, the ECO should determine whether any procedures require modification to improve the efficiency and applicability of this EMPr onsite. Any such changes or updates must 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.

10 CONCLUSIONS

10.1 IMPACT MANAGEMENT OUTCOMES

The successful implementation of the impact management actions, stipulated in Chapter 5 of this EMPr, for each phase of the Umsobomvu Development will result in the avoidance, reduction, management and/or mitigation of the potential adverse impacts and risks associated with the development. In addition, the implementation of the recommended management plans, in Appendix E of this EMPr, should further contribute to the avoidance, reduction and/or management of potential adverse impacts resulting from the various stages of the Umsobomvu Development. The general impact management outcomes of this EMPr are to:

- Reduce the adverse impacts and enhance the benefits associated with the Umsobomvu Development.
- Preserve faunal and floral species and their associated habitats within identified sensitive areas and outside of the development footprint.
- Preserve faunal and floral SCC within the development footprint and immediate surrounds.
- Maintain soil and vegetation cover, through the implementation of erosion control, stormwater management, and alien vegetation management measures.
- Undertake activities in a manner which does not place workers or the public at risk in terms of health and safety.
- Prevent, and where not possible, control fires to protect public health, the environment and any properties in the vicinity of the development.
- Reduce the potential for pollution, in terms of air pollution, land pollution, water pollution, and noise pollution.
- Preserve cultural heritage and palaeontological resources of significance.
- Rehabilitate disturbed areas to their natural state or a near-natural state.
- Manage and maintain the operational development to reduce adverse impacts associated with the operation of the development and to ensure sustainable development.
- Reduce the adverse impacts on avifaunal species due to the loss of habitat, electrocution caused by the operational OHL and Substations, and collision with the operational OHL.

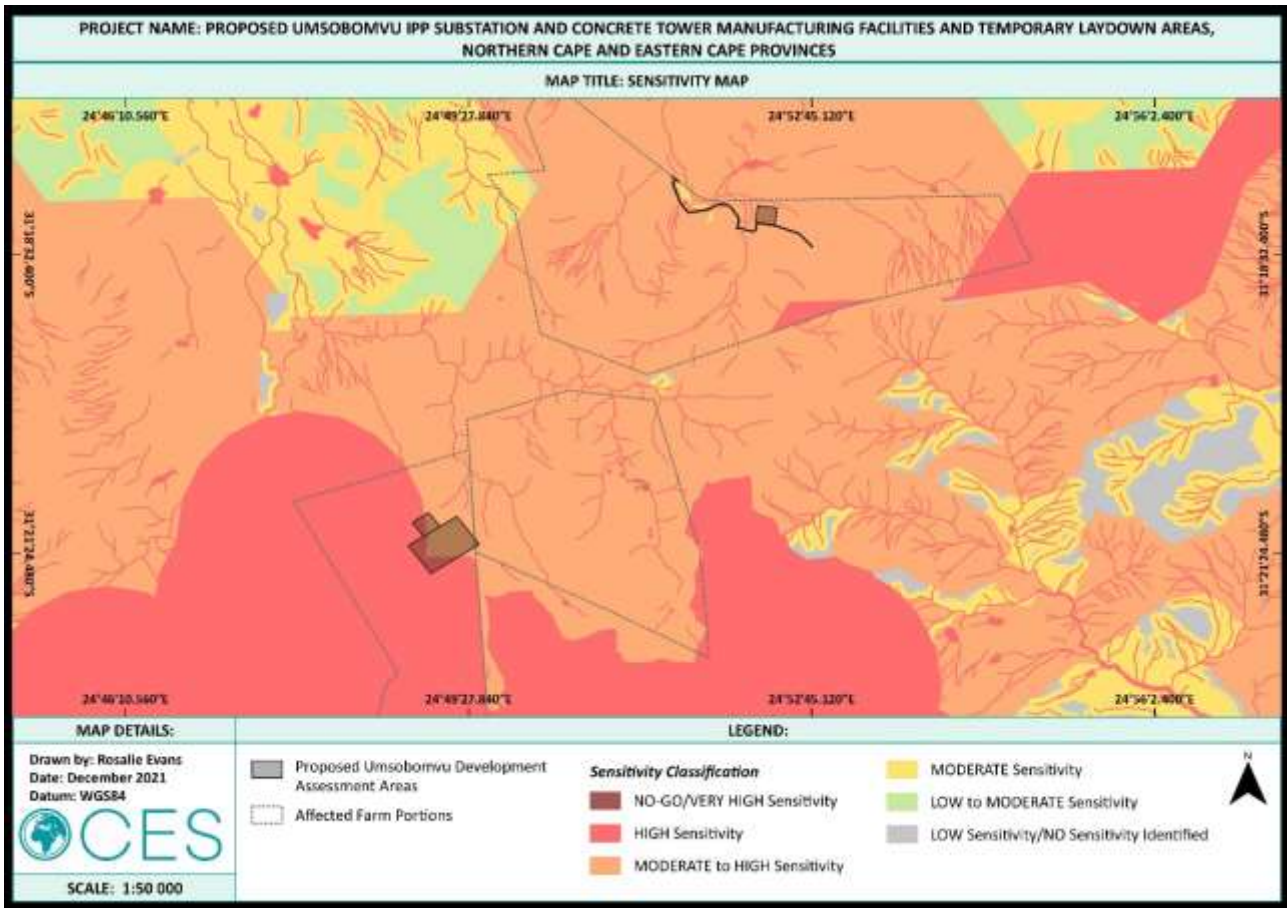


Figure 10.1: Sensitivity Map of the proposed Umsobomvu Development site.

10.2 CONCLUDING STATEMENTS

All foreseeable actions and the relevant mitigation measures and/or management actions must be contained in this document. This EMPr should be seen as a day-to-day management document. The EMPr sets out the environmental and social standards, which are required to minimise the negative impacts and maximise the positive benefits of the Umsobomvu Development. This EMPr could therefore change frequently, and, if managed correctly, lead to successful phases of development.






All attempts must 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.

APPENDIX A: EXAMPLE OF AN ENVIRONMENTAL EDUCATION COURSE







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

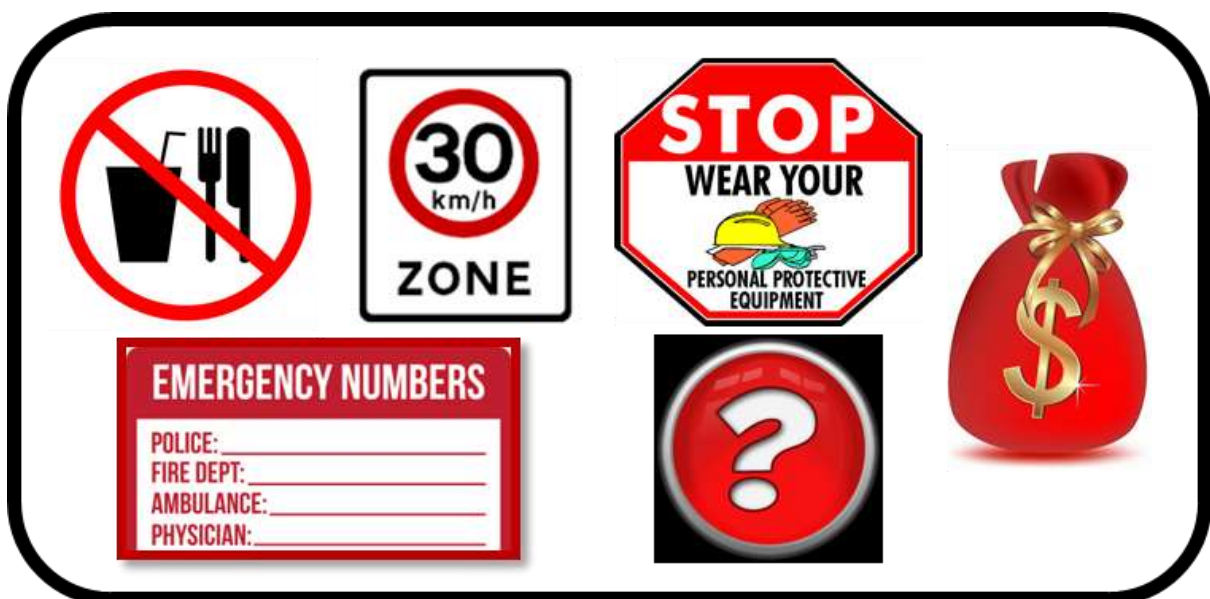
Tips and Guidelines

-  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 in 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



APPENDIX B: ENVIRONMENTAL AUTHORISATION

INSERT COPY/IES OF ENVIRONMENTAL AUTHORISATION(S) ONCE RECEIVED

APPENDIX C: 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:

(Signature)

(Print name)

Date: _____

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

(Signature)

(Print name)

Date: _____

APPENDIX D: CHANCE FOSSIL FINDS PROCEDURE [PALAEOLOGY]

APPENDIX 1 - CHANCE FOSSIL FINDS PROCEDURE: Ancillary infrastructure for the Umsobomvu 1 WEF near Middelburg	
Province & region:	NORTHERN CAPE: Pixley Ka Seme District Municipality EASTERN CAPE: Chris Hani District Municipality
Responsible Heritage Resources Agency	N. Cape: SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Phone: +27 (0)21 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). E. Cape: ECPHRA (Contact details: Mr Sello Mokhanya, 74 Alexander Road, King Williams Town 5600; Email: smokhanya@ecphra.org.za)
Rock unit(s)	Adelaide Subgroup and Katberg Formation (Tarkastad Subgroup) of Beaufort Group. Late Caenozoic superficial deposits (e.g. colluvium, alluvium, soils, surface gravels, pedocretes).
Potential fossils	Vertebrate skeletal remains and burrows, trace fossils, plant fossil (e.g. petrified wood, plant compressions) within the Beaufort Group. Mammalian and other vertebrate bones, teeth and horncores, freshwater molluscs, calcretised trace fossils (e.g. termitaria), subfossil plant material within superficial sediments.
ECO protocol	1. Once alerted to fossil occurrence(s): alert site foreman, stop work in area immediately (<i>N.B.</i> safety first!), safeguard site with security tape / fence / sand bags if necessary.
	2. Record key data while fossil remains are still <i>in situ</i> : <ul style="list-style-type: none"> • Accurate geographic location – describe and mark on site map / 1: 50 000 map / satellite image / aerial photo • Context – describe position of fossils within stratigraphy (rock layering), depth below surface • Photograph fossil(s) <i>in situ</i> with scale, from different angles, including images showing context (e.g. rock layering)
	3. If feasible to leave fossils <i>in situ</i> : <ul style="list-style-type: none"> • Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation • Ensure fossil site remains safeguarded until clearance is given by the Heritage Resources Agency for work to resume
	3. If <i>not</i> feasible to leave fossils <i>in situ</i> (emergency procedure only): <ul style="list-style-type: none"> • <i>Carefully</i> remove fossils, as far as possible still enclosed within the original sedimentary matrix (e.g. entire block of fossiliferous rock) • Photograph fossils against a plain, level background, with scale • Carefully wrap fossils in several layers of newspaper / tissue paper / plastic bags • Safeguard fossils together with locality and collection data (including collector and date) in a box in a safe place for examination by a palaeontologist • Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation
	4. If required by Heritage Resources Agency, ensure that a suitably-qualified specialist palaeontologist is appointed as soon as possible by the developer.
	5. Implement any further mitigation measures proposed by the palaeontologist and Heritage Resources Agency
Specialist palaeontologist	Record, describe and judiciously sample fossil remains together with relevant contextual data (stratigraphy / sedimentology / taphonomy). Ensure that fossils are curated in an approved repository (e.g. museum / university / Council for Geoscience collection) together with full collection data. Submit Palaeontological Mitigation report to Heritage Resources Agency. Adhere to best international practice for palaeontological fieldwork and Heritage Resources Agency minimum standards.

APPENDIX E: MANAGEMENT PLANS

1. SITE CLEARING PLAN

VEGETATION CLEARING

- Before clearing of vegetation, the Contractor should ensure that all litter and non-organic material is removed from the area to be cleared.
- Vegetation clearing must take place in a phased manner in order to retain vegetation cover for as long as possible in order to reduce the size of areas where dust can be generated by wind.
- All seed-bearing invasive alien vegetation must be removed from site.
- Removed vegetation must not be dumped onto adjacent intact vegetation and topsoil must be removed separately.
- All indigenous plant material which has been removed from cleared areas should be stockpiled for mulching or temporarily stockpiled in a demarcated area, which meets the satisfaction of the ESO or the ECO, before disposal at an approved landfill site.
- The use of herbicides is prohibited, unless approved by the ESO or the ECO.
- The Contractor should submit a site clearing Method Statement to the ESO and the ECO for approval. This Method Statement should include the details of the phasing of the clearing and how this will be done, where and how cleared material will be stored and/or disposed of, etc.

TOPSOIL CLEARING

- Topsoil (a layer of approximately 100 - 150 mm) should be removed from areas to be disturbed during construction and safely stockpiled for landscaping purposes.
- All plant material (grasses, herbs and larger bushclump species) removed from the site should be mixed into the topsoil.
- Topsoil stockpiles should be convex and should not exceed a height of 2 m.
- Stockpiles must be located in areas agreed to by the ESO or the ECO.
- Topsoil stockpiles must not be subject to compaction greater than 1 500 kg/m² and should not be pushed by a bulldozer for more than 50 m.
- Topsoil stockpiles must be monitored regularly to identify any alien plants, which must be removed when they germinate to prevent contamination of the seed bank.
- Appropriate measures, as agreed to by the ESO or the ECO, should be taken to protect topsoil stockpiles from erosion by wind or water by providing suitable stormwater and cut off drains, containment using hessian or similar material and/or by establishing suitable temporary vegetation.
- Topsoil stockpiles must not be covered with materials such as plastic which could cause it to compost or which could kill the seed bank.
- The Contractor must be held responsible for the replacement, at their own cost, for any unnecessary loss of topsoil due to their failure to work according to the requirements of this EMP and the approved Method Statement(s).

2. RE-VEGETATION AND HABITAT REHABILITATION MANAGEMENT PLAN

SITE VEGETATION

Re-vegetating and rehabilitating the site, once constructed, through a comprehensive landscaping effort will benefit the faunal species which find refuge on the site. Linked to this, is the creation, preservation, and maintenance of tracts of natural and ornamental vegetation in all stages of ecological succession, interconnected by corridors or green belts for escape, foraging, breeding and exploratory movements. In terms of the scope of the construction activities, landscaping and rehabilitation will be minimal; many instances will require clean-up activities together with planting ground-stabilising vegetation. Rehabilitation and landscaping efforts should focus on rehabilitating the following areas:

- Road verges after road construction has been completed.
- Stormwater soak away features and landscaped areas.
- The transformed portions of the site which have not been developed must be rehabilitated by planting indigenous plant species which occur in the area.
- Areas where pockets of alien invasive species have been removed.
- Areas not disturbed by the construction activities, but from previous land use, or those where invasive species have been removed, must be identified by a suitably qualified botanist as suitable sites for relocating plant SCC.

The ECO must approve a list of indigenous plants to be used during rehabilitation prior to the commencement of rehabilitation activities. According to the South Africa, Lesotho and Swaziland Vegetation Map (SANBI, 2018), the proposed infrastructure is situated in an area classified as containing Besemkaree Koppies Shrubland and Eastern Upper Karoo.

Besemkaree Koppies Shrubland occurs in the Northern Cape, Free State and Eastern Cape Provinces along the slopes of koppies, butts and tafelbergs (Mucina and Rutherford, 2006). This vegetation type consists of two (2) layers; the lower layer is dominated by dwarf small-leaved shrubs, and in years with high rainfall, grasses. The upper layer is dominated by tall shrubs such as *Rhus erosa*, *Rhus burchelli*, *Rhus ciliata*, *Euclea crispa*, *Diospyros austro-africana* and *Olea europaea subsp. africana*. This vegetation type is classified as **Least Threatened** as it is largely excluded from agricultural practices. The conservation target is 28%, with 5% being conserved in the various reserves such as the Gariep Dam, Rolfontein, Tussen Die Riviere, Caledon and Kalkfontein Dam Nature Reserve.

The site investigations confirmed that this vegetation within the site is associated with high lying rocky outcrops, mountain summits, mountain slopes and in areas near drainage lines. The condition of this vegetation varied and ranged from being fairly intact in inaccessible areas, such as on steep slopes and on rocky outcrops, to showing signs of erosion in heavily impacted areas. Portions of this vegetation type have also been impacted to the extent that there is minimal vegetation cover and, in some cases, were devoid of vegetation altogether, most likely as a result of overgrazing. This vegetation type was characterised by a mosaic of shrubs, dwarf trees and a grass layer. The dominant shrubs onsite included *Elytropappus rhinocerotis*, *Euryops annea* and *Chrysocoma ciliata*. Dwarf trees such as *Rhus erosa*, *Euclea crispa* and *Euclea undulata* were present, and grass species such as *Eragrostis chloromelas*, *Themeda triandra* and *Aristida sp.* were interspersed throughout the proposed site.

Eastern Upper Karoo occurs in the Northern Cape, Eastern Cape and Western Cape and is associated with a flat to gently sloping topography (Mucina and Rutherford, 2006). It is dominated by dwarf microphyllus shrubs and grasses belonging to the *Aristida* and *Eragrostis* genera. This vegetation type is classified as **Least Threatened** with a conservation target of 21%. A portion of this vegetation type

has been conserved in Mountain Zebra and Karoo National Parks as well as in Oviston, Commando Drift, Rolfontein and Gariiep Dam Nature Reserves. This vegetation type occurs in the low lying, flat areas of the affected properties.

PLANT SPECIES OF CONSERVATION CONCERN

The below list of plant SCC which are likely to occur within the project area has been compiled using records from the Plants of Southern Africa (POSA) website, the National Screening Tool Report, and the species previously recorded by CES (2018). No SCC were recorded in the National Screening Tool Report generated for the proposed site. However, based on the plant species lists obtained from the POSA website and CES (2018), thirteen (13) plant SCC were recorded for the site, all of which are classified as Least Concern (LC). Although classified as LC, these species are protected in terms of the Provincial Nature and Environmental Conservation Ordinance (Ordinance No. 19 Of 1974) and the Northern Cape Nature Conservation Act (Act No. 9 of 2009).

Two (2) of the thirteen (13) SCC, including *Stomatium middelburgense* and *Aloe broomii*, were recorded during the site visit conducted for this assessment, while three (3) of the thirteen (13) SCC were recorded in the broader project area during the field survey conducted by CES (2018), including *Gomphocarpus fruticosus*, *Moraea huttonii* and *Harveya pumila*.

The species list, containing plant species which are likely to occur within the proposed site, was assessed against the IUCN Red Data List, the South African Red Data List, the NEMBA (Act No. 10 of 2004) list of protected species, DAFF's list of protected tree species as well as the PNCO (Ordinance No. 19 Of 1974 list of species and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) species lists.

The identified and potential plant SCC include:

- ***Aloe broomii*** (IUCN: LC, SA Red List: LC, PNCO: Schedule 4, Northern Cape Nature Conservation Act: Schedule 2): This species is widespread in the central interior of South Africa, from the eastern Karoo in the south-eastern parts of the Northern Cape and adjacent areas in the Western Cape eastwards through the southern Free State and the Eastern Cape interior. Major habitats includes Nama-Karoo and Grasslands (von Staden, 2018). The presence of this species was confirmed onsite.
- ***Gomphocarpus fruticosus*** (SA Red List: LC, PNCO: Schedule 4, Northern Cape Nature Conservation Act: Schedule 2): This species is widespread, common and not in danger of extinction. It is not endemic to South Africa. It occurs on dry sandy soils in open disturbed places (often on riverbanks) in a variety of habitats including Albany Thicket, Desert, Fynbos, Grassland, Indian Ocean Coastal Belt, Nama Karoo, Savanna, and Succulent Karoo in the Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape, North West, Western Cape Provinces (von Staden, 2012). The presence of this species was confirmed in the broader project area.
- ***Harveya pumila*** (SA Red List: LC, PNCO: Schedule 4): This species is not endemic to South Africa and occurs in the Eastern Cape, Free State, Gauteng, KwaZulu-Natal, and Mpumalanga Provinces (Victor, 2004). The presence of this species was confirmed in the broader project area.
- ***Moraea huttonii*** (SA Red List: LC, PNCO: Schedule 4, Northern Cape Nature Conservation Act: Schedule 2): This species is not endemic to South Africa. There is a lack of information on the habitat requirements for this species, however it has been recorded in the Eastern Cape, Free State, KwaZulu-Natal, and Mpumalanga Provinces (Cholo and Foden, 2006). The presence of this species was confirmed in the broader project area.
- ***Delosperma lootsbergense*** (IUCN: LC, SA Red List: LC, Northern Cape Nature Conservation Act: Schedule 2): This species is endemic to the high mountains of the Eastern Cape interior, including the Sneeuwberg Range near Graaff-Reinet, the Stormberg near Molteno, and the Suurberg Range

on the border of the Northern Cape south of Noupoot. Its habitat mainly includes rocky slopes and cliffs in high altitude montane grasslands and Nama-Karoo (Clark and Raimondo, 2019). The presence of this species onsite has not been confirmed but the likelihood of it occurring within the site is high.

- ***Galenia subcarnosa*** (IUCN: LC, SA Red List: LC, Northern Cape Nature Conservation Act: Schedule 2): This species is endemic to South Africa and mainly occurs in the Eastern Cape and Northern Cape Province (Kamundi and Victor, 2006). The presence of this species onsite has not been confirmed but the likelihood of it occurring within the site is high.
- ***Stomatium middelburgense*** (IUCN: LC, SA Red List: LC, Northern Cape Nature Conservation Act: Schedule 2): This species is endemic to South Africa and mainly occurs in the Eastern Cape Province (Burgoyne, 2006). The presence of this species was confirmed onsite.
- ***Xysmalobium gomphocarpoides*** (IUCN: LC, SA Red List: LC, PNCO: Schedule 4, Northern Cape Nature Conservation Act: Schedule 2): This species is endemic to South Africa and occurs in the Eastern Cape, Free State, Northern Cape, North West, Western Cape Provinces. This taxon was not selected in any one of four screening processes for highlighting potential taxa of conservation concern for detailed assessment and was hence given an automated status of Least Concern (Foden and Potter, 2005). The presence of this species onsite has not been confirmed but the likelihood of it occurring within the site is possible.
- ***Crassula umbellata*** (IUCN: LC, SA Red List: LC, Northern Cape Nature Conservation Act: Schedule 2): This species is endemic to South Africa and occurs on sandy or gravelly slopes of the Fynbos and Succulent Karoo Biome in the Eastern Cape, Northern Cape and Western Cape Provinces (Foden and Potter, 2009). The presence of this species onsite has not been confirmed but the likelihood of it occurring within the site is possible.
- ***Crassula setulosa*** (IUCN: NE, SA Red List: LC, Northern Cape Nature Conservation Act: Schedule 2): This species is not endemic to South Africa and occurs in a wide variety of habitats in the Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape, and North West Provinces. The presence of this species onsite has not been confirmed but the likelihood of it occurring within the site is high.
- ***Nemesia sp.*** (Northern Cape Nature Conservation Act: Schedule 2): Unknown. The presence of this species onsite has not been confirmed but the likelihood of it occurring within the site is possible.
- ***Manulea plurirosulata*** (IUCN: LC, SA Red List: LC, Northern Cape Nature Conservation Act: Schedule 2): This species is endemic to South Africa and occurs in the Eastern Cape and Free State Provinces. There is a lack of information on the habitat requirements for this species, however this taxon was not selected in any one of four screening processes for highlighting potential taxa of conservation concern for detailed assessment and was hence given an automated status of Least Concern (Foden and Potter, 2005). The presence of this species onsite has not been confirmed but the likelihood of it occurring within the site is possible.
- ***Jamesbrittenia filicaulis*** (IUCN: LC, SA Red List: LC, Northern Cape Nature Conservation Act: Schedule 2): This species is not endemic to South Africa and occurs within the Eastern Cape, Free State and KwaZulu-Natal Provinces. There is a lack of information on the habitat requirements for this species, however this taxon was not selected in any one of four screening processes for highlighting potential taxa of conservation concern for detailed assessment and was hence given an automated status of Least Concern (Foden and Potter, 2005). The presence of this species onsite has not been confirmed but the likelihood of it occurring within the site is possible.

A suitably qualified Botanist must identify plant SCC within the development footprints, which require relocation, prior to construction. Once plant SCC have been identified within the construction areas, permits must be obtained for the destruction and/or for the removal and transplanting of the individuals. The removed plant SCC must either be transplanted in areas adjacent with a similar habitat, in which construction activities will not take place, or be stored in a nursery until used for

rehabilitating the disturbed areas within the site. The recommended out-planting procedure must be followed to ensure the success of the transplanted plant SCC, as per Table 1 below.

Table 1: Recommended Out-Planting Procedure.

TASKS	METHOD
<p>PLOT PREPARATION</p>	<p>The plots should be prepared as follows:</p> <ul style="list-style-type: none"> • Prior to rehabilitation of the site, all remnants of foreign debris must be removed from the site. • All plots should first be covered with 1 m deep subsoil and then with topsoil (minimum depth of 10 cm). Soils should be manually spread evenly over the surface. Topsoil must be spread to the original depth (10 cm), and deeper where sufficient topsoil remains. • As topsoil will contain all cleared vegetation, no additional treatment will be required. However, to avoid erosion and increase nitrogen content, it might be necessary to sow a cover crop of commercially available Rye Grass (<i>Lolium perenne</i>). Although not indigenous, it is recommended as it has been used successfully elsewhere, is annual so dies off, is able to bind soil, and increases nutrients and soil mycorrhiza in the sand. This all improves the success of indigenous seeding and planting. Seed at the rate of 50 kg per hectare.
<p>PLANT PREPARATION</p>	<p>Plants must undergo a period of ‘hardening-off’ during which they have been exposed to full, direct sunlight and been under a reduced watering regime.</p> <p>The individual plants destined for each plot should be grouped into plot-specific, marked baskets, before they leave the nursery. Each plant should be labelled with an aluminium label, giving species code, and a specific numeral identifying the plot.</p> <p>Before the out-planting commences, the equipment necessary for the proper handling and placing of all required materials should be on hand, in good condition and to acceptable approved standards.</p> <ul style="list-style-type: none"> • Planting should preferably be done during the rainy season. • Unless otherwise specified by the ESO or the ECO, excavate square holes of 800 mm x 800 mm x 800 mm on average for trees and 500 mm x 500 mm x 500 mm on average for shrubs. • Backfill planting holes with topsoil. 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 well firmed down to a level equal to that of the surrounding <i>in situ</i> material • After planting, each plant must be well watered, adding more soil upon settlement if necessary. • Stake all trees and tall aloes using 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. depending on the rainfall). • A raised circular 200 mm high subsoil berm, placed 500 mm (shrubs) to 750 mm (trees) from the plant’s 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. • Herbs, shrubs, and trees should be planted at a density of at least 1 plant per 6,25 m² or 1600 plants per hectare.
<p>MAINTENANCE</p>	<ul style="list-style-type: none"> • Water all transplanted plants, as specified.

TASKS	METHOD
	<ul style="list-style-type: none"> ● Watering must commence and continue immediately after transplanting. Apply the following watering regime: Early morning and evenings for the first week; Then once a day for the next week; then twice a week until there is evidence of new shoots, whereafter watering is stopped. ● Check all plants for pests and diseases on a regular basis and treat the plants using approved methods and products as per manufacturers specifications. ● Control weeds by means of extraction, cutting or other approved methods. ● For planted areas that have failed to establish, replace plants with the same species as originally specified. The same species must be used unless otherwise specified by the ESO and/or the ECO.

In order to rehabilitate transformed and invaded areas, the following landscaping techniques should be employed:

- Clearing of vegetation should take place in accordance with the construction programme, instead of exposing large tracts of land simultaneously.
- Clearing of invaded areas should be undertaken as per the Alien Vegetation Management Plan.
- No re-useable topsoil should be removed from the site.
- Grass sods should be removed from areas to be cleared and stored for later use during rehabilitation.
- Sods used in re-vegetation should be obtained directly from the veld, but not from the identified sensitive areas. Veld sods should contain at least a 50 mm topsoil layer, and the roots must be minimally disturbed. They should either be obtained from the near vicinity of the site from an area selected by the ESO or the ECO, or from areas of the proposed development site that are earmarked for development. The soil should be compatible with that removed from the area to be re-vegetated and must not have been compacted by heavy machinery.
- Indigenous seeds may be harvested for purposes of re-vegetation in areas that are free of alien invasive vegetation, either at the site prior to clearance or from suitable neighbouring sites.
- The stockpiled vegetation from the clearing operations should be reduced to mulch.
- Indigenous plant material must be kept separate from alien material. The indigenous vegetative material should either be reduced by mechanical means (chipper) or by hand-axing to sticks no longer than 100 mm. The chipped material should be mixed with the topsoil at a ratio not exceeding 1:1.
- Mulch is to be harvested from areas that are to be denuded of vegetation during construction activities, provided that they are free of seed-bearing alien invasive plants.
- No harvesting of vegetation may be done outside the area to be disturbed by construction activities.
- Mulches should be collected in such a manner as to restrict the loss of seed.
- Brush-cut mulch should be stored for as short a period as possible, and seed released from stockpiles should be collected for use in the rehabilitation process.
- Re-vegetated areas should be monitored every three (3) months for the first twelve (12) months and every six (6) months thereafter.
- Re-vegetated areas showing inadequate surface coverage (less than 30% within 9 months after re-vegetation) should either be re-vegetated from scratch, or addition infill planting might be required. The ECO should advise.
- The Contractor must be responsible for maintaining the desired level of moisture necessary to maintain vigorous and healthy growth in re-vegetated areas. The quantity of water applied at one time should be sufficient to penetrate the soil to a minimum depth of 800 mm, where appropriate, and at a rate that will prevent saturation of the soil.
- Water used for the irrigation of re-vegetated areas should be free of chlorine and other pollutants which could have a detrimental effect on the plants.

- All seeded, planted, or sodded grass areas and all shrubs or trees planted are to be irrigated at regular intervals.
- Where herbicides are used to clear vegetation, species-specific chemicals should be applied to individual plants only. General spraying should be strictly prohibited.

3. ALIEN VEGETATION MANAGEMENT PLAN

An “invasive species” is any species whose establishment and spread outside of its natural distribution range (i) threatens ecosystems, habitats or other species or has a demonstrable potential to threaten ecosystems, habitats or other species; and (ii) 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 (CARA) (Act No. 43 of 1983 - Regulation 15, 30 March 2001), for agricultural land, and the National Environmental Management: Biodiversity Act (NEM:BA) (Act No. 10 of 2004), for natural areas, invasive alien plant species should be controlled and eradicated with an emphasis on urgent action in biodiversity Ancillary areas. NEM:BA published a list of Alien and Invasive Species (No. 599) in 2014 which regulates the management of alien and invasive plants in natural environments.

The following alien invasive species have been recorded in the broader project area during the field survey conducted by CES (2018):

- ***Opuntia stricta*** (Common Prickly Pear)
CARA (Act No. 43 of 1983): Category 1
NEM:BA National List of Invasive Species: Category 1b
- ***Populus sp.***
CARA (Act No. 43 of 1983): Category 2
NEM:BA National List of Invasive Species: Category 2

Additional alien vegetation species could be present within the site. The ECO, advised by a suitably qualified Botanical Specialist, should assist in the identification of alien vegetation species during the construction phase and advise on suitable methods of removal and disposal.

NEM:BA Category 1b: Invasive Species

Opuntia stricta is listed under Category 1b of the NEMBA: National List of Invasive Species in Terms Sections 70(1), 71(3) and 71A. Plants classified as Category 1b alien invasive species are prohibited from:

- Being imported into the Republic;
- Growing or in any other way propagating any specimen;
- Conveying, moving or otherwise translocating any specimen;
- Spreading or allowing the spread of any specimen; and
- Releasing any specimen.

NEM:BA Category 2: Invasive Species

Populus spp. are listed under Category 2 of the NEMBA: National List of Invasive Species. Category 2 invasive species are regulated by area. A permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any species listed under Category 2.

CARA Category 1: Declared weeds

Opuntia stricta is listed under Category 1 of CARA. Plants classified as Category 1 in CARA are Declared Weeds. These are prohibited plants, which must be controlled or eradicated where possible (except in biocontrol reserves, which are areas designated for the breeding of biocontrol agents).

CARA Category 2: Invader Plants

Populus sp. is listed under Category 2 of CARA. Plants classified as Category 2 are declared Invader

Plants and may only be grown under controlled conditions if a permit is acquired. No trade in these plants is permitted.

It is essential that alien invasive species be removed from the infrastructure development site. Following the Working for Water guidelines for effective alien vegetation removal (DWAF, 2009), an alien removal programme should consist of the following three (3) phases:

- I. **Initial control:** Clearing and eradication of alien invasive stands so as to drastically reduce the existing population.
- II. **Follow-up control:** Control of re-growth (including seedlings, root suckers and coppice growth); which should be conducted annually for the first five (5) years.
- III. **Maintenance control:** Sustain alien plant numbers with ongoing annual monitoring for the life of the project, and if necessary, implement additional control methods to avoid re-establishment of alien invasive stands.

WEED REMOVAL (INITIAL CONTROL PROGRAMME FOR ALL ALIEN VEGETATION ENCOUNTERED)

There are a number of possible methods which can be used to control alien invasive species; these include mechanical, chemical, biological, and mycoherbicide control. In addition, integrated control methods consist of the use of a combination of these methods to control alien vegetation. This section outlines possible techniques used in mechanical and chemical control methods only, as biological and mycoherbicide control is not recommended for this site and therefore not discussed further.

Mechanical Control Methods

The Agricultural Research Council (ARC)(2014) describes mechanical control as damaging or removing the plant by physical action. Various methods could be used, including uprooting/hand pulling, slashing, mowing, felling, ringbarking or bark stripping (ARC, 2014). This method of alien vegetation removal is best suited to small areas or sparse infestations. The following mechanical methods for removal are recommended:

- Hand pulling: Grip the seedlings or saplings low down and pull out by hand (using gloves). Make use of a hoe for plants that cannot be pulled out with ease.
- Ring barking: Bark is removed to from the bottom of the stem to a height of 0.75 – 1.0 m to below ground level. Bush knives or hatchets can be used for debarking.
- Frill or Ring-bark: Using an axe or bush knife, angled cuts are made downward into the cambium layer through the bark in a ring; herbicide is applied into the cuts.
- Cut stump treatment: Stems should be cut 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.

Chemical Control Methods

Chemical control methods involve the use of registered herbicides to kill the target weed (ARC, 2014). Chemical control methods for alien plant removal include using a number of approved environmentally safe herbicides, which are applied to the leaves, stems or stumps of alien invader species.

- Foliar Spray:
 - Seedlings – Touchdown
 - Young trees – Garlon
- Cut Stumps (larger trees) and then apply:
 - Chopper;
 - Confront (2%); or
 - Timbrel 3A*.

- Frill (trees) and then apply:
 - Chopper; or
 - Timbrel 3A*.
- Stem Injection:
 - MSMA;
 - Mamba; or
 - Touchdown.

The Working for Water Programme: Guide to Control Method and Herbicide Selection for Alien Vegetation must be followed.

4. STORMWATER MANAGEMENT PLAN

This Stormwater Management Plan must be implemented during the construction and operational phases of the project. During the implementation of the Stormwater Management Plan, the Contractor must also ensure compliance with applicable regulations and prevent off-site migration of contaminated stormwater and the increase soil erosion. This Stormwater Management Plan serves as a high-level guideline for designers and Contractors to follow measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures must promote the dissipation of stormwater runoff.

Diligence in stormwater management is essential and a full-time task, even during dry periods, as the lack of it could lead to the degradation of the site over time, rendering it susceptible to serious damage in the event of unexpected flooding, and subsequent potential damage to equipment on site due to gradual erosion after normal rainfall events, or by unexpected damage due to extreme flood events.

The site must conform to all engineering designs and measures to manage and control water runoff and erosion during or after rainstorms. This will include the following items:

- Runoff control and drains;
- Slope attenuation;
- Silt fences;
- Stormwater channels and catch pits;
- Shade or catch nets; and
- Soil bindings.

The civil design should describe and illustrate the proposed stormwater control measures as stipulated by the Civil Engineer, in compliance with this Stormwater Management Plan:

- Control measures to be implemented before and during the construction period, including the final stormwater control measures (post-construction). All roads and platforms should be designed and built according to SANS 1200 applicable sections to ensure all stormwater measures are properly implemented.
- The location, area/extent (m²/ha) and specifications of all temporary and permanent water management structures or stabilisation methods.
- Stone pitching or concrete-lined drains be placed adjacent to roads where required to transfer the water to existing watercourses.
- At the point where stormwater is discharged, energy dissipaters must be constructed to slow the flow of runoff water.
- Mitre drains should be cut in the site roads at appropriate places to ensure water runoff and control.
- All cut-and-fill banks should be covered with stone pitching or crusher stone to ensure bank stabilisation and the elimination of potential erosion.

The aim is to ensure that the stormwater runoff is guided off the construction area, and such that it does not create erosion problems that may require aftercare.

In addition, the following surface water control measures should be implemented:

- Surface water flow must be guided to ensure there is no flow directly to an erosion area.
- Prevent the concentration or flow of surface water or stormwater down cut-and-fill slopes or along pipeline routes or roads and ensure measures to prevent erosion are in place prior to construction.

- Stormwater and any runoff generated by hard surfaces should be discharged into retention swales or areas with rock riprap. These areas must be grassed with indigenous vegetation. These energy dissipation structures must be placed in a manner that flows are managed prior to being discharged back into the natural watercourses, thus not only preventing erosion, but also supporting the maintenance of natural base flows within these systems, i.e. hydrological regime (water quantity and quality) is maintained.
- Mitigate against siltation and sedimentation using the above-mentioned structures and ensure that the structures do not cause erosion.
- Ensure that all stormwater control features have soft engineered areas that attenuate flows, allowing for water to percolate into the local aquifers.
- Minimise and restrict site clearing to areas required for construction purposes only and restrict disturbance to adjacent undisturbed natural vegetation.
- Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment.
- Minimise the diversion of flows into different catchments.
- If implementing dust control measures, prevent over-wetting, saturation and runoff that may cause erosion and sedimentation.
- Watercourse (stream) crossings must not trap any runoff, thereby creating inundated areas, but allow for free-flowing watercourses.

5. EROSION MANAGEMENT PLAN

This Erosion Management Plan must be implemented prior to construction as well as during the construction and operational phases of the project, along with the Stormwater Management Plan. The Erosion Management Plan must ensure compliance with applicable regulations and prevent off-site migration of contaminated stormwater or increase in soil erosion. This Plan will serve as a high-level guideline for designers and Contractors to follow measures that allow surface and subsurface movement of water along drainage lines that will not impede natural surface and subsurface flows. Drainage measures must promote the dissipation of stormwater runoff.

Diligence in stormwater management and erosion management is essential and a full-time task, even during dry periods, as the lack of management could lead to the degradation of the site over time, placing the site and surrounds at risk to serious damage in the event of unexpected flooding, and subsequent potential damage to equipment on site due to gradual erosion after normal rainfall events, or by unexpected damage due to extreme flood events.

The site must conform to all engineering designs and measures to manage and control water runoff and erosion during or after rainstorms. This will include the following items:

- Runoff control and drains;
- Slope attenuation;
- Silt fences;
- Stormwater channels and catch pits;
- Shade or catch nets; and
- Soil bindings.

The civil design should describe and illustrate the proposed erosion control measures as stipulated by the Civil Engineer, in compliance with this Erosion Management Plan:

- Erosion control measures to be implemented before and during the construction period, including the final erosion control measures (post-construction). All roads and platforms should be designed and built according to SANS 1200 applicable sections to ensure all stormwater measures are properly implemented.
- The location, area/extent (m²/ha) and specifications of all temporary and permanent water management structures or stabilisation methods.
- Stone pitching or concrete-lined drains be placed adjacent to roads where required to transfer the water to existing watercourses.
- At the point where stormwater is discharged, energy dissipaters must be constructed to slow the flow of runoff water.
- Mitre drains should be cut in the site roads at appropriate places to ensure water runoff and control.
- All cut-and-fill banks should be covered with stone pitching or crusher stone to ensure bank stabilisation and the elimination of potential erosion.

The aim is to ensure that the stormwater runoff is guided off the construction area, and such that it does not create erosion problems within the site and the surrounds.

In addition, the following surface water control measures should be implemented to reduce the risk of erosion:

- Surface water flow must be guided to ensure there is no flow directly into an area which could increase erosion.

- Prevent the concentration or flow of surface water or stormwater down cut-and-fill slopes or along pipeline routes or roads and ensure measures to prevent erosion are in place prior to construction.
- Stormwater and any runoff generated by hard surfaces should be discharged into retention swales or areas with rock riprap. These areas must be grassed with indigenous vegetation. These energy dissipation structures must be placed in a manner that flows are managed prior to being discharged back into the natural watercourses, thus not only preventing erosion, but also supporting the maintenance of natural base flows within these systems, i.e. hydrological regime (water quantity and quality) is maintained.
- Mitigate against siltation and sedimentation using the above-mentioned structures and ensure that the structures do not cause erosion.
- Ensure that all stormwater control features have soft engineered areas that attenuate flows, allowing for water to percolate into the local aquifers.
- Minimise and restrict site clearing to areas required for construction purposes only and restrict disturbance to adjacent undisturbed natural vegetation.
- Large tracts of bare soil are likely to cause dust pollution and increase erosion.
- If implementing dust control measures, prevent over-wetting, saturation and runoff that may cause erosion and sedimentation.
- Watercourse (stream) crossings must not trap any runoff, thereby creating inundated areas, but allow for free-flowing watercourses.

6. 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 Umsobomvu Development to reduce the likelihood of emergency incidents and to ensure that there will be appropriate responses to unexpected or accidental adverse incidents.

EMERGENCY INCIDENT 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 EMPr(s) and the Environmental Authorisation 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 onsite 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 onsite. 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 onsite, and the use of these drip trays must be monitored by the appointed ECO.
- All hazardous chemicals that will be used onsite must have 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.
- Due to the Covid-19 pandemic, masks should be worn by all employees and social distancing should be practiced at all times.
- Vehicle speed limits must be indicated onsite 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.

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 onsite 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 onsite, 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.
- The ECO and the HSE Representative must compile 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.

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 onsite, 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.

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.

7. FIRE MANAGEMENT PLAN

It is imperative that the necessary precautions be implemented to minimise this risk of fire within the site and surrounds. The following measures must be implemented to reduce the risk of fires during the construction, operational and decommissioning phases.

CONSTRUCTION PHASE MANAGEMENT MEASURES

- The Contractor must ensure that all personnel are aware of the fire risk and the need to extinguish cigarettes before disposal, in appropriate waste disposal containers.
- The risk of fire is highest during the drier months and during high wind velocities. To avoid and manage fire risk the following steps should be implemented:
 - Firefighting equipment must be kept onsite and ensure that all personnel are educated on how to use it as well as the procedures to be followed in the event of a fire.
 - Identify the relevant authorities and structures responsible for fighting fires in the area and liaise with them regarding procedures should a fire commence.
 - Ensure that all the necessary emergency contact details are posted at conspicuous and relevant locations.
- Should a Contractor be found responsible for the outbreak of a fire, they must be liable for any associated costs.
- Open fires must not be allowed on site for the purpose of cooking or warmth. Bona fide braai fires (such braai fires must be limited to the traditional “month end” braais and not individual daily cooking fires) may be lit within the construction camp or site.
- The Contractor must take all reasonable steps to prevent the accidental occurrence or spread of fire. The Contractor must appoint a fire officer who should be responsible for ensuring immediate and appropriate action in the event of a fire.
- The Contractor must ensure that all site personnel are aware of the procedure to be followed in the event of a fire. The appointed fire officer must notify the Fire and Emergency Services in the event of a fire and must not delay doing so until such time as the fire is beyond control.
- The Contractor must ensure that there is basic firefighting equipment onsite at all times. This equipment should, at a minimum, include fire extinguishers and beaters. The Contractor must pay the costs incurred by organisations called to put out fires started by himself/herself, his/her staff, or any sub-contractor. The Contractor must also pay the costs incurred to reinstate burnt areas as deemed necessary by the RE.
- Any work that requires the use of fire may only take place at that designated area and as approved by the RE. Firefighting equipment must be available in these areas.
- The Contractor should ensure that the telephone number of the local Fire and Emergency Service is displayed at the site offices.
- The Contractor is to ascertain the fire requirements and must submit a fire contingency Method Statement to the ESO and ECO for approval.

OPERATIONAL PHASE MANAGEMENT MEASURES

Any requirements of the local Fire Protection Association must be adhered to in consultation with the relevant landowners, as per the requirements of the National Veld and Forest Fire legislation, which may include:

- Formation of a Fire Protection Association (FPA).
- Duty to prepare and maintain firebreaks.
- Requirements for firebreaks.
- Readiness for firefighting.
- Actions to fight fires.
- In areas other than designated development footprints, a network of firebreaks must be

maintained and overlap with any firebreaks managed by the landowners to ensure that fires are not able to spread over the development.

- All road reserves will serve as firebreak; and
- All firebreaks must be maintained as required by the local Fire Chief.
- Firebreaks are to be positioned and prepared in such a way as to cause the least disturbance to soil and biodiversity. Firebreaks should be free from combustible material, e.g. pruned material and leaf litter.
- Ensure that firefighting equipment is maintained and in good working order before the start of each fire season.
- Smoking outside of designated safe areas must not be permitted.
- Flicking of cigarette butts into adjacent vegetation must not be permitted.
- Suitable signage must be provided onsite, including entrance warning of fire risk and warnings not to flick cigarette butts into vegetated areas.

8. WASTE MANAGEMENT PLAN

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 onsite 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 onsite is disposed of in a suitable and timeous manner. Where possible, some of the construction waste should be recycled and used in construction.

SOLID AND LIQUID WASTE

During the construction phase, solid waste must be stored in a designated area, which has been approved by the ECO, within the site is covered, tip-proof drums for collection and disposal. All refuse containers must be free of any holes and in good condition. A refuse control system should be established for the collection and removal of refuse to the satisfaction of the ESO or 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.

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 operation 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.

HAZARDOUS WASTE

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 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.

APPENDIX F: CURRICULUM VITAE OF THE ENVIRONMENTAL TEAM

- Dr Alan Carter (CES, Executive Director)
- Ms Caroline Evans (CES, Principal Environmental Consultant)
- Ms Lunga Mbulana (CES, Environmental Consultant)

ALAN ROBERT CARTER
Curriculum Vitae**CONTACT DETAILS**

Name of Company	CES – Environmental and Social Advisory Services
Designation	Executive Director - East London and Port Elizabeth branches of CES
Profession	Environmental consultant and financial accountant
Years with firm	20 (twenty) + years
E-mail	a.carter@cesnet.co.za
Office number	+27 (0) 43 726-7809
Mobile	+27 (0) 83 379-9861
Nationality	South African
Professional Body	<ul style="list-style-type: none">➤ SACNASP: South African Council for Natural Scientific Profession➤ EAPASA: Environmental Assessment Practitioners Association of South Africa➤ IWMSA: Institute Waste Management Southern Africa➤ TSBCPA: Texas State Board of Certified Public Accountants (USA)➤ AICPA: American Institute of Certified Public Accountants (USA)➤ Exemplar Global: Environmental Management Systems Auditor
Key areas of expertise	<ul style="list-style-type: none">➤ Environmental Impact Assessment➤ Marine Ecology➤ Environmental and coastal management➤ Waste management➤ Climate change and emissions inventories➤ Financial accounting and project feasibility studies➤ Environmental management systems, auditing and due-diligence

PROFILE

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 marine ecology. He is also a certified ISO14001 EMS auditor with Exemplar Global (formerly the American National Standards Institute). Alan has been responsible for leading and managing numerous and varied environmental and financial consulting projects over the past 30 years.

ALAN ROBERT CARTER
Curriculum Vitae



EMPLOYMENT EXPERIENCE

- January 2001 – Present: Executive Director (Coastal & Environmental Services, East London, South Africa)
- January 1999 – December 2001: Manager (Arthur Andersen LLP, Public Accounting Firm, Chicago, Illinois USA)
- December 1996 – December 1998: Senior Accountant/Auditor (Ernst & Young LLP, Public Accounting Firm, Austin, Texas, USA.)
- January 1994 – December 1996: Senior Accountant/Auditor (Ernst & Young, Charteris & Barnes, Chartered Accountants, East London, South Africa)
- July 1991 – December 1994: Associate Consultant (Coastal & Environmental Services, East London, South Africa)
- March 1989 – June 1990: Data Investigator (London Stock Exchange, London, England, United Kingdom)

ACADEMIC QUALIFICATIONS

- Ph.D. Plant Science (Marine) - Rhodes University 1987
- B. Compt. Hons. Accounting Science - University of South Africa 1997
- B. Com. Financial Accounting - Rhodes University 1995
- B.Sc. Hons. Plant Science - Rhodes University 1983
- B.Sc. Plant Science & Zoology - Rhodes University 1982

COURSES

- Environmental Management Systems Lead Auditor Training Course - American National Standards Institute and British Standards Institute (2000)
- ISO 14001:2015 Implementing Changes - British Standards Institute (2015)
- Numerous other workshops and training courses.

CONSULTING EXPERIENCE

Environmental Impact Assessment

- Managed numerous environmental impact assessment (EIA) projects (estimated at over 200 EIAs) and prepared EIA reports in terms of relevant EIA legislation and regulations (including World Bank and IFC Standards) for development proposals including: bulk water and waste water, roads, electrical, mining, ports, aquaculture, renewable energy (over 20 solar facilities and over 20 wind farms), industrial processes, housing developments, golf estates and resorts, etc. (2002 – present).
- Projects have also included preparation of applications in terms of other statutory requirements, such as water-use and mining licence /permit applications.
- Assisted City of Johannesburg in the process to proclaim four nature reserves in terms of relevant legislation (2015-2016).

Feasibility and Pre-feasibility Assessments

- Managed projects to develop pre-feasibility and feasibility assessments for various projects, including various tourism developments, aquaculture, infrastructure projects, etc.
- Managed project for the East London Industrial Development Zone (ELIDZ) to develop a Conceptual Framework for a Mariculture Zone within the ELIDZ (2009).
- Managed the following aquaculture feasibility studies:
 - Mariculture Zone at Qoloha on the South African Wild Coast (2013).
 - Mariculture Zone within the Coega Industrial Development Zone (2014).
 - Aquaponics Zone within the Coega Industrial Development Zone (2017).
 - Finfish cage farming within the Port of Richards Bay (2019).

ALAN ROBERT CARTER
Curriculum Vitae

- Multispecies aquaculture hatchery and demonstration facility in the Eastern Cape Province (2019).
- Managed project to determine the financial feasibility of various proposed tourism developments for the Kouga Development Agency in the Eastern Cape Province (2006)
- Contributed significantly to a study to determine the financial and environmental feasibility of three proposed tourism development projects at Coffee Bay on the Wild Coast (2004).

Strategic Environmental Assessment

- Managed Strategic Environmental Assessment (SEA) project toward the development of a Biofuel Industry in the Eastern Cape Province of South Africa (2014-2016)
- Managed Strategic Environmental Assessment (SEA) projects for two South African ports (2006 – 2007).
- Managed Strategic Environmental Assessment (SEA) projects for five (5) local municipalities in the Eastern Cape as part of the municipal Spatial Development Framework plans (2004 – 2005).
- Involved in the financial assessment of various land-use options and carbon credit potential as part of a larger Strategic Environmental Assessment (SEA) for assessing forestry potential in Water Catchment Area 12 in the Eastern Cape of South Africa (2006).

Climate change, emissions trading and renewable energy

- Provided specialist peer review services for National Department of Environmental Affairs relating to climate change impact assessments for large infrastructure projects (2017-2018).
- Conducted climate change impact assessment for a proposed coal-fired power station in Africa (2017-2018).
- Participated in the development of a web-based Monitoring & Evaluation (M&E) system for climate change Mitigation and Adaptation in South Africa for National Department of Environmental Affairs (DEA) (2015-2016).
- Managed project to develop a Climate Change Strategy for Buffalo City Metro Municipality (2013).
- Managed projects to develop climate change strategies for two district municipalities in the Eastern Cape Province (2011).
- Conducted specialist carbon stock and greenhouse gas emissions impact and life cycle assessment as part of the Environmental, Social and Health Impact Assessment for a proposed sugarcane to ethanol project in Sierra Leone (2009 - 2010) and a proposed Jatropha bio-diesel project in Mozambique (2009 - 2010).
- Managed project to develop the Eastern Cape Province Climate Change Strategy (2010).
- Managed project to develop a Transnet National Ports Authority Climate Change Risk Strategy (2009).
- Participated in a project to develop a Renewable Energy roadmap for the East London Industrial Development Zone (ELIDZ) (2013).
- Participated in a project for the East London Industrial Development Zone (ELIDZ) and Eastern Cape Government to prepare a Renewable Energy Strategy (2009).
- Contributed to the development of Arthur Andersen LLP's International Climate Change and Emissions Trading Services (2001).
- Conducted carbon credit (Clean Development Mechanism - CDM) feasibility assessment for a variety of renewable energy projects ranging from biogas to solar PV.

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Curriculum Vitae

- Participated in the preparation of CDM applications for two solar PV projects in the Eastern Cape.

Waste Management

- Managed project to develop Integrated Waste Management Plans for six local municipalities on behalf of the Sarah Baartman District Municipality in the Eastern Cape Province (2016).
- Managed project to develop Integrated Waste Management Plans for four local municipalities on behalf of Alfred Nzo District Municipality in the Eastern Cape Province (2015).
- Managed project to develop Integrated Waste Management Plans for eight local municipalities on behalf of Chris Hani District Municipality in the Eastern Cape Province (2011).
- Managed a project to develop a zero-waste strategy for a community development in the Eastern Cape Province (2010).
- Managed waste management status quo analysis for a District Municipality in the Eastern Cape Province (2003).
- For three consecutive years, managed elements of the evaluation of the environmental financial reserves of the three largest solid waste companies (Waste Management, Inc., Republic Services, Inc., Allied Waste, Inc.) and number of smaller waste companies in the USA as part of the annual financial audit process for SEC reporting purposes. Ensured compliance with RCRA and CERCLA environmental regulations.
- Managed elements of the evaluation of the environmental financial reserves of the largest hazardous waste company in the USA (Safety-Kleen, Inc.), as part of the audit process for SEC reporting purposes. Ensured compliance with RCRA and CERCLA environmental regulations.

Environmental auditing and compliance

- Conducted environmental legal compliance audit for various large Transnet Freight Rail facilities (2018).
- Lead auditor for numerous Environmental Control Officer (ECO) projects, including construction of wind and solar farms, road infrastructure, bulk water and sewage infrastructure, port infrastructure, cemeteries, etc.
- Participated in numerous ISO14001 Environmental Management System (EMS) audits for large South African corporations including SAPPI, BHP Billiton, SAB Miller, Western Platinum Refinery, Dorbyl Group and others (2002 – present).
- Reviewed the SHE data reporting system of International Paper, Inc. (IP) for three successive years as part of the verification of the IP SHE Annual Report, which included environmental assessments of 12 IP pulp and paper mills located throughout the USA.

Environmental Due Diligence and Business Risk

- Participated in project on behalf of the CDC Group (UK) to conduct a due diligence on the ESG systems and mechanisms in place for an agro-industry investment entity with considerable agricultural investments throughout Africa (2021).
- Conducted environmental due diligence projects on behalf of the German Development Bank for a forestry pulp and paper operation in Swaziland (2010) and for a large diversified South African agricultural/agro-processing company (2011).
- Managed project for the Transnet National Ports Authority to identify the environmental risks and liabilities associated with the operations of the Port of Durban

ALAN ROBERT CARTER
Curriculum Vitae

as part of a broader National initiative to assess business and financial risks relating to environmental management (2006).

- Conducted sustainability and cost/benefit analysis of various waste water treatment options (including a marine pipeline at Hood Point) for the West Bank of East London (2004).
- Conducted analysis of permit fees and application processing costs for off-road vehicle use on the South African coastline for the Department of Environmental Affairs and Tourism, Marine & Coastal Management (2003).
- Involved in the determination of the historical cost element of environmental remediation insurance claims for a number of multinational companies, including Dow Chemicals, Inc. and International Paper, Inc.
- Evaluated the environmental budgeting process of the US Army and provided best practice guidance for improving the process.

Policy and Guidelines

- Managed project to develop an Estuarine Management Plan for the Quinera Estuary for the Eastern Cape Department of Economic Development, Environmental Affairs and Tourism (2021).
- Development of Administration / Application Fee Structure for the Reclamation of Land, Coastal Use Permits, Coastal Waters Discharge Permits, Dumping of Waste at Sea, Off-Road Vehicle Regulations Promulgated in Terms of the National Environmental Management Act: Integrated Coastal Management Act (Act No. 24 Of 2008) (2017).
- Managed project to develop an Estuarine Management Plan for the Buffalo River Estuary for the National Department of Environmental Affairs (2017).
- Managed project to develop a Coastal Management Programme for Amathole District Municipality, Eastern Cape (2015 – 2016).
- Managed project to develop a sustainability diagnostic report as part of the development of the Eastern Cape Development Plan and Vision 2030 (2013).
- Managed project for the Department of Environmental Affairs and Tourism, Marine & Coastal Management to determine the cost implications associated with the implementation of the Integrated Coastal Management Act (2007).
- Managed project to develop a Conservation Plan and Municipal Open Space System (MOSS) for Buffalo City Municipality (2007)
- Managed project to develop a Sanitation Policy and Strategy for Buffalo City Municipality, Eastern Cape (2004 – 2006).
- Managed project to develop an Integrated Environmental Management Plan and Integrated Coastal Zone Management Plan for Buffalo City Municipality, Eastern Cape (2004 – 2005).
- Managed projects to develop and implement an Environmental Management System (EMS) for the Chris Hani and Joe Gqabi (formerly Ukhahlamba) District Municipalities in the Eastern Cape generally in line with ISO14001 EMS standards (2004 – 2005).
- Managed project to develop a State of the Environment Report and Environmental Implementation Plans for Amathole, Chris Hani, OR Tambo and Joe Gqabi District Municipalities in the Eastern Cape Province (2005 – 20010).
- Conducted analysis of permit fees and application processing costs for off-road vehicle use on the South African coastline for the Department of Environmental Affairs and Tourism, Marine & Coastal Management (2003).

Environmental & Social Management Systems

ALAN ROBERT CARTER
Curriculum Vitae**PUBLICATIONS**

- Managed project to develop Environmental & Social Management Systems (ESMS) in line with IFC Performance Standards for an agricultural equipment supplier in Malawi on behalf of Norfund (2021).
- Managed projects to develop Environmental Management Systems (EMS) in line with ISO14001 EMS Standard for a South African water utility (2019).
- Managed projects to develop Environmental & Social Management Systems (ESMS) in line with IFC Performance Standards for four (4) wind farms in South Africa (2015-2018).
- Managed project to develop an Environmental & Social Management System (ESMS) in line with IFC Performance Standards for a telecoms company in Zimbabwe on behalf of the German Development Bank (2013).
- Conducted Environmental Management System (EMS) reviews for a number of large US corporations, including Gulfstream Aerospace Corporation.

Public financial accounting

- While with Ernst & Young LLP, (USA), functioned as lead financial auditor for various public and private companies, mostly in the technology business segment of up to \$200 million in annual sales. Client experience included assistance in a \$100 million debt offering, a \$100 million IPO and SEC annual and quarterly reporting requirements.
- Completed three years of articles (training contract) in fulfilment of the certification requirements of the South African Institute of Chartered Accountants which included auditing, accounting and preparation of tax returns for many small to medium sized commercial entities.

Refereed Publications

- Carter, A.R. 1985. Reproductive morphology and phenology, and culture studies of *Gelidium pristoides* (Rhodophyta) from Port Alfred In South Africa. *Botanica Marina* 28: 303-311.
- Carter, A.R. 1993. Chromosome observations relating to bispore production in *Gelidium pristoides* (Gelidiales, Rhodophyta). *Botanica Marina* 36: 253-256.
- Carter, A.R. and R.J. Anderson. 1985. Regrowth after experimental harvesting of the agarophyte *Gelidium pristoides* (Gelidiales: Rhodophyta) in the eastern Cape Province. *South African Journal of Marine Science* 3: 111-118.
- Carter, A.R. and R.J. Anderson. 1986. Seasonal growth and agar contents in *Gelidium pristoides* (Gelidiales, Rhodophyta) from Port Alfred, South Africa. *Botanica Marina* 29: 117-123.
- Carter, A.R. and R.H. Simons. 1987. Regrowth and production capacity of *Gelidium pristoides* (Gelidiales, Rhodophyta) under various harvesting regimes at Port Alfred, South Africa. *Botanica Marina* 30: 227-231.
- Carter, A.R. and R.J. Anderson. 1991. Biological and physical factors controlling the spatial distribution of the intertidal alga *Gelidium pristoides* in the eastern Cape Province, South Africa. *Journal of the Marine Biological Association of the United Kingdom* 71: 555-568.

Published reports

- Water Research Commission. 2006. Profiling Estuary Management in Integrated Development Planning in South Africa with Particular Reference to the Eastern Cape. Project No. K5/1485.
- Turpie J., N. Sihlophe, A. Carter, T. Maswime and S. Hosking. 2006. Maximising the socio-economic benefits of estuaries through integrated planning and management: A

ALAN ROBERT CARTER
Curriculum Vitae

rationale and protocol for incorporating and enhancing estuary values in planning and management. Un-published Water Research Commission Report No. K5/1485

Conference Proceedings

- Carter, A.R. 2002. Climate change and emission inventories in South Africa. Invited plenary paper at the 5th International System Auditors Convention, Pretoria. Held under the auspices of the South African Auditor & Training Certification Association Conference (SAATCA).
- Carter, A.R. 2003. Accounting for environmental closure costs and remediation liabilities in the South African mining industry. Proceedings of the Mining and Sustainable Development Conference. Chamber of Mines of South Africa, Vol. 2: 6B1-5
- Carter, A.R. and S. Fergus. 2004. Sustainability analysis of wastewater treatment options on the West Bank of East London, Buffalo City. Proceedings of the Annual National Conference of the International Association for Impact Assessment, South African Affiliate: Pages 295-301.
- Carter, A., L. Greyling, M. Parramon and K. Whittington-Jones. 2007. A methodology for assessing the risk of incurring environmental costs associated with port activities. Proceedings of the 1st Global Conference of the Environmental Management Accounting Network.
- Hawley, GL, AR McMaster and AR Carter. 2009. Carbon, carbon stock and life-cycle assessment in assessing cumulative climate change impacts in the environmental impact process. Proceedings of the Annual National Conference of the International Association for Impact Assessment, South African Affiliate.
- Hawley, GL, AR McMaster and AR Carter. 2010. The Environmental and Social Impact Assessment and associated issues and challenges. African, Caribbean and Pacific Group of States (ACP), Science and Technology Programme, Sustainable Crop Biofuels in Africa.
- Carter, AR. 2011. A case study in the use of Life Cycle Assessment (LCA) in the assessment of greenhouse gas impacts and emissions in biofuel projects. 2nd Environmental Management Accounting Network- Africa Conference on Sustainability Accounting for Emerging Economies. Abstracts: Pages 69-70.

CERTIFICATION

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes me, my qualifications, and my experience. I understand that any wilful misstatement described herein may lead to my disqualification or dismissal, if engaged.

**ALAN ROBERT CARTER**

Date: 28 January 2022

CAROLINE ANN BEER (NÉE EVANS)
Curriculum Vitae**CONTACT DETAILS**

Name of Company	CES – Environmental and Social Advisory Services
Designation	Makhanda (Grahamstown) Branch
Profession	Principal Environmental Consultant
Years with firm	Eight (8) Years
E-mail	c.evans@cesnet.co.za
Office number	+27 (0)46 622 2364
Nationality	South African
Voluntary Affiliations	International Association for Impact Assessment (IAIA) Member No. 5798
Key areas of expertise	<ul style="list-style-type: none">➤ Project Management➤ Specialist Management➤ Report Reviews➤ Report Writing➤ Renewable Energy➤ Agricultural Developments

PROFILE**Ms Caroline Evans**

Ms Caroline Evans is a Principal Environmental Consultant with more than eight (8) years' experience, and she is based in the Makhanda (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, Waste Water 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, Albany 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.

CAROLINE ANN BEER (NÉE EVANS)
Curriculum Vitae**EMPLOYMENT
EXPERIENCE****Coastal & Environmental Services, Principal Environmental Consultant***August 2020 - Present*

- Project Management
- Specialist Management
- Renewable Energy Consultant
- Report Reviews
- Report Writing

Coastal & Environmental Services, Senior Environmental Consultant*August 2016 – July 2020*

- Project Management
- Specialist Management
- Renewable Energy Consultant
- Report Writing
- Wetland Specialist

Coastal & Environmental Services, Environmental Consultant*November 2013 – July 2016*

- Report Writing
- Renewable Energy Consultant
- Wetland Specialist Input

Rhodes University, Department of Environmental Science, Graduate Assistant*January 2010 – January 2012***ACADEMIC
QUALIFICATIONS****Rhodes University, Eastern Cape, South Africa***B.Sc. Honours Environmental Science (with distinction)
2011***Rhodes University, Eastern Cape, South Africa***B.Sc. Zoology & Environmental Science (with distinction)
2007-2010***COURSES**

- Rhodes University, Eastern Cape
"Environmental Impact Assessment" 2013. *(with distinction)*
- Rhodes University, Eastern Cape
"Tools for Wetland Assessment" 2010. *(with distinction)*
- Rhodes University, Eastern Cape
"Urban Ecology" 2010. *(with distinction)*
- Rhodes University, Eastern Cape
"Post Graduate Statistics" 2010. *(with distinction)*

**CONSULTING
EXPERIENCE****ENVIRONMENTAL IMPACT ASSESSMENTS:**

- Project: Albany Wind Energy Facility (Grahamstown, EC)

CAROLINE ANN BEER (NÉE EVANS)
Curriculum Vitae

Role: Project Manager and Report Production

- Project: Umsobomvu Wind Energy Facility (Middelburg, EC / Noupoort, NC)
Role: Project Manager and Report Production
- Project: Waainek Wind Energy Facility Post-Construction Bird and Bat Monitoring (Grahamstown, EC)
Role: Project Manager and Report Production
- Project: Dassiesridge Wind Energy Facility (Uitenhage, EC)
Role: Project Manager and Report Production
- Project: Waalhoek Wind Energy Facility (Utrecht, KZN)
Role: Project Manager and Report Production
- Project: Waalhoek Wind Energy Facility (Utrecht, KZN)
Role: Project Manager and Report Production
- Project: Great Kei Wind Energy Facility (Komga, EC)
Role: Assistant Project Manager and Report Production
- Project: Doordraai Citrus Plantation (Cookhouse, EC)
Role: Project Manager and Report Production
- Project: Fishwater Flats WWTW Biogas (Port Elizabeth, EC)
Role: Report Production
- Project: Olivewood Golf and Residential Estate (Chintsa, EC)
Role: Report Production

BASIC ASSESSMENTS:

- Project: Albany Powerline (Grahamstown, EC)
Role: Project Manager and Report Production
- Project: Scarlet Ibis Wind Energy Facility (NMBM, EC)
Role: Project Manager and Report Production
- Project: Grey Jade Waterfall Feedlot Biogas (Berlin, EC)
Role: Project Manager and Report Production
- Project: Black Lite Solar 5MW PV (Berlin, EC)
Role: Project Manager and Report Production
- Project: Sitrusrand Kirkwood Citrus (Kirkwood, EC)
Role: Project Manager
- Project: Kareekrans Middleton Pivot (Middleton, EC)
Role: Project Manager
- Project: Ultsig Boerdery Kirkwood Citrus (Kirkwood, EC)

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Curriculum Vitae

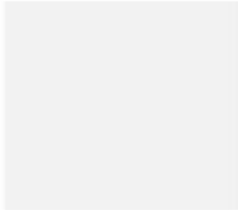
Role: Project Manager

OTHER REPORTS:

- Project: Eastern Cape Biofuels Strategic Environmental Assessment (EC)
Role: Report Production
- Project: Coega Industrial Development Zone (EC)
Role: Report Production
- Project: Umsobomvu WEF EA Amendments (EC & NC)
Role: Project Manager and Report Production
- Project: Dassiesridge WEF EA Amendments (EC)
Role: Project Manager and Report Production
- Project: Great Kei WEF EA Amendments (EC)
Role: Project Manager and Report Production
- Project: Ukomeleza WEF EA Amendments (EC)
Role: Project Manager and Report Production
- Project: Motherwell WEF EA Amendments (EC)
Role: Project Manager and Report Production
- Project: Golden Valley II WEF EA Amendments (EC)
Role: Project Manager and Report Production
- Project: Peddie WEF and PV EA Amendments (EC)
Role: Project Manager and Report Production
- Project: Nqamakwe WEF and PV EA Amendments (EC)
Role: Project Manager and Report Production
- Project: Thomas River Renewable Energy Facility EA Amendments (EC)
Role: Project Manager and Report Production
- Project: Qunu WEF and PV EA Amendments (EC)
Role: Project Manager and Report Production

SPECIALIST REPORTS:

- Project: Umsobomvu Wind Energy Facility (Middelburg, EC / Noupoort, NC)
Role: Visual Impact Assessment
- Project: Dassiesridge Wind Energy Facility (Uitenhage, EC)
Role: Visual Impact Assessment
- Project: Great Kei Wind Energy Facility (Komga, EC)
Role: Visual Impact Assessment
- Project: Waaihoek Wind Energy Facility (Utrecht, KZN)

CAROLINE ANN BEER (NÉE EVANS)
Curriculum Vitae

Role: Visual Impact Assessment & Wetland Impact Assessment

- Project: Olivewood Golf and Residential Estate (Chintsa, EC)
Role: Visual Impact Assessment
- Project: Oyster Bay Wind Energy Facility (Oyster Bay, EC)
Role: Wetland Impact Assessment

CERTIFICATION

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes me, my qualifications, and my experience. I understand that any wilful misstatement described herein may lead to my disqualification or dismissal, if engaged.

**CAROLINE ANN EVANS**

Date: February 2022

LUNGA MBULANA
Curriculum Vitae**CONTACT DETAILS**

Name of Company	CES – Environmental and Social Advisory Services
Designation	Environmental Consultant East London
Profession	Environmental consultant
Years with firm	1 (One) Year
E-mail	l.mbulana@cesnet.co.za
Office number	+27 (0)43 726-7809
Mobile	+27 (0)83 379-9861
Nationality	South African
Professional Body	➤ SACNASP: South African Council for Natural Scientific Profession
Key areas of expertise	➤ Environmental Impact Assessments ➤ Basic Assessment reports ➤ Water Quality Monitoring ➤ Environmental Management Plans ➤ Public Participation Process ➤ Environmental management systems, auditing and due-diligence

PROFILE

Lunga is an environmental consultant in the East London branch of CES. In addition, Lunga holds a BSc degree with majors in environmental and water science, geology and biodiversity and conservation as well as a BSc Honours degree in Environmental and Water Science from the University of Western Cape. Lunga's research provided an understanding of geomorphic processes of hillslope-channel relationships in the Silvermine valley catchment, Western Cape. She is a registered scientist with SACNASP. She has assisted in Basic Assessment Reports, Environmental Management Plans as well as the Public Participation Processes. Lunga is interested in all aspects of environmental quality management.

LUNGA MBULANA
*Curriculum Vitae***EMPLOYMENT
EXPERIENCE**

- January 2022 – Present: Environmental Consultant (EOH Coastal & Environmental Services, East London, South Africa)
- January 2019- December 2021: Environmental Officer (Eastern Cape Department of Public Works and Infrastructure- Joe Gqabi region, South Africa)
- December 2017- December 2018: Environmental Science Trainee (Eastern Cape Department of Economic Development, Environmental Affairs and Tourism- Joe Gqabi, South Africa)
- April 2016 – December 2017: Environmental Science Graduate (Eastern Cape Department of Public Works- Joe Gqabi region, South Africa)

**ACADEMIC
QUALIFICATIONS**

- B.Sc. Hons. Environmental and Water Science – University of the Western Cape 2016
- B.Sc. Environmental and Water Science- University of the Western Cape 2014

**EMPLOYMENT
EXPERIENCE****Project Management**

- Conducted the coordination of appointed consultants and engineer project teams.
- Performed project administration duties which included compiling tender documentation, score sheets and presentations to BID committees.
- Committed and submitted payments to finance. Environmental auditing
- Project administration of projects via tendering processes and presenting project to BID committees for approval.
- Performed an environmental perspective advisory role for landscaping projects
- Assessed implementation of existing integrated environmental, health and safety management system:
- Maintained, reviewed and reported on safety performance in the department
- Applied NEMA legislation during the rehabilitation of construction projects post the close-out stage.

Environmental Management

- Utilised GIS (Geographical Information Systems) to assess project impacts and project no-go areas by implementing GIS buffer zones.
- Conducted environmental impact assessment reviews of environmental impact assessment reports and applications for environmental authorisation.
- Completed administration of all incumbent environmental impact assessment applications on NEAS.
- Conducted review of compliance audit reports of environmentally authorised projects.
- Liaised with and advised municipalities regarding compliance to environmental legislation and provided inputs on municipal operational documentation i.e., Spatial Development Framework, Land-Use Management Schemes, municipal by-laws etc.
- Conducted environmental awareness campaigns including environmental legislation dissemination contact sessions to inform stakeholders of technical, legislative and policy changes.

LUNGA MBULANA
*Curriculum Vitae***CONSULTING
EXPERIENCE****Waste Management**

- Managed project to develop Integrated Waste Management Plans for six local municipalities on behalf of the Sarah Baartman District Municipality in the Eastern Cape Province (2016).
- Reviewed waste applications and municipal waste management documentation such as Waste By-Laws, Integrated Waste Management Plans.
- Monitored compliance progress of Waste License Holders on SAWIC.
- Coordinated monitoring of waste management funded projects.
- Planned and implemented training for waste data collection at landfill without weighbridge to determine daily, monthly, and annual waste tonnage.
- Conducted waste management facilities audits.

In the environmental management and assessment field Hlumela has been team member for the following projects -

General:

- East London Industrial Development Zone- Water Quality Monitoring project (Fieldwork and report writing)
- Proposed Residence at Lido Avenue Nahoon River (Report writing)
- Proposed Residence at Bonnie Doon, Nahoon River (Report writing)
- Proposed refurbishment of the Senqu Rural Water Supply Scheme (assistance with PPP)

CERTIFICATION

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes me, my qualifications, and my experience. I understand that any wilful misstatement described herein may lead to my disqualification or dismissal, if engaged.

**LUNGA MBULANA**

Date: January 2022