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FINAL ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

Proposed Installation of Battery Energy Storage System (BESS) at the Graafwater Substation near Graafwater, Western Cape

Report No: 19108-04-Rep-001-Graafwater FEMPr-Rev0

Submitted to:

Department of Environmental, Forestry and Fisheries
Environment House,
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South Africa

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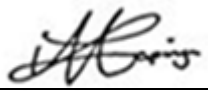
DOCUMENT APPROVAL

ACTION	DESIGNATION	NAME	DATE	SIGNATURE
Prepared	Junior EAP	Jessica Morwasehla	08 October 2020	
Reviewed/ Approved	Project Manager	Tebogo Mapinga	06 November 2020	

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LIST OF ACROYNYMS

Acronym	Description
BA	Basic Assessment
BAR	Basic Assessment Report
BESS	Battery Energy Storage System
CA	Competent Authority
DEA&DP	Department of Environmental Affairs and Development Planning
DEFF	Department of Environment, Forestry and Fisheries
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EO	Environmental Officer
MS	Method Statement
NEMA	National Environmental Management Act 107 of 1998 (as amended)
NEMWA	National Environmental Management Waste Management Act 59 of 2008
NWA	National Water Act 36 of 1998
OHS	Occupational Health and Safety Act 85 of 1993
PAIA	Promotion of Access to Information Act 2 of 2000
PM	Project Manager
PPE	Personal Protection Equipment
PPP	Public Participation Process
SANRAL	Spatial Planning & Land Use Management
SAHRA	South African Heritage Resources Agency

GLOSSARY OF TERMS

Term	Description
Alien species	A species that is not indigenous to the area or out of its natural distribution range.
Alternatives	Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.
Alternatives	Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.
Ambient sound level	Background noise level already present in the environment (in the absence of noise generated by any other proposed development).
Assessment	The process or collecting, organising, analysing, interpreting and communicating information which is relevant.
Commencement	The start of any physical activity, including site preparation and any other activity on site resulting in the furtherance of a listed activity or specified activity, but does not include any activity required for the purposes of an investigation or feasibility study as long as such investigation or feasibility study does not constitute a listed activity or specified activity.
Commissioning	Commissioning commences once construction is completed. Commissioning covers all activities including testing after all components of the power station are installed.
Construction	Construction means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity. Construction begins with any activity which requires Environmental Authorisation.
Construction Activity	A Construction activity is any action taken by the Contractor, his subcontractors, suppliers or personnel during the Construction process.
Contractor	Any legal entity or consortium contracted to undertake the activity associated with the proposed project.
Decommissioning	Means to take out the active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily re-commissioned.
Development	Means the building, erection, construction or establishment of a facility, structure or infrastructure, including associated earthwork or borrow pits, that is necessary or for the undertaking of a listed or specified activity but excludes any modification, alteration or expansion of such a facility, structure or infrastructure, including associated earthworks or borrow pits, and excluding the redevelopment of the same facility in the same location, with the same capacity and footprint.
Development footprint	Means any evidence of physical alteration as a result of the undertaking of any activity.
Environment	Environment means the surroundings within which humans exist and that are made up of – (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	Element of an organization's activities or products or services that can interact with the environment.
Environmental Control Officer (ECO)	The person to be appointed by the Contractor, with the approval of the Engineer, to oversee the construction activities and to ensure that all environmental specifications and EMPr obligations are met during these

Term	Description
	phases. The ECO will be responsible for the monitoring, reviewing and verifying of compliance with the EMPr by the Contractor.
Environmental Assessment Practitioner	Individual responsible for the planning, management, coordination or review of Environmental Impact Assessments, Strategic Environmental Assessments, Environmental Management Programmes or any other appropriate environmental instruments introduced through regulations.
Environmental Impact	Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects.
Habitat	The place in which a species or ecological community occurs naturally.
Hazardous waste	Any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment (Van der Linde and Feris, 2010; pg 185).
Heritage	That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act of 2000
Indigenous	All biological organisms that occurred naturally within the study area prior to 1800
Interested and Affected Party	Interested and Affected Party for the purposes of Chapter 5 of the NEMA and in relation to the assessment of the environmental impact of a listed activity or related activity, means an interested and affected party contemplated in Section 24(4)(a)(v) of the NEMA and which includes - a) Any person, group of persons or organisation interested in or affected by such operation or activity; and b) Any organ of stale that may have jurisdiction over any aspect of the operation or activity.
Maintenance	Means actions performed to keep a structure or system functioning or in service on the same location, capacity and footprint.
Pollution	Pollution means 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.
Pre-construction	The period prior to the commencement of construction, which may include activities (e.g. geotechnical surveys) which do not require Environmental Authorisation.
Significant impact	An impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment.
Waste	Any substance, whether or not that substance can be reduced re-used, recycled and recovered; that is surplus, unwanted, rejected, discarded, abandoned or disposed of which the generator has no further use for the purposes of production. Any product which must be treated and disposed of, that is identified as waste by the minister of Environmental affairs (by notice in the Gazette) and includes waste generated by the mining, medical or other sectors, but: A by-product is not considered waste, and portion of waste, once re-used, recycled and recovered, ceases to be waste.

1 INTRODUCTION AND BACKGROUND

Eskom Holdings SOC Limited (herein to as Eskom) has proposed the establishment of on-site Electrical Energy Storage (EES) for integrating intermittent renewable energy sources at various substations throughout the Western Cape. The EES is becoming increasingly important for integrating renewable energy sources, assisting to better balancing the grid. The complete EES system may be either provided as a single, self-contained enclosure, containing all essential systems and sub-system, or a distributed system, with a series of discrete sub-systems electrically connected on-site to form a complete system or a combination of the above-mentioned technology.

The proposed method of storage and integrating with the electricity grid is through the installation of proposed Battery Energy Storage Systems (BESS). The BESS will consist of an electrolyte (varying from zinc-bromide, vanadium, lithium ion and other lead-acid containing substances) and will be filled on site during the construction period. The substances will be kept in the electrolyte for a short period.

This Environmental Management Program details the specifications and requirements identified for the Graafwater Substation.

2 GENERAL OBJECTIVES AND PURPOSE OF EMPr

ESKOM (applicant) together with the contractors appointed to undertake the development and installation activities will be required to:

- Manage and operate their activities with due care and diligence;
- Avoid and/or limit any adverse impacts they may have on the environment by the proper design and construction of the proposed development;
- Control predicted impacts that may occur so as to meet acceptable standards, both as a legal and a moral responsibility to the environment within which they operate; and
- Ensure transparency in their operation and environmental management of the site.

This Environmental Management Programme (EMPr) serves as a stand-alone document to be issued to and used by ESKOM (applicant), the contractor/s, sub-consultants and project managers (PMs) /supervisors during the construction and operational phases of the project. By its very nature, the EMPr is a dynamic document and updating may be required over the life of the development.

3 DOCUMENT ROADMAP

The EMPr document has been structured and collated to conform to Section 19(4) read with Appendix 4 of the National Environmental Management Act 107 of 1998 (NEMA) (as amended) Environmental Impact Assessment (EIA) Regulation 2014. The relevant document parts which addresses each of the aspects provided in Appendix 4 of the NEMA EIA Regulation 2014 is provided in Table 3-1. This has been done to ensure that the Competent Authority (CA) (i.e.

DEA) is provided with a comprehensive document that can be translated into a working / dynamic document during the Construction and Operational Phases of the proposed project.

Table 3-1: Document Roadmap

Relevant regulation, stipulation or condition			Relevant Document Part
Appendix 4			
1. An EMPr must comply with section 24N of the Act and include-			
(a)	details of -		
	(i)	the EAP who prepared the EMPr; and	Section 5
	(ii)	the expertise of that EAP to prepare an EMPr, including curriculum vitae;	Section 5
(b)	a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;		Section 4
(c)	prepared map at an appropriate scale which superimpose the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;		Section 4
(d)	assessment description of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including-		
	(i)	Planning and design;	Section 10
	(ii)	Pre-construction activities;	Section 10
	(iii)	Construction activities	Section 10
	(iv)	Rehabilitation of the environment after construction and where applicable post closure; and	Section 17
	(v)	Where relevant, operational activities	Section 10
(e)	a description and identification of impact management outcomes required for the aspects contemplated in paragraph (d);		Section 10
(f)	a description of the proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable, include actions to-		
	(i)	Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	Section 10 & 15
	(ii)	Comply with any prescribed environmental management standards or practices;	Section 7
	(iii)	Comply with any applicable provisions of the Act regarding closure, where applicable; and	Not applicable
	(iv)	Comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	Not applicable
(g)	the method of monitoring the implantation of the impact management actions contemplated in paragraph (f);		Section 10, 14, 15 & 16
(h)	the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);		Section 15
(i)	an indication of the persons who will be responsible for the implementation of the impact management actions;		Section 9 & 15
(j)	the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;		Section 15
(k)	the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);		Section 11 & 15 & 16

Relevant regulation, stipulation or condition			Relevant Document Part
(l)	a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;		Section 16
(m)	an environmental awareness plan prescribing 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	Section 13
	(ii)	Risks must be dealt with in order to avoid pollution or the degradation of the environment; and	Section 15
(n)	any specific information that may be required by the competent authority		Not Applicable

4 PROJECT DESCRIPTION

4.1 Study Area

Description of the Study Area

The proposed development site lies in the existing Graafwater Substation. The existing substation site is void of vegetation and the ground is covered in fire-retardant gravel, which is characteristic of all substations as a fire risk aversion factor. The substation is surrounded by actively cultivated agricultural lands and therefore all vegetation features within the immediate surrounding area has been transformed to suit the land use. The northern and southern boundary areas of the substation site include a small amount of natural vegetation, but not of any significant amount to warrant a formal conservation effort nor to warrant development restrictions on the substation.

Table 4-1: Description of the proposed site in terms of the optimised layout

	DESCRIPTION
Farm Name	Portion 25 of Farm Bueroskraal 220,
SD Code	C02000000000022000025
Development Footprint	0.45ha
Co-ordinates	Laydown Area Corner Co-ordinates 32° 10'57.72" S 18° 35'57.69" E Battery storage area Co-ordinates 32° 10'58.14" S 18° 35'57.46" E 32° 10'58.05" S 18° 35'59.41" E 32° 10'56.87" S 18° 35'59.32" E 32° 10'55.98" S 18° 35'57.34" E Battery storage area Central Co-ordinates 32° 10'57.31" S 18° 35'58.29" E
Municipality	Cederberg Local Municipality
District Municipality	West Coast District Municipality
Ward Number	Ward 4
Land Zoning	Agriculture
Access to the site	The project site can be accessed off local road, off R364, south of Graafwater.
Nearest Towns	~3.3km from Graafwater and ~27.55km from Clanwilliam

Figure 4-1: Locality Map

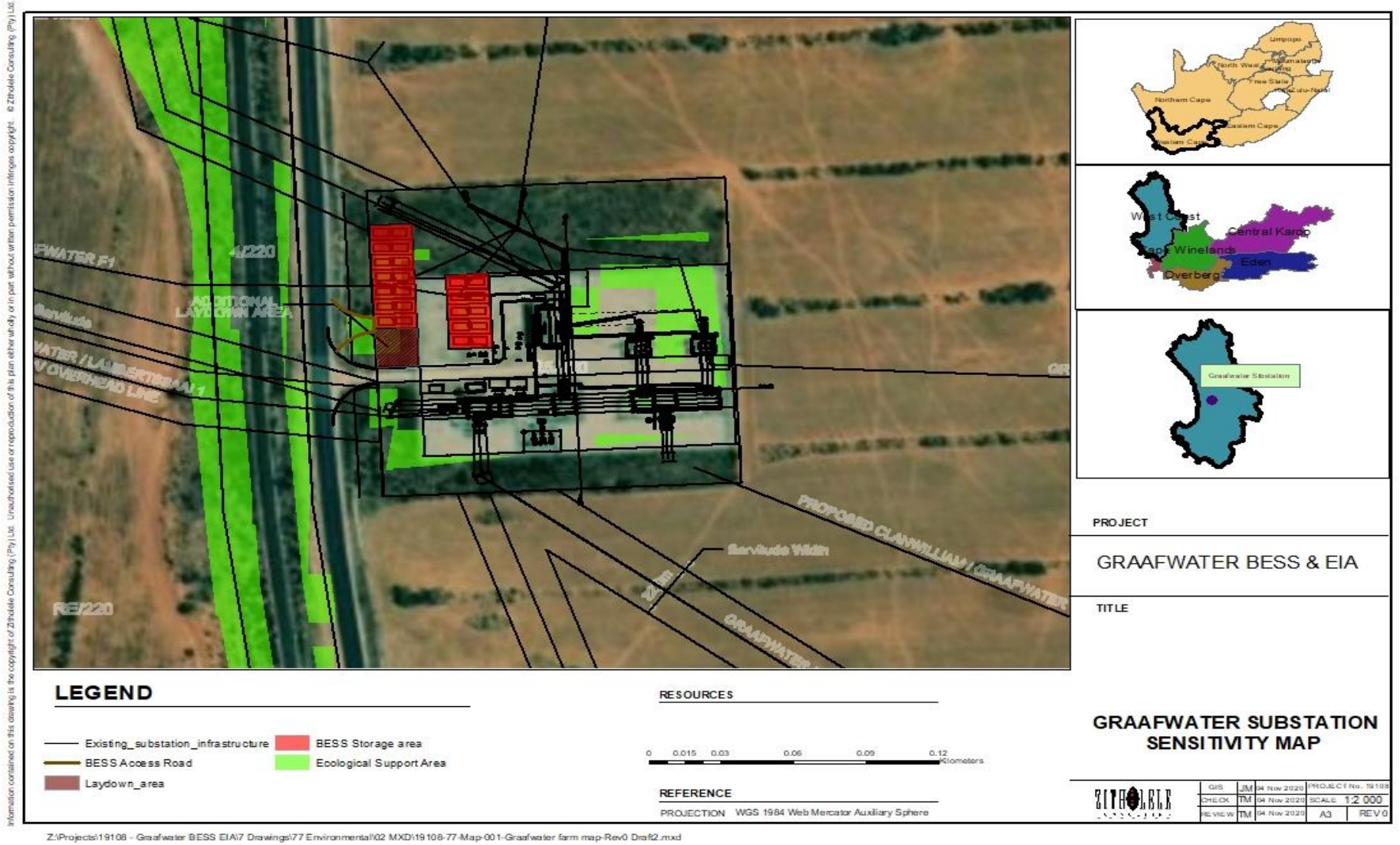

Figure 4-2: <u>Sensitivity Map of the Optimised Layout</u> (refer to Appendix B for a A3 Map)

4.2 Project Activities

Eskom proposes to install grid-scale battery storage at the existing Graafwater Substation site, mainly as opportunity for capital deferment, which would otherwise require Eskom to embark on normal network strengthening through building new networks and major refurbishments. The proposed development will also include the following infrastructures:

- Network integration equipment (e.g. power cables, control cables, isolators, circuit breakers, transformers, etc.) will be required to connect the new BESS to existing infrastructure at the substations.
- A 3-tier fencing around the BESS site will be used, security equipment, lighting, and/or control room upgrades.
- New platforms will be built for the BESS as the current proposed area is not suitable.
- Existing access roads to the substations may also need to be lengthened, realigned or upgraded to ensure easy access to the BESS, specifically for low-bed trucks during construction to deliver and install the BESS containers onto the platform.
- An additional access road directly to the BESS site will be constructed to ensure easy access and safety of movement.
- A temporary laydown area and site camp will be required during construction.
- Underground cables connecting the BESS to the substation and feeder bay extensions.
- Storm-water management measures to be implemented on site.
- Installation of lightning masts.

Need and desirability

The project forms part of the World Bank funding set of criteria for the Major Build program and requires a carbon friendly alternative to be implemented in Eskom as an alternative to the Kiwano CSP project. The project is thus required to connect an equivalent of a 100 MW of Renewable Energy plant, with a capacity of at least 525 GWh per year. Furthermore, according to a high-level analysis of constrained feeders within the distribution business, current feeder levels do not meet the required voltage and thermal characteristics as required by its license conditions.

Eskom has therefore proposed BESS to provide ancillary support in terms of enhanced frequency control of the network, reactive power support and improved quality of supply performance near existing Distributed Generation Renewable Energy plants. The Battery Storage technology may enable the immediate levels of constraint to be addressed and provide continued access to potential customers to these networks. The battery storage technology will also improve the quality of supply and mitigate voltage related concerns on the networks. The Battery Storage technology may also enable some significant strengthening investments to be deferred, whilst providing a reliable and effective interim solution to the problems faced on the Distribution Networks.

Electricity generation from renewable sources are limited by the intermittency and variability of wind and solar resources, i.e. when wind blows and sun shines. Energy storage allows for the storing of electricity for later use even when the renewable resource is unavailable. The process involves the conversion of electrical energy into another form of energy such as chemical or kinetic energy, store it temporarily and then converted back to electrical energy, therefore giving the utility considerable flexibility and control.

4.3 Description of Project Component

4.3.1 Pre-Construction and Construction process for the proposed development

The construction of the proposed development will be undertaken in the following steps:

- Undertaking and completion of proposed development concept;
- Obtain the relevant permits and siting approval (Undertake the EIA Process, obtain permits from local authorities, landowners, fire department, etc.);
- Pre-Construction site work, such as geotechnical investigations;
- Undertaking of and compliance with pre-construction activities and conditions in terms of the Environmental Authorisation;
- Site preparation (Vegetation clearance);
- Installation of the batteries;
- Construction and/or installation of water supply and storm water management infrastructure; and
- Testing and commissioning.

The construction phase for the proposed project will take approximately 2 years.

4.3.2 Operational activities

After the installation and commissioning, the responsibility for safe operation and asset management will be transferred to the operational team. It should be noted that in some cases the manufacturer of certain components remains responsible for maintenance of specific components as part of a service agreement. A plan for systematic maintenance and function testing should be kept on location showing in detail how components and systems should be tested and what should be observed during testing. Visual periodical and mandatory services should be kept in place. Maintenance may be performed manually or automated. In case of manual maintenance, a higher level of safety precautions needs to be undertaken.

4.3.3 Decommissioning activities

An electrical energy storage (EES) system that does not meet the performance requirements, where repairs do not solve the problem and where change in the EES system does not lead to a profitable alternative business case, reached its end of lifecycle. Such an

ESS system should be de-installed, disassembled, removed from the site, transported, re-used/recycled. If possible, the EES system should be de-energised safely before any other steps can be taken. Before the transportation of the components, relevant safety prescripts must be in effect, to ensure that the EES system and its components are safe to transport.

5 DETAILS AND EXPERTISE OF ENVIRONMENTAL ASSESSMENT PRACTITIONER

In terms of the National Environmental Management Act, (Act 107 of 1998) as amended (NEMA) and EIA Regulations (2014), the proponent/developer must appoint an Environmental Assessment Practitioner (EAP) to undertake a BA and/or Public Participation Process (PPP) for listed activities regulated in terms of the aforementioned act. In this regard, Eskom has appointed Zitholele Consulting (Pty) Ltd as the EAP on this project to undertake the BA process for the proposed project, in accordance with the aforementioned regulations.

Zitholele is an empowerment company formed to provide specialist consulting services primarily to the public sector in the fields of Water Engineering, Integrated Water Resource Management, Environmental and Waste Services, Communication (public participation and awareness creation) and Livelihoods and Economic Development.

Zitholele Consulting has no vested interest in the proposed project and hereby declares its independence as required by the EIA Regulations (2014, as amended).

This EMPr report has been compiled by the following persons who have the relevant expertise and experience in environmental management (see attached CV in **Appendix A**):

Table 5-1: Details of EAP on this project

Name and Surname	**Tebogo Mapinga (Project Manager)**
Highest Qualification	Bsc (Zoology & Physiology)
Professional Registration	Pr.Sci.Nat. (115518)
Company Represented	Zitholele Consulting (Pty) Ltd.
Physical Address	Building 1, Maxwell Office Park, Magwa Crescent West, Waterfall City, Midrand
Postal Address	P O Box 6002, Halfway House, 1685
Contact Number	011 207 2060
Facsimile	086 674 6121

E-mail	tebogom@zitholele.co.za
Name and Surname	**Mathys Vosloo (Project Associates and peer reviewer)**
Highest Qualification	Phd Zoology
Professional Registration	Pr.Sci.Nat. (400136/12)
Company Represented	Zitholele Consulting (Pty) Ltd
Physical Address	Building 1, Maxwell Office Park, Magwa Crescent West, Waterfall City, Midrand
Postal Address	P O Box 6002, Halfway House, 1685
Contact Number	011 207 2079
Facsimile	086 674 6121
E-mail	mathysv@zitholele.co.za
Name and Surname	**Jessica Morwasehla (EAP and author of the EMPr)**
Highest Qualification	BSc Environmental and Resource Studies
Professional Registration	SACNASP Candidate. (121840)
Company Represented	Zitholele Consulting (Pty) Ltd
Physical Address	Building 1, Maxwell Office Park, Magwa Crescent West, Waterfall City, Midrand
Postal Address	P O Box 6002, Halfway House, 1685
Contact Number	011 207 2060
Facsimile	086 674 6121
E-mail	jessicam@zitholele.co.za

Specialist Teams

ZITHOLELE CONSULTING

An Ecological and Heritage Specialist were appointed by Zitholele to undertake the relevant assessments to identify assess impacts and propose appropriate mitigation and management measures for the identified impacts. The following specialist was commissioned:

- Ecological Assessment - Dr. Mathew Ross (Pr Sci Nat) of EnviRoss CC.
- Heritage Desktop Assessment – Jaco van der Walt MA (Archaeology) of HCAC

6 DETAILS OF PROJECT PROPONENT

The details of the project proponent/Developer are provided in Table 6-1 below.

Table 6-1: Proponent's details

Applicant name:	Eskom Holdings SOC Ltd
Company Registration number:	2002/015527/06
Contact person:	Mrs Justine Wyngaardt
Responsible position:	Eskom Environmental Manager
Physical address:	Eskom Road Brackenfell 7560
Telephone:	(021) 980 3112
Cell:	082 938 3479
Fax:	(086) 660 6092
E-mail:	wyngaajo@eskom.co.za

7 LEGISLATIVE FRAMEWORK

7.1 Legislative Requirements for the EMPr

In terms of Section 19(4) read with Appendix 4 of the Environmental Impact Assessment Regulations, 2014 as amended (EIA Regulations); the EMPr must comply with Section 24N of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) as amended and include.

The implementation of the EMPr for the proposed activity is a requirement by the NEMA EIA Regulations (2014) and is likely to similarly be a condition in the Environmental Authorisation (assuming such), issued by the DEFF. As such, failure to comply with this EMPr will constitute an offence and the client and their Contractor may be liable to penalties and/or legal action. Therefore, it is important for all the responsible parties to understand their duties and undertake them with duty and care.

7.2 Other Applicable Legislation

The client is responsible for compliance with the provisions for duty of care and remediation of damage in accordance with Section 28 of NEMA and its obligations regarding the control of emergency incidents in terms of Section 30 of NEMA. Accordingly, the DEFF and DEA&DP must immediately be notified of an incident as defined in subsection 30(1) (a) of NEMA.

Various environmental legislation and policies relate to the proposed activities, including the following listed in Table 7-1.

Table 7-1: List of Applicable Legislation

Title of legislation, policy or guideline:	Administering authority:	Promulgation Date:
National Environmental Management Act, 1998 (Act No. 107 of 1998 as amended).	National & Provincial	27 November 1998
The Constitution of the Republic of South Africa (Act 106 of 1998)	The Judiciary	18 December 1996
NEMA Environmental Impact Assessment (EIA) Regulations 2014, as amended in April 2017 (published in Government Notice No. R.326)	Department of Environmental Affairs (DEA)	4 December 2014, amended on the 07 April 2018
National Water Act 36 of 1998 (NWA)	Department of Water and Sanitation (DWS)	20 August 1998
Water Service Act 108 of 1997	DWS	19 December 1997
National Environmental Management Waste Act 59 of 2008 (as amended) (NEMWA), National Norms and standards for the Storage of Waste (GNR.926 of 29 November 2013)	DEA	10 March 2009 29 November 2013
National Environmental Management: Biodiversity Act 10 of 2004	DEA	07 June 2004
National Heritage Resources Act 25 of 1999	The South African Heritage Resources Agency (SAHRA)	28 April 1999
Applicable by-laws of the Cederberg Local Municipality.	Cederberg Local Municipality	n/a

7.3 List of activities associated with the project

The activities that are associated with the proposed project trigger activities listed in Government Notice No. R.983 (2014). As set out in Regulations 19 of the National Environmental Management Act (NEMA) Environmental Impact Assessment Regulations, 2014, the proposed project is subjected to a BA Process (Government Notice No. R.982). Zitholele Consulting (Pty) Ltd has therefore been appointed as the independent EAP to undertake the BA Process for the proposed Project.

The BAR will be submitted to the DEFF for licensing of the listed activity triggered as indicated in Table 7-2 below:

Table 7-2: Detailed description of the listed activity associated with the project

Indicate the number of the relevant Government Notice:	Activity No (s) (relevant notice): e.g. Listing notices 1, 2 or 3	Describe each listed activity as per the wording in the listing notices:
GN R983 08 Dec 2014 (as amended)	14 (Listing Notice 1)	The proposed development entails the storage and handling of dangerous good where the storage contained will have a combined capacity of 80 cubic metres or more and not exceeding 500 cubic metres. The Solid State (Lituim Ion Batteries) utilize both lithium and heavy metals (typically cobalt or Manganese) in the reaction required to store energy. The chemical composition of these types of technologies is considered hazardous, containing toxic materials. All the batteries will be containerized and makes provision for secondary containment to accommodate any spill as a result of normal operation and maintenance.

8 ORGANISATION STRUCTURE

The organisational structure identifies and defines the responsibilities and authority of the various role-players (individuals and organisations) involved in the project. All instructions and official communications regarding environmental matters shall follow the organisational structure shown in **Figure 8-1** below.

The organisational structure reflected in **Figure 8-1** has been developed to ensure that:

- There are clear channels of communication;
- There is an explicit organisational hierarchy for the integration project; and
- Potential conflicting or contradictory instructions are avoided.

In terms of the defined organisational structure reflected in **Figure 8-1** below, all instructions that relate to environmental matters will be communicated to the Contractor via the Environmental Officer (EO). The only exception to this rule would be in an emergency situation. An emergency is defined as a situation requiring immediate action and where failure to intervene timeously would, in the reasonable opinion of the Environmental Control Officer (ECO), result in unacceptable environmental degradation. In emergency situations instructions may be given directly to the Contractor. The detailed roles and responsibilities of the various role-players identified in the organisational structure are outlined in **Section 9**.

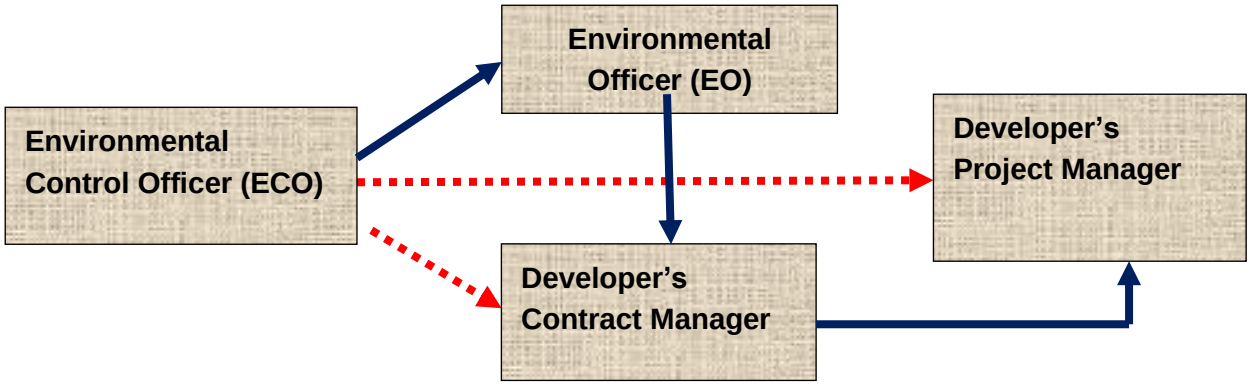

Figure 8-1: Organisation Structure for Environmental Reporting

9 ENVIRONMENTAL ROLES AND RESPONSIBILITIES

The Contractor, for the proposed development and installation, shall be responsible for ensuring compliance with the provisions contained in the EMPr, and shall be held accountable in terms of the EMPr. The detailed roles and responsibilities of each of these organisations are outlined below.

9.1 Department of Environment, Forestry and Fisheries

As the CA, the DEFF has the responsibility to ensure that the developer complies with the conditions of the EA for this proposed project (once received) as well as the requirements of the broader environmental legislation, specifically the NEMA. Compliance would be confirmed via the following mechanisms:

- Receipt and review of the environmental reporting required in terms of the EA; and
- *Ad hoc* and planned site inspection by the DEA Compliance and Enforcement.

The successful implementation of this EMPr requires cooperation between the Developer (Eskom Holdings SOC Ltd.), project manager, the appointed contractors and the appointed ECO.

9.2 General roles and responsibilities

General roles and responsibilities have been outlined below (Table 9-1) and the project team is required to comply with the conditions defined herein.

Table 9-1: Roles and Responsibilities

Responsible Agent	Role/Responsibility
Monitoring Authority	The National Department of Environmental Affairs (DEA) is the designated authority responsible for authorising this EMPr. DEA

Responsible Agent	Role/Responsibility
DEFF	has overall responsibility for ensuring that the Applicant complies with the conditions of Environmental Authorisation and the EMPr. DEA shall also be responsible for approving any amendments to the EMPr (if required). DEA may also perform random site inspections to check compliance with the EMPr.
Developer	The Developer has overall responsibility for ensuring that its operations are undertaken in an environmentally sound and responsible manner, and in particular, reflects the requirements and specifications of the EMPr and recommendations from the relevant authorities. The responsibilities of the Project Developer will be to: • appoint or designate a suitably qualified PM to manage the implementation of the proposed development; • Establish and maintain regular and proactive communications with the designated/ appointed PM, Contractor(s) and ECO; and • Ensure that the EMPr is reviewed and updated as necessary. <u>Reporting Structure:</u> The Developer will liaise with and/or take instruction from the following: • Authorities; • ECO; and • General Public.
ECO	ECO should be a suitably qualified person and should: • Ensure that contractors receive copies of the EMPr, Environmental Authorisation and all agreed Method Statements; • Provide on-site guidance, surveillance and reporting commensurate with the project phase/progress; • Undertake frequent site visits and record key findings. This includes photographic monitoring of the construction site and an evaluation of the implementation, effectiveness and level of compliance of on-site construction activities with the EMPr and associated plans and procedures; • Attend monthly project meetings; • Instruct EO or Contract Manager or Eskom's appointed PM on actions or issues impacting on the environment and provide appropriate site instructions to address and rectify these matters; • Record and provide written documentation of non-conformances with the EMPr and require Eskom to undertake mitigation measures to avoid or minimise any adverse impacts on the environment or report required changes to the EMPr; • Review corrective and preventative actions to ensure

Responsible Agent	Role/Responsibility
	implementation of recommendations made from audits and site inspections; • Order the Contractor to suspend part or all of the works if the Contractor and/or any sub-contractors, suppliers, etc. fail to comply with any aspect of either the EMPr or EA; • Identify possible areas of improvement; • Ongoing assessment of the suitability or effectiveness of the EMPr and make concomitant recommendations; • Submit monthly environmental audit reports to DEA (or as per conditions of EA) during the construction phase; • Monitor and record the processing of public complaints and their resolution relating to the construction activities; and • Ensure that updates to the EMPr (as necessary) are implemented.
Construction Contractor (CC) / Appointed EO	The Construction Contractor must: • Appoint a EO to interpret the EA and EMPr on behalf of the Construction Contractor *inter alia* to ensure appropriate environmental awareness and training to achieve conditions of the EA and EMPr; • Ensure that all construction staff, sub-contractors, suppliers, etc. are familiar with, understand and adhere to the EMPr, EA and all agreed Method Statements (Environmental Awareness Plan) per their job function; • Ensure that all facets of the work undertaken are properly and competently directed, guided and executed during construction according to the EMPr; • Ensure construction of the facility to contractual environmental specifications; and • Adherence to laws and standards relevant to the construction of the facility.
PM	The primary role of the PM will to ensure that the Contractor and Developer comply with the environmental specifications in the EMPr. The PM shall further: • Oversee the general compliance of the Contractor with the EMPr and other pertinent site specifications; and • Liaise between and with the Contractor (including EO) and ECO on environmental matters, as well as any pertinent engineering matters where these may have environmental consequences. In addition, the PM shall: • Designate or appoint a suitably qualified Environmental Manager (EM) that will manage all environmental aspects on behalf of the PM and the Developer; • Assume overall responsibility for the effective implementation and administration of the EMPr; • Be familiar with the contents of the EMPr, and his role and responsibilities as defined herein;

Responsible Agent	Role/Responsibility
	• Ensure that the EMPr is included in the Contractor's contract; • Communicate to the Contractor, verbally and in writing, the advice of the ECO and the contents of the ECO reports; • In conjunction with the EO; undertake regular inspections of the Contractor's site as well as the installation works in order to check for compliance with the EMPr in terms of the specifications outlined therein. Inspections shall take place at least once a week during construction and copies of the weekly monitoring checklist will be contained in the file; • Issue site instructions giving effect to the ECO requirements where necessary; • Keep a register of all complaints and incidents (spills, injuries, complaints, legal transgressions, etc.) and other documentation related to the EMPr; • Report to the ECO any problems (or complaints) which cannot first be resolved in co-operation with the Contractor(s); • Implement recommendations of possible audits; • Implement Temporary Work Stoppages as advised by the ECO, where serious environmental infringements and non-compliances have occurred; • Facilitate proactive communication between all role-players in the interests of effective environmental management; and • Ensure that construction staff is trained in accordance with requirements of the EMPr. <u>Reporting Structure:</u> The PM will report to the Developer, as and when required.

10 ENVIRONMENTAL ISSUES IDENTIFIED

A specialist ecological assessment and desktop heritage assessment had been conducted for the proposed Project and a summary of the findings have been included below:

Ecology Assessment

During the field survey conducted, no Red Data Listed species were observed on site. The current ecological state of the proposed development footprint has already been subject to historical disturbances and therefor the floral community structures have already been altered. The site has already been subject to complete stripping of vegetation, landscaping, and compaction of soils and preparation of the ground with a fire-retardant inert substance (most likely to be concrete, stone paving or crushed stone (such as crushed dolerite). Although soil management is recommended the site is regarded as topographically flat, and stormwater run-off is not thought to be a significant concern. As long as the proposed

mitigation measures are implemented on site during construction, the overall impacts associated with the proposed development can be managed to be of low significance.

Overall, the impact of the proposed activity is expected to be LOW as the study site is already heavily impacted by the current and surrounding activities and land use. The activities will further be mitigated to acceptable levels. A summary of the anticipated environmental impacts associated with each of the project lifecycle phases of the proposed project that were identified during the BA Process is presented in Table 10-1 and Table 10-2 below.

Desktop Heritage Assessment

A scattered isolated Stone Age artefact and the base of a historical wine bottle were seen in the area immediately north of the substation site. However, the proposed development site is less than 5ha in extent, it is highly disturbed due to the current activities on the site and the development will be undertaken within the Graafwater Substation footprint and there are no impacts expected, therefore no further Heritage studies were undertaken on this site.

Table 10-1: Summary of Pre-Construction, Construction and Operation Phase Impacts

Proposal

Potential impacts:	**Significance rating of impacts (positive or negative):**	**Proposed mitigation:**	**Significance rating of impacts after mitigation:**	**Risk of the impact** and **mitigation not being implemented**
PRE-CONSTRUCTION				
Appointment of construction contractor	**4 – Moderate (+)**	• Ensure that unskilled labour required for the construction and installation of equipment are predominately South Africans from the surrounding communities.	**4 – Moderate (+)**	• No improvement on the unemployment conditions in the area and livelihood of the surrounding communities.
Poor communication about the project creates high expectations about the potential of job opportunities.	**3 – Low (-)**	• Caution with communication so as not to create the expectation of massive job creation	**2- Low (-)**	• Poor communication could lead to disappointment amongst community members, Labour and social unrest. While the project will create employment opportunities – the scale of the project means that not everyone will get employed
Damage to equipment or containers transportation n	**3 – Low (-)**	• Making use of accredited hazardous goods transportation companies. • Equipment properly packaged in line with regulations to facilitate safe handling, transportation and placement. • Inspection of packaging for damage. • Risk assessment to be conducted. • Route planning and obtaining all relevant permits from the local authorities. • Adhere to OEM handling and transportation instructions. • Agreement / contract with HazMat company for first response, site clean-up and rehabilitation. • All MSDS available for the BESS.	**2 – Low (-)**	• This could lead to road accident caused by driver or 3rd party; cargo not being properly secured. • Spillage of electrolytes/ dangerous substances. • Contamination of the soil, ground water and flora.
Clearing of vegetation to	**6 -**	• Limit the footprint to only areas	**6 - Moderate**	• Vegetation stripping of the infrastructure footprint

accommodate infrastructure and services	**Moderate**	necessary for the construction process. • Utilise single access roads only. • The footprint of the proposed development should be limited to the areas that already suffer transformation. • Rehabilitation of the areas that are impacted by the development outside of the ultimate infrastructure footprint will aid in abating the ecological impacts.		will be necessary to allow for the establishment of infrastructure. • This will have limited significance to the due to the site having already been historically subject to impacting features.
Loss of RDL floral species during site clearing.	**0.6 - Low**	• The occurrence of RDL floral species is highly unlikely due to the transformation of the associated habitat throughout the site.	**0.6 - Low**	• Site clearing will remove all vegetation to accommodate the infrastructure development. RDL or otherwise sensitive floral species may be included when vegetation is stripped, suffering loss of individuals. • This is highly unlikely due to the transformed nature of the footprint area and therefore thought insignificant to the project.
Loss and/or displacement of sensitive faunal species.	**0.6 - Low**	• Indiscriminate habitat destruction to be avoided and the proposed development should remain as localised as possible (including support areas and services); • Unlikely to occur due to the transformed state of the proposed construction footprint and immediate surrounding areas	**0.6 - Low**	• Site disturbances and vegetation (habitat) loss may lead to the loss of faunal species that are sensitive to disturbances. • Again, the transformed nature of the footprint area assumes that only highly adaptable and generalist species would inhabit the site and therefore thought insignificant to the project.
Destruction of nesting and/or roosting habitat for faunal species.	**4 - Moderate**	• Indiscriminate habitat destruction to be avoided and the proposed development should remain as localised as possible (including support areas and services). • Unlikely to occur due to the transformed state of the proposed construction footprint and immediate surrounding areas.	**0.6 - Low**	• Site clearing will remove all vegetation to accommodate the infrastructure development. • The transformed nature of the footprint area assumes that only highly adaptable and generalist species would inhabit the site and therefore thought insignificant to the project.

Destruction of ground-dwelling and/or sedentary fauna.	**0.6 - Low**	• Limit the footprint to only areas necessary for the construction process. • Utilise single access roads only. • Avoid indiscriminate destruction of habitat.	**0.6 - Low**	• Site clearing will remove all vegetation and habitat to accommodate the infrastructure development. Ground-dwelling fauna (e.g. Mygalomorph spiders) or ground-nesting birds may be included when vegetation is stripped, suffering loss of individuals. • Thought to have a low probability, however, due to the already-transformed nature of the proposed development site.
Destruction of sensitive habitat	**0.6 - Low**	• Indiscriminate habitat destruction to be avoided and the proposed development should remain as localised as possible (including support areas and services). • Unlikely to occur due to the transformed state of the proposed construction footprint and immediate surrounding areas.	**0.6 - Low**	• Association that the site has with CBAs and ESAs indicates that sensitive habitat units occur at the site. The proposed development site has already suffered ecological and physical transformation and therefore this is thought to be an insignificant impact.
Disturbance features that alter the vegetation structures	**0.6 - Low**	• Indiscriminate habitat destruction to be avoided and the proposed development should remain as localised as possible (including support areas and services). • Unlikely to occur due to the transformed state of the proposed construction footprint and immediate surrounding areas.	**0.7 - Low**	• Disturbances of soils will lead to altered state of vegetation structures. This will often lead to bush encroachment or establishment of exotic invasive species. • The infrastructure footprint will be permanently stripped of vegetation and maintained as such. A perimeter area will also be maintained to avert fire risks.
Habitat fragmentation resulting from infrastructure development.	**0.5 - Low**	• The habitat is already highly fragmented due to surrounding infrastructure development. The significance of this impact due to the proposed development is therefore insignificant.	**0.4 - Low**	• The proposed development site is embedded within an industrial area and therefore already suffers relatively ecological isolation. An open area occurs to the southeast, but access is hindered by a railway line. This is therefore not thought to be a significant ecological impact emanating from the proposed development.
Soil erosion.	**0.3 - Low**	• Topsoil stockpiles should be protected from erosion. Compile and implement the Stormwater	**0.3 - Low**	• Soil erosion will take affect any unprotected soils that have suffered disturbances, including unprotected stockpiles of stored topsoil.

		Management Plan and the Erosion Management Plan.		• Soil stripping, soil compaction and vegetation removal will increase rates of erosion and entry of sediment into the general environment and surrounding watercourses. • The site is relatively flat, so there will be limited risk of erosion. Stockpiled soils will, however, be at risk of dispersal.
CONSTRUCTION PHASE				
➢ **ECOLOGY**				
Damage to equipment or containers during storage and installation	**6-Moderate**	• Inspection of packaging for damage. • Risk assessment to be conducted. • Effective scheduling to limit onsite storage of equipment - site to be ready to readily accept BESS. • Proper supervision is required. • Adhere to OEM handling, transportation and storage instructions. • Agreement / contract with HazMat company for first response, site clean-up and rehabilitation. • All MSDS available for the BESS.	**0.6- Low**	• This could lead to road accident caused by driver or 3rd party; cargo not being properly secured. • Spillage of electrolytes/ dangerous substances. • Contamination of the soil, ground water and flora.
Clearing of vegetation to accommodate infrastructure and services	**6 - Moderate**	• Limit the footprint to only areas necessary for the construction process. • Utilise single access roads only. • The footprint of the proposed development should be limited to the areas that already suffer transformation. • Rehabilitation of the areas that are impacted by the development outside of the ultimate infrastructure footprint will aid in abating the ecological impacts.	**6 - Moderate**	• Vegetation stripping of the infrastructure footprint will be necessary to allow for the establishment of infrastructure. • This will have limited significance to the due to the site having already been historically subject to impacting features.
Loss of RDL floral species during site clearing.	**0.6 - Low**	• The occurrence of RDL floral species is highly unlikely due to the transformation of the associated	**0.6 - Low**	• Site clearing will remove all vegetation to accommodate the infrastructure development. RDL or otherwise sensitive floral species may be

		habitat throughout the site.		included when vegetation is stripped, suffering loss of individuals. • This is highly unlikely due to the transformed nature of the footprint area and therefore thought insignificant to the project.
Loss and/or displacement of sensitive faunal species.	**0.6 - Low**	• Indiscriminate habitat destruction to be avoided and the proposed development should remain as localised as possible (including support areas and services). • Unlikely to occur due to the transformed state of the proposed construction footprint and immediate surrounding areas	**0.6 - Low**	• Site disturbances and vegetation (habitat) loss may lead to the loss of faunal species that are sensitive to disturbances. • Again, the transformed nature of the footprint area assumes that only highly adaptable and generalist species would inhabit the site and therefore thought insignificant to the project.
Destruction of nesting and/or roosting habitat for faunal species.	**4 - Moderate**	• Indiscriminate habitat destruction to be avoided and the proposed development should remain as localised as possible (including support areas and services). • Unlikely to occur due to the transformed state of the proposed construction footprint and immediate surrounding areas.	**0.6 - Low**	• Site clearing will remove all vegetation to accommodate the infrastructure development. • The transformed nature of the footprint area assumes that only highly adaptable and generalist species would inhabit the site and therefore thought insignificant to the project.
Destruction of ground-dwelling and/or sedentary fauna.	**0.6 - Low**	• Limit the footprint to only areas necessary for the construction process. • Utilise single access roads only. • Avoid indiscriminate destruction of habitat.	**0.6 - Low**	• Site clearing will remove all vegetation and habitat to accommodate the infrastructure development. Ground-dwelling fauna (e.g. Mygalomorph spiders) or ground-nesting birds may be included when vegetation is stripped, suffering loss of individuals. • Thought to have a low probability, however, due to the already-transformed nature of the proposed development site.
Destruction of sensitive habitat	**0.6 - Low**	• Indiscriminate habitat destruction to be avoided and the proposed development should remain as localised as possible (including support areas and services). • Unlikely to occur due to the	**0.6 - Low**	• Association that the site has with CBAs and ESAs indicates that sensitive habitat units occur at the site. The proposed development site has already suffered ecological and physical transformation and therefore this is thought to be an insignificant

		transformed state of the proposed construction footprint and immediate surrounding areas.		impact.
Disturbance of features that alter the vegetation structures	**0.6 - Low**	• Indiscriminate habitat destruction to be avoided and the proposed development should remain as localised as possible (including support areas and services). • Unlikely to occur due to the transformed state of the proposed construction footprint and immediate surrounding areas.	**0.7 - Low**	• Disturbances of soils will lead to altered state of vegetation structures. This will often lead to bush encroachment or establishment of exotic invasive species. • The infrastructure footprint will be permanently stripped of vegetation and maintained as such. A perimeter area will also be maintained to avert fire risks.
Habitat fragmentation resulting from infrastructure development.	**0.5 - Low**	• The habitat is already highly fragmented due to surrounding infrastructure development. The significance of this impact due to the proposed development is therefore insignificant.	**0.4 - Low**	• The proposed development site is embedded within an industrial area and therefore already suffers relatively ecological isolation. An open area occurs to the southeast, but access is hindered by a railway line. This is therefore not thought to be a significant ecological impact emanating from the proposed development.
Soil erosion.	**0.3 - Low**	• Topsoil stockpiles should be protected from erosion.	**0.3 - Low**	• Soil erosion will take affect any unprotected soils that have suffered disturbances, including unprotected stockpiles of stored topsoil. • Soil stripping, soil compaction and vegetation removal will increase rates of erosion and entry of sediment into the general environment and surrounding watercourses. • The site is relatively flat, so there will be limited risk of erosion. Stockpiled soils will, however, be at risk of dispersal.
Soil contamination, vegetation loss and vegetation disturbance due to fuel and chemicals	**4 - Moderate**	• Mitigation measures as stipulated in the EMPr must be implemented in order to prevent potential soil pollution through fuel and oil leaks and spills and then compliance monitored by an Environmental	**0.3 - Low**	• Pollution of water resources and land. • Loss of natural habitats for the biodiversity occurring in the area.

		Control Officer (ECO). • Make sure construction vehicles are maintained and serviced to prevent oil and fuel leaks. • Emergency on-site maintenance should be done over appropriate drip trays and all oil or fuel must be disposed of according to waste regulations. Drip-trays must be placed under vehicles and equipment when not in use. • Implement suitable erosion control measures. • All liquid chemical must be stored in a bundled area with a capacity of at least 110% of maximum allowable volume.		
Potential Impact Vegetation and habitat disturbance due to the accidental introduction of alien species	**4 - Moderate**	• The Contractor implements suitable methods during the construction phase to limit the introduction and spread of alien invasive plant species. • Promote awareness of all personnel. • The establishment of pioneer species should be considered with the natural cycle of rehabilitation of disturbed areas, which assists with erosion control, dust and establishment of more permanent species. This can be controlled during construction phase and thereafter more stringent measures should be implemented during the rehabilitation and post rehabilitation. • Larger exotic species that are not included in the Category 1b list of invasive species could also be	**0.3 - Low**	• Loss of natural habitats for the biodiversity occurring in the area.

		allowed to remain for aesthetic purposes.		
Vegetation and habitat disturbance due to pollution and littering during construction phase	**4 - Moderate**	• The Contractor should employ personnel on site responsible for preventing and controlling of litter. • Promote good housekeeping with daily clean-ups on site. • During construction, refresher training can be conducted to construction workers with regards to littering, ad hoc veld fires, and dumping. • No fires are allowed on site.	**0.3 - Low**	• Loss of natural habitats for the biodiversity occurring in the area.
Loss of habitat of the Leipoldtville Sand Fynbos and CBA region	**4 - Moderate**	• Vehicles and construction workers should under no circumstances be allowed outside the site boundaries to prevent impact on the surrounding vegetation. • Where possible, natural vegetation must not be cleared and encouraged to grow. • All stockpiles, construction vehicles, equipment and machinery should be situated away from the natural vegetation. • Disturbance of vegetation must be limited only to areas of construction. • Prevent contamination of natural grasslands by any pollution. • Areas cleared of vegetation must be re-vegetated prior to contractor leaving the site	**0.3 - Low**	• Loss of natural habitats for the biodiversity occurring in the area.
Damage to plant life outside of the proposed development site	**4 - Moderate**	• Construction activities should be restricted to the development footprint area and then the compliance in terms of footprint can be monitored by ECO. • Areas which could be deemed as no	**0.3 - Low**	• Loss of natural habitats for the biodiversity occurring in the area.

		go should be clearly marked.		
Disturbance to animals	**4 - Moderate**	• Animals residing within the designated area shall not be unnecessarily disturbed. • During construction, refresher training can be conducted to construction workers with regards to littering and poaching. • The Contractor and his/her employees shall not bring any domestic animals onto site. • Toolbox talks should be provided to contractors regarding disturbance to animals. Particular emphasis should be placed on talks regarding snakes.	**0.3 - Low**	• Displacement of animals.
Animal passage out of construction site	**4 - Moderate**	• Allow for safe animal passage through and specifically out of the construction site.	**0.3 - Low**	• Loss of animals within the proposed area.
The proposed construction activities may affect biodiversity through the encroachment of exotic vegetation following soil disturbance, in addition the maintenance of the area would disturb naturalised species within the area	**4 - Moderate**	• Newly cleared soils will have to be re-vegetated and stabilised as soon as construction has been completed and there should be an on-going monitoring program to control and/or eradicate newly emerging invasive species.	**0.3 - Low**	• The encroachment of exotic vegetation following soil disturbance.
Increased employment opportunities and economic growth	**4 - Moderate**	• Leverage this through procurement policies that favour local suppliers and businesses.	**2- Low**	• Infrastructure development drives economic growth and has a huge multiplier effect. Infrastructure development not only generates employment directly through construction and operations but also creates an industrial base around the development for goods and services to supply the construction workers and activities. These industries would get more entrepreneurs

				and employ more labour. These workers would purchase more goods from the markets, creating a virtuous cycle.
Creation of temporary skilled and unskilled job opportunities directly on the project	**4 - Moderate**	• It is recommended that if practical, a local employment policy is adopted to maximise the opportunities made available to the local labour force (Sourced from nearest towns or within the Cederberg Local Municipality). • The recruitment selection process should seek to promote gender equality and should aim to optimise the employment of women wherever possible. • Efforts need to be employed to enhance indirect local employment/entrepreneurship opportunities by supporting local entrepreneurs as far as possible, where appropriate.	**2- Low**	• Creating temporary skilled and unskilled job opportunities.
Temporary increase in traffic disruptions and movement patterns during the construction phase	**6- Moderate**	• Standard working hours to be implemented during the construction phase, and/or as any deviation that is approved. • Construction vehicles must be roadworthy, and drivers must be qualified, obey traffic rules, follow speed limits and made aware of the potential road safety issues. • All construction vehicles should be inspected regularly to ensure their road worthiness. • Provision of adequate and strategically placed traffic warning signs and control measures along the main access roads to warn road users of the construction activities	**1- Low**	• If mitigation measures are not implemented, the traffic disruptions will continue to impact the surrounding businesses and the nearby communities.

		taking place for the duration of the construction phase. Warning signs must be visible at all times. • Implement penalties for reckless driving for the drivers of heavy vehicles as a way to enforce compliance to traffic rules. • All roads used by the project Developer and its contractors must be maintained in good working order during the construction phase. • It is recommended that a Community Liaison Officer be appointed to implement as the proposed grievance mechanism. A method of communication should be implemented whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process		
Nuisance impacts in terms of temporary increase in noise and dust, or the wear and tear on access roads to the site	**5- Moderate**	• Dust suppression measures must be implemented for heavy vehicles on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. • Ensure all vehicles are road worthy, drivers are qualified and are made aware of the potential noise and dust issues. • It is recommended that a Community Liaison Officer should be appointed. A method of communication should be implemented whereby procedures to lodge complaints are set out in order for the local community to express any	**2- Moderate**	• If mitigation measures are not implemented the propose development will generate dust and noise and will continue to impact the surrounding businesses and the nearby communities.

		complaints or grievances with the construction process.		
Termination of temporary employment	**6 Moderate**	• N/A	**6-Moderate**	• Loss of temporary employment.
Safety and security	**4-Moderate**	• Waste streams must be identified and documented. • Waste management plan must be implemented. • Accredited waste facilities to be contracted for accepting / recycling the waste. • Working hours should be kept between daylight hours during the construction phase, and/or as any deviation that is approved by the relevant authorities. • The perimeter of the construction site should be appropriately secured to prevent any unauthorised access to the site; the fencing of the site should be maintained throughout the construction periods. • Access in and out of the construction camp should be strictly controlled • No open fires are permitted outside of designated areas. • Contractor must provide adequate firefighting equipment on site and provide firefighting training to selected construction staff. • A comprehensive employee induction programme would cover land access protocols, fire management and road safety. • The contractor should have personnel trained in first aid on site to deal with smaller incidents that	**2- Low**	• This increase the risk of a fire outbreak which will have an impact on the substation and the personal working within the premises.

		require medical attention • It is recommended that a Community Liaison Officer should be appointed to implement a grievance mechanism. A method of communication should be implemented whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process • It is recommended that a Stakeholder Engagement Plan be compiled and implemented for the construction phase of the project.		
Disturbance, damage, destruction or sealing-in of fossil remains preserved at or beneath the ground surface within the development area, most notably by bedrock excavations during the construction phase.	**1-Low**	• Monitoring of all substantial bedrock excavations for fossil remains by ECO, with reporting of substantial new palaeontological finds to SAHRA for possible specialist mitigation.	**1-Low**	• Will result in the permanent loss of any heritage features.
During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological and paleontological material or objects.	**1-Low**	• No mitigation measures are required as no sites were identified. It is recommended that a chance find procedure should be implemented for the project.	**1-Low**	• Will result in the permanent loss of archaeological and paleontological material or objects
Soil and water contamination due to the handling and storage of dangerous goods during the construction and operation phases.	**6-Moderate**	• Any spillages of dangerous substances must be contained as soon as possible, and remedial and clean-up actions initiated immediately.	**1-Low**	• May result in a fire or explosion and the contamination of soil and ground water.

		• Regular inspections of the permanent bunded areas for storage of dangerous goods must be undertaken throughout the life cycle of the project. • Appropriate spill kits must be available on site. • Maintenance vehicles must have access to spill kits. • An emergency spill response plan must be developed for implementation during the construction and the operational phase. Personnel should be suitably trained to attend to any spills that may occur. • A fire management plan must be developed for implementation during the construction and the operational phase. Personnel must be suitably trained to manage any fires which may occur on site. • Flammable substances must be stored in enclosed containers away from heat, sparks, open flames, or oxidizing materials. • Develop a monitoring and leak detection procedure for monitoring of the chemical spillages.		
OPERATION PHASE				
Vegetation transformation for areas that are routinely maintained.	**1-Low**	• The peripheral area of the substation will be routinely maintained to avert the fire risks and therefore any emergent exotic vegetation can be simultaneously managed	**0-Low**	• Routine disturbances of vegetation will result in transformation of the structures, with an expected increase in abundance of pioneering species. • The relatively small spatial scale tends to render this impact insignificant.
➢ **Storage and handling of Hazardous Substances**				
Storing and handling of	**4 -**	• Storage of chemicals to be limited to	**3 - Moderate**	• Spillages of dangerous chemicals from

dangerous chemicals	**Moderate**	appropriate and secure facilities on site and access limited to authorised personnel only. • Storage in secure containers to ensure/limit the potential for the occurrence of leakages. • Storage area to be bunded with an appropriate volume capacity to protect from environmental contamination should accidental leakages occur. • Transferal of chemicals to batteries should be done according to best practice guidelines to limit spillage. • A fire management plan must be developed for implementation during the construction and the operational phase. Personnel must be suitably trained to manage any fires which may occur on site. • Should spillage occur, the ECO must be informed immediately, and a clean-up operation immediately commenced. Contaminated soils must be cleared and removed for disposal at a registered waste site capable of disposal of the chemicals.		inadequate and unprotected storage facilities and/or spillages during routine operations will contaminate soils and lead to chemicals (heavy metals) becoming bio-available to enter into the food chain. • Chemical leachates could contaminate groundwater and/or be transported to surface water ecosystems via surface water runoff.

Table 10-2: Summary of Decommissioning Phase Impacts

NB: The impacts below have been determined for the decommissioning of the proposed construction site. All activities relating to the future decommissioning of the proposed development and the associated infrastructure does not form part of this application and as such would be subject to a separate Environmental Authorisation Process.

Id.	Impact	Description	Nature of Impact (Negative / Positive)	Management Objective / Principle	Level of Mitigation
Decommissioning Phase					
Equipment associated with the proposed Project would only be decommissioned once it has reached the end of its economic life. It is most likely that decommissioning activities of the infrastructure of the facility would comprise the disassembly and replacement of the infrastructure with more appropriate technology/infrastructure available at that time. » Site Preparation Site preparation activities will include confirming the integrity of the access to the site to accommodate required equipment, preparation of the site (e.g. lay down areas, construction platform) and the mobilisation of construction equipment. » Disassemble and Remove Infrastructure Disassembled components will be reused, recycled, or disposed of in accordance with regulatory requirements or any other requirements deemed applicable by the Original Equipment Manufacturer. .					

11 APPROACH TO CORRECTIVE ACTION

11.1 Implementation of Corrective Action

Checking and corrective action forms part of the environmental management function and is aimed at ensuring that the necessary environmental management activities are being implemented and that the desired outcomes are achieved. When non-conformities do occur that have a negative impact on the environment, these should be rectified by the implementation of corrective actions issued by the ECO and PM within a reasonable or agreed period of time. All corrective actions need to be documented and the outcome photographed and included in the next report. Broadly, the mechanisms for addressing non-compliance that are provided for in the environmental specifications and associated contract documentation can be divided into the following categories:

- Controlling performance via the certification of payments;
- Requiring the Contractor to “make good”, at their own cost, any unjustifiable environmental degradation;
- Implementing a system of penalties to dissuade environmentally risky behaviours;
- Removing environmentally non-compliant staff/ plant from site, or suspending part or all of the activities on site;
- To confirm, upon receipt of the Tender, that the Contractor has made sufficient allowance in his Tender Price for meeting the various environmental requirements; and
- During the tender adjudication process for each Contract, each Contractor should be scored in terms of the aforementioned considerations and allocated an environmental competency score. This score should form a key consideration in the final decision-making regarding the award of the various contracts.

12 METHOD STATEMENTS

A Method Statement (MS) must be compiled for every activity undertaken by the Contractor which poses a risk to the environment (natural, biophysical and social), and includes the following:

- The MS should be submitted at least 7 working days prior to the commencement of work to the ECO;
- A MS describes the scope of the intended work in a step by step description to ensure that the ECO / EO understand the Contractors intentions. This will enable them to assist in devising any mitigation measures which would minimise environmental impact during these tasks;
- The ECO may require changes to a MS if it does not comply with the specification or if, in the reasonable opinion of the ECO, the proposal may result in, or carries a greater than reasonable risk of damage to the environment in excess of that permitted by the EMPr or any legislation;
- The Contractor shall carry out the activities in accordance with the approved MS;
- Approved MS shall be readily available on the site and shall be communicated to all relevant personnel;

- Approval of the MS shall not absolve the Contractor from any of his obligations or responsibilities in terms of the contract;
- No claim for delay or additional cost incurred by the Contractor shall be entertained due to inadequacy of a MS;
- For each instance where it is requested that the Contractor submit a MS to the satisfaction of the ECO, the format should clearly indicate as a minimum the following:
    - Responsible person (Name and Identity Number) and an alternative (Name and Identity Number);
    - The applicable requirements provided in all legislation and policies which have a bearing on the proposed activities (refer to Table 7-1);
    - Training Requirements;
    - Timing of activities as per the Project / Construction Schedule;
    - Materials, plant and equipment to be used;
    - Proposed construction procedure, including the order in which the activities making up the procedure will be carried out, designed to implement the relevant environmental specifications;
    - The system to be implemented to ensure compliance with the above;
    - Person Protection Equipment (PPE) required;
    - A detailed description of the process of work, methods and materials;
    - Emergency Procedures;
    - Response in the case of a non-compliance; and
    - Other information deemed necessary by the ECO.
- All MS must be signed by the Engineer; and
- Work may not commence until the MS has been approved by the ECO. All MS will form part of the EMPr documentation and are subject to all terms and conditions contained within the EMPr main document.

The following MS shall be prepared by the Contractor for approval:

- **Site Layout**: The graphical representation with detailed notes of the location, layout and method of establishment of the construction camp must be provided and must include the following:
    - All Contractor's buildings, and/or offices;
    - Lay down areas;
    - Vehicle and plant storage areas, including wash areas;
    - Workshops, if required and approved by ECO;
    - Fuel storage and dispensing areas, if required and approved by ECO;
    - Cement/concrete batching areas, if required and approved by ECO (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);
    - Other infrastructure required for the running of the project.
- **Access Routes**: Details, including a drawing, showing where and how the access points and routes will be located and managed must be provided in a MS. Details of fences and

gates affected or used during the construction activities, including a drawing showing the location of fences and access gates must be provided.

- **Pollution control**: Expected solid waste types, quantities, methods and frequency of collection and disposal as well as location of disposal sites must be identified and stated in a MS. The MS shall further include methods of minimising, controlling, collecting and disposing of contaminated water, and details of any hazardous substances/materials to be used, together with the transport, storage, handling and disposal procedures for the substances.
- **Safety considerations**: The Contractor shall provide details identifying what safety precautions will be implemented to ensure the safety of all staff, and the general public at large, on site during the life of the project. This will include protective clothing requirements for all types of construction activities on site, including protection against dust, noise, falling objects, and work associated with electricity and working at heights.
- **Emergency procedures**: The Contractor shall provide details regarding all relevant emergency procedures that will be implemented for fire control and accidental leaks and spillages of hazardous substances (including fuel and oil). The Contractor shall further include details of risk reduction measures to be implemented including firefighting equipment, fire prevention procedures and spill kits.
- **Waste management control**: The Contractor shall provide details regarding how solid and liquid waste generated on the construction site and site camp will be collected, stored, transported and disposed of. Details of any service provider(s) appointed to manage this task must also be provided.
- **Storm water and erosion control**: The Contractor shall provide details of how storm water emanating within or adjacent to the construction site may impact on construction activities. Details on how the Contractor will deal with storm water runoff and potential erosion within the construction footprint and servitude must be provided. Details of any service provider(s) appointed to manage this task must also be provided.

13 ENVRIONMENTAL AWARENESS PLAN

Environmental awareness training is required for all personnel involved in the proposed project. This includes all employees working on the site including temporary labourers, contractors and subcontractors. The Environmental Awareness Plan is intended to describe the method that will be adopted by the proponent to inform any person acting on their behalf, including an agent, sub-contractor, employee or any person rendering a service, of any environmental risk which may result from the implementation of the project activities and the manner in which risks must be managed in order to avoid adverse environmental consequences.

Environmental awareness training should cover:

- The importance of the EMPr;
- Specific details of the EMPr;

- Employees role in compliance with the EMPr;
- Environmental effects associated with the activities;
- Training targeted at specific personnel, e.g. example operators of heavy machinery;
- 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;
- Emergency preparedness and response requirements;
- The potential consequences of departure from specified operating procedures;
- The mitigation measures required to be implemented when carrying out their work activities;
- Environmental legal requirements and obligations;
- The importance of not littering;
- The importance of using supplied toilet facilities;
- The need to use water and electricity sparingly; and
- Details of and encouragement to minimise the production of waste and re-use, recover and recycle waste where possible.

Training should be conducted by a suitably qualified person and if necessary, in more than one language to ensure it is understood by all workers. Copies of the environmental training must be available on site in languages appropriate to the work force. Records of the training sessions including attendance registers, nature of training and date of training should be kept to ensure all parties have received the necessary training and for auditing purposes.

In addition to training, general environmental awareness must be fostered among the project's workforce to encourage the implementation of environmentally sound practices throughout its duration. Environmental awareness and training is an important aspect of the implementation of the EMPr. Once the awareness plan and training material are available, the entire workforce and project management team should undergo an environmental awareness training course. Environmental awareness training is critical for the workforce to understand how they can play a role in achieving the objectives specified in the EMPr. All visitors to the site (including project team members which are not based onsite), must undergo Environmental Induction before being permitted to the construction and associated area. The Environmental Induction should be structured so as to provide a condensed version of the comprehensive Environmental Awareness Training that will be provided to the workforce / onsite staff.

Environmental awareness could be fostered in the following manner:

- Induction for all workers on site, before commencing work;
- Refresher courses as and when required;
- Daily toolbox talks at the start of each day with all workers coming on site, where workers might be alerted to particular environmental concerns associated with their tasks for that day or the area/habitat in which they are working; and

- Courses must be given by suitably qualified personnel and in a language and medium understood by workers/employees.

The Environmental Awareness Plan should be drawn up by the PM, in consultation with the ECO and EO and should be kept for implementation and audit purposes. The Environmental Awareness Plan should be a dynamic document (or set of documents) which should be updated as changes to the project, environment, staff and *etc.* occur.

14 TRAINING

The applicable training will be as follows:

- The EO shall be appropriately trained in environmental management and shall possess the skills necessary to impart environmental management skills to all personnel involved in the construction of the proposed mixed business and residential development;
- The PM and EO shall ensure, on behalf of the Developer, that the employees (including construction workers, engineers, and long-term employees) are adequately trained and understand the management measures provided in the EMPr; and
- All employees shall have an induction presentation on environmental awareness. The cost, venue and logistics shall be for Eskom's account.

Where possible, training must be conducted in the predominant mother language spoken by the employees. The induction and training shall, as a minimum, include the following:

- The importance of conformance with all the specifications of the EMPr and other environmental policies and procedures;
- The significant 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 EMPr and other environmental policies and procedures;
- The potential consequences of departure from specified operating procedures; and
- The mitigation measures required to be implemented when carrying out their work activities.

14.1 Environmental Authorisation

The ECO shall convey the contents of this EMPr and the conditions of the EA and discuss the contents in detail with the Developer's PM and Contractors. This formal induction training shall be done with all main and sub-contractors. Record of the training dates, people who attended and discussion points shall be kept by the ECO.

15 ENVIRONMENTAL MANAGEMENT MEASURES

The management measures documented in each of the sub-sections below have been compiled using the following information:

- Impact Assessment and mitigation measures documented in the BAR for the proposed establishment of a mixed business and residential development and its operations; and

- Mitigation and management recommendations provided by the specialist studies and EAP.

The mitigation and management measures relating to each anticipated impact are described in Table 15-1.

In addition to the above-mentioned information sources, the EMPr should be updated to include the conditions documented in the EA to be received upon approval of the BAR. The Developer should appoint an EAP to amend the EMPr should amendments be required by DEA.

15.1.1 Pre-Construction and Construction Phase

Preconstruction -Planning and Design Phase

Overall Goal: undertake the pre-construction (planning and design) phase in a way that:

» Ensures that the design of the Project responds to the identified environmental constraints and opportunities.
» Ensures that pre-construction activities are undertaken in accordance with all relevant legislative requirements.
» Ensures that adequate regard has been taken of any landowner and community concerns and that these are appropriately addressed through design and planning (where appropriate).
» Ensures that the best environmental options are selected for the linear components, including the power line alignment.
» Enables the Project construction activities to be undertaken without significant disruption to other land uses and activities in the area.

Construction Phase

Overall Goal: Undertake the construction phase in a way that:

» Ensures that construction activities are properly managed in respect of environmental aspects and impacts.
» Enables construction activities to be undertaken without significant disruption to other land uses and activities in the area, in particular concerning noise impacts, traffic and road use, and effects on local businesses and residents.
» Minimises the impact on the indigenous natural vegetation, and habitats of ecological value (i.e. drainage lines).
» Minimises impacts on fauna using the site.
» Minimises the impact on heritage site should they be discovered.
» Establishes an environmental baseline during construction activities on the site, where possible.

In order to meet this goal, the following impacts, responsible person have been identified, together with necessary actions and monitoring requirements. Refer to Table 15-1.

15.1.2 Construction Phase

Table 15-1: Impacts, Management/ Mitigation Measures during Pre-Construction and Construction Phase

Id.	Impact	Mitigation / Management Measures	Responsible Person	Frequency and/or Time Period	Method of Monitoring
Pre-Construction and Construction Phase					
1.	Appointment of construction contractor	Ensure that unskilled labour required for the construction and installation of equipment are predominately South Africans from the surrounding communities.	Developer	Not applicable	Not applicable
2.	Economic benefit to local economy	Ensure that unskilled labour required for the construction and installation of equipment are predominately South Africans from the surrounding communities.	Developer / Contractor	Not Applicable	Not Applicable.
3.	Increased employment opportunities and economic growth	Leverage this through procurement policies that favour local suppliers and businesses.	Developer / Contractor	Duration of Construction Phase.	Monthly ECO Audits.
4.	Creation of temporary skilled and unskilled job opportunities directly on the project	It is recommended that if practical, a local employment policy is adopted to maximise the opportunities made available to the local labour force (Sourced from nearest towns or within the Cederberg Local Municipality). The recruitment selection process should seek to promote gender equality and should aim to optimise the employment of women wherever possible. Efforts need to be employed to enhance indirect local employment/entrepreneurship opportunities by supporting local	Developer / Contractor	Duration of Construction Phase.	Monthly ECO Audits.

Id.	Impact	Mitigation / Management Measures	Responsible Person	Frequency and/or Time Period	Method of Monitoring
Pre-Construction and Construction Phase					
		entrepreneurs as far as possible, where appropriate.			
5.	Dust nuisance	Water sprays, especially on dry and windy days, on haul roads and where vegetation is being / has been cleared. Dust nuisance Complaints should be recorded in the complaints register at the construction site.	Contractor / EO / Developer / ECO	Duration of Construction Phase.	Complaints register must be kept at the construction site. No. of dust complaints received will be used to measure the effectiveness of the dust impact mitigation.
6.	Possible sedimentation from uncovered areas	Vegetation clearance should be undertaken in phases, i.e. limited to working unit at a time.	Contractor / EO / ECO	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits.
7.	Loss of ecological integrity and natural habitats	No mitigation measures proposed. However, the proposed development site has largely degraded over the years.	Not Applicable.	Not Applicable.	Not Applicable.
8.	Loss of Red Data Listed (RDL) floral species during site clearing.	The occurrence of RDL floral species is highly unlikely due to the transformation of the associated habitat throughout the site.	Contractor / EO / ECO	Duration of Construction Phase.	Monthly ECO Audits.
9.	Loss and/or displacement of sensitive faunal species.	Indiscriminate habitat destruction to be avoided and the proposed development should remain as localised as possible (including support areas and services); Unlikely to occur due to the transformed state of the proposed construction	Contractor / EO / ECO	Duration of Construction Phase.	Monthly ECO Audits

Id.	Impact	Mitigation / Management Measures	Responsible Person	Frequency and/or Time Period	Method of Monitoring
Pre-Construction and Construction Phase					
		footprint and immediate surrounding areas			
10.	Destruction of nesting and/or roosting habitat for faunal species.	Indiscriminate habitat destruction to be avoided and the proposed development should remain as localised as possible (including support areas and services); Unlikely to occur due to the transformed state of the proposed construction footprint and immediate surrounding areas.	Contractor / EO / ECO	Duration of Construction Phase.	Monthly ECO Audits
11.	Clearing of vegetation to accommodate infrastructure and services	Limit the footprint to only areas necessary for the construction process; Utilise single access roads only; The footprint of the proposed development should be limited to the areas that already suffer transformation; Rehabilitation of the areas that are impacted by the development outside of the ultimate infrastructure footprint will aid in abating the ecological impacts.	Contractor / EO / ECO	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits
12.	Damage to plant life outside of the proposed development site	Construction activities should be restricted to the development footprint area and then the compliance in terms of footprint can be monitored by Environmental Control Officer (ECO). Areas which could be deemed as no go should be clearly marked.	Contractor / EO / ECO	Duration of Construction Phase.	Monthly ECO Audits
13.	Vehicle traffic congestion	Standard working hours to be implemented during the construction phase, and/or as any deviation that is approved. Construction vehicles must be roadworthy, and drivers must be qualified, obey traffic rules, follow	Contractor / Developer	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits.

Id.	Impact	Mitigation / Management Measures	Responsible Person	Frequency and/or Time Period	Method of Monitoring
Pre-Construction and Construction Phase					
		speed limits and made aware of the potential road safety issues. All construction vehicles should be inspected regularly to ensure their road worthiness. Provision of adequate and strategically placed traffic warning signs and control measures along the main access roads to warn road users of the construction activities taking place for the duration of the construction phase. Warning signs must be visible at all times. Implement penalties for reckless driving for the drivers of heavy vehicles as a way to enforce compliance to traffic rules. All roads used by the project Developer and its contractors must be maintained in good working order during the construction phase. It is recommended that a Community Liaison Officer be appointed to implement as the proposed grievance mechanism. A method of communication should be implemented whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process			
14.	Land/soil pollution from chemical / hydrocarbon spills, litter and waste metals.	Establish a chemical storage area that is suitably designed to contain all spills. Ensure that hydrocarbons are stored in a bunded area with a capacity of 110% of storage volume. Ensure that the bunded area is suitably designed to allow for cleaning and	Contractor / EO / ECO	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits.

Id.	Impact	Mitigation / Management Measures	Responsible Person	Frequency and/or Time Period	Method of Monitoring
Pre-Construction and Construction Phase					
		prevent spillage to the environment. Ensure that all vehicles, storage, and usage areas have suitable spill kits. Develop a chemical and hydrocarbon spill procedure. Ensure that chemical and hydrocarbon usage is controlled. No servicing of vehicles onsite. Regular inspection and servicing of vehicles. Develop a spill management procedure for vehicles that may leak accidently. Develop a waste management plan. Ensure that concrete spills are cleaned up. Ensure litter is cleared regularly to designated waste areas.			
15.	Pollution may enter ground / surface water	Establish a chemical storage area that is suitably designed to contain all spills. Ensure that hydrocarbons are stored in a bunded area with a capacity of 110% of storage volume. Ensure that the bunded area is suitably designed to allow for cleaning and prevent spillage to the environment. Ensure that all vehicles, storage, and usage areas have suitable spill kits. Develop a chemical and hydrocarbon spill procedure. Ensure that chemical and hydrocarbon usage is controlled.	Contractor / EO / ECO	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits.
16.	Nuisance impacts in terms of temporary increase in noise and dust,	Dust suppression measures must be implemented for heavy vehicles on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.	Contractor / EO / ECO	Duration of Construction Phase.	Complaints register must be kept at the construction site. No. of dust complaints

Id.	Impact	Mitigation / Management Measures	Responsible Person	Frequency and/or Time Period	Method of Monitoring
Pre-Construction and Construction Phase					
	or the wear and tear on access roads to the site	Ensure all vehicles are road worthy, drivers are qualified and are made aware of the potential noise and dust issues. It is recommended that a Community Liaison Officer should be appointed. A method of communication should be implemented whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process.			received will be used to measure the effectiveness of the dust impact mitigation.
17.	Erosion and loss of soil resources	Develop a storm water management plan prior to commencement with construction. Use silt traps where necessary. Use bumps, humps, and cut off drains to control water velocity of exposed soils. Stockpile soils from footings in demarcated areas. Use soil material from footings in rehabilitation of impacted areas wherever possible. Develop a spill management procedure for vehicles that may leak accidently. Develop a waste management plan.	Contractor / EO / ECO	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits.
18.	Habitat fragmentation resulting from infrastructure development.	The habitat is already highly fragmented due to surrounding infrastructure development. The significance of this impact due to the proposed development is therefore insignificant.	Contractor / EO / ECO	Duration of Construction Phase.	Monthly ECO Audits.

Id.	Impact	Mitigation / Management Measures	Responsible Person	Frequency and/or Time Period	Method of Monitoring
Pre-Construction and Construction Phase					
19.	Damage to equipment or containers during storage and installation	Inspection of packaging for damage. Risk assessment to be conducted. Effective scheduling to limit onsite storage of equipment - site to be ready to readily accept BESS. Proper supervision is required. Adhere to OEM handling, transportation and storage instructions. Agreement / contract with HazMat company for first response, site clean-up and rehabilitation. All MSDS available for the BESS.			
20.	Sedimentation, siltation, and increased turbidity in surface water	Soil stock piling to be done at the designated area.	Contractor / EO / ECO	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits.
21.	Impact on heritage resources	In the unlikely event of any unmarked human burials, burial pits, potsherds or stone tools being uncovered during earthworks for the proposed development, these must be reported immediately to the South African Heritage Resources Agency (Mr Mxolisi Dlamuka (021 483 9598)	Contractor / EO / ECO	Duration of Construction Phase.	Monthly ECO Audits.
22.	Uncontrolled activities may lead to fires	Undertake monitoring to determine if fires have any impact on the surrounding environment, suitable rehabilitation is to be undertaken where necessary. A fire management plan to be established prior to construction commencing. Vegetation is to be cut back in areas where welding is undertaken to prevent	Contractor / EO / Developer / ECO	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits.

Id.	Impact	Mitigation / Management Measures	Responsible Person	Frequency and/or Time Period	Method of Monitoring
Pre-Construction and Construction Phase					
		fires from occurring. Fire breaks along the servitude are to be established. Suitable fire-fighting equipment and training is to be provided.			
23.	Safety and security	• Waste streams must be identified and documented. • Waste management plan must be implemented. • Accredited waste facilities to be contracted for accepting / recycling the waste. • Working hours should be kept between daylight hours during the construction phase, and/or as any deviation that is approved by the relevant authorities. • The perimeter of the construction site should be appropriately secured to prevent any unauthorised access to the site; the fencing of the site should be maintained throughout the construction periods. • Access in and out of the construction camp should be strictly controlled • No open fires are permitted outside of designated areas. • Contractor must provide adequate firefighting equipment on site and provide firefighting training to selected construction staff. • A comprehensive employee induction programme would cover land access protocols, fire management and road safety.	Contractor / EO / Developer / ECO	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits.

Id.	Impact	Mitigation / Management Measures	Responsible Person	Frequency and/or Time Period	Method of Monitoring
Pre-Construction and Construction Phase					
		• The contractor should have personnel trained in first aid on site to deal with smaller incidents that require medical attention • It is recommended that a Community Liaison Officer should be appointed to implement a grievance mechanism. A method of communication should be implemented whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process It is recommended that a Stakeholder Engagement Plan be compiled and implemented for the construction phase of the project.			
24.	Waste generated on site	• Adhere to the National Norms and Standards for the Storage of Waste promulgated in Government Notice No. 926 of 29 November 2013 if the volumes of waste stored for longer than 90 days exceed 80m3 for hazardous waste and/or 100m3 for general waste. This must be noted as waste production during construction is estimated at 72m3. • Hazardous waste generated during the operational phase must under no circumstances be mixed with general waste. Should this occur, the entire volume of general waste will be classified as hazardous waste and must be managed as such.	Contractor / EO / Developer /	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits.

Id.	Impact	Mitigation / Management Measures	Responsible Person	Frequency and/or Time Period	Method of Monitoring
Pre-Construction and Construction Phase					
25.	Storage and Handling of Dangerous Goods: Soil and water contamination due to the handling and storage of dangerous goods during the construction and operation phases.	Any spillages of dangerous substances must be contained as soon as possible, and remedial and clean-up actions initiated immediately. Regular inspections of the permanent bunded areas for storage of dangerous goods must be undertaken throughout the life cycle of the project. Appropriate spill kits must be available on site. Maintenance vehicles must have access to spill kits. An emergency spill response plan must be developed for implementation during the construction and the operational phase. Personnel should be suitably trained to attend to any spills that may occur. A fire management plan must be developed for implementation during the construction and the operational phase. Personnel must be suitably trained to manage any fires which may occur on site. Flammable substances must be stored in enclosed containers away from heat, sparks, open flames, or oxidizing materials. Develop a monitoring and leak detection procedure for monitoring of the chemical spillages.	Contractor / EO / Developer / ECO	Monthly monitoring within the duration of Construction Phase.	Monthly ECO Audits.

15.1.3 Operational Phase

Overall Goal: To ensure that the operation of the Project does not have unforeseen impacts on the environment and to ensure that all impacts are monitored, and the necessary corrective action taken in all cases. To address this goal, it is necessary to operate the BESS in a way that:

- Ensures that operation activities are properly managed in respect of environmental aspects and impacts.
- Enables the BESS operation activities to be undertaken without significant disruption to other land uses in the area, regarding traffic and road use, and effects on local community.
- Minimises impacts on fauna using the site.

An operations manager must be appointed during operation whose duty it will be to ensure the implementation of the operation EMPr for operation activities and all infrastructure under the control of the facility owner. For all Eskom Holdings SOC Limited infrastructure, Eskom manages its operations through the implementation of the Environmental Management System ISO 14001:2004 and relevant in-house procedures. For any public road infrastructure, the Provincial Roads Authority and/or SANRAL manage their infrastructure through the implementation of relevant departmental environmental management procedures.

Table 15-2: Impacts, Management/ Mitigation Measures during Operational Phase

Id.	Impact	Mitigation / Management Measures	Responsible Person	Frequency and/or Time Period	Method of Monitoring
Operational Phase					
1.	Pollution from litter, waste metals, vehicle spills / hydrocarbon spills during maintenance	Ensure that a site clean-up is undertaken at the end of every maintenance cycle to ensure that no pollution has occurred. Where this has happened, appropriate remedial action is to be taken.	Developer / Operations Manager	Duration of Operational Phase.	Compliance inspection by the authority.

Id.	Impact	Mitigation / Management Measures	Responsible Person	Frequency and/or Time Period	Method of Monitoring
Operational Phase					
	activities				
2.	Pollution may enter ground / surface water	Ensure that all vehicles, storage, and usage areas have suitable spill kits. Develop a chemical and hydrocarbon spill procedure. Ensure that chemical and hydrocarbon usage is controlled.	Operations Manager / Developer	Duration of Operational Phase.	Compliance inspection by the authority.
3.	Improvement on livelihood of the local communities (positive)	No Mitigation proposed	Developer	Duration of Operational Phase.	Not Applicable.
4.	Storing and handling of dangerous chemicals	Storage of chemicals to be limited to appropriate and secure facilities on site and access limited to authorised personnel only; Storage in secure containers to ensure/limit the potential for the occurrence of leakages; Storage area to be bunded with an appropriate volume capacity to protect from environmental contamination should accidental leakages occur; Transferal of chemicals to batteries should be done according to best practice guidelines to limit spillage. A fire management plan must be developed for implementation during the construction and the operational phase. Personnel must be suitably trained to	Operations Manager / Developer	Duration of Operational Phase.	Compliance inspection by the authority.

Id.	Impact	Mitigation / Management Measures	Responsible Person	Frequency and/or Time Period	Method of Monitoring
Operational Phase					
		manage any fires which may occur on site. Should spillage occur, the ECO must be informed immediately, and a clean-up operation immediately commenced. Contaminated soils must be cleared and removed for disposal at a registered waste site capable of disposal of the chemicals.			
5.	Contribution to the Local Economic Development and Infrastructural Development (Positive)	None required	Developer	Duration of Operational Phase.	Not applicable

15.1.4 Decommissioning Phase

Similar to construction, the removal of the infrastructure associated with the project would involve the preparation of the area, given the amount of machinery and workers that will remain and work on the decommissioning. The following decommissioning activities are relevant:

- Operational access roads are expected to be in good condition and be appropriate for the transit of decommissioning equipment (heavy cranes, special trucks, etc.).
- A small temporary decommissioning camp may be established with associated staff facilities.
- Laydown areas will be prepared as required. In this regard vegetation may require stripping and topsoil may be stockpiled for use in rehabilitation.
- All waste materials and chemicals will be removed for reuse in other facilities or proper management through authorised waste management service providers.
- The elimination of all lubricants and chemical products stored in the plant will be carried out. These products may be sold or turned over to an authorised waste management service provider, as they are not the plant's main components.
- Reusable elements are components that can be used again, i.e., are not waste. It is advantageous to find a use for these so-called sub-products, due to the reduced costs involved with the consequent economic and environmental benefits. The possible sub-products from the BESS will be multiple in terms of type, quantity and volume. Thus, certain substances are not considered "usable". Other materials from the plant may be reusable in other such facilities, depending on their condition.
- Concrete structures and buildings (including foundations) will be demolished and the rubble will be disposed of at appropriate facilities, unless otherwise agreed for an alternative use in line with the decommissioning and closure plan.

a) Rehabilitation

Following decommissioning and removal of all project material from the site, the disturbed areas will be rehabilitated to pre-project land capability. Where possible, rehabilitation will be conducted concurrently with decommissioning. The following rehabilitation activities are relevant:

- The existing profiles of the land affected will be improved and stabilised thereby leaving profiles not incompatible with the topography of the area, which is essentially flat.
- Ripping of compacted soils will be done prior to adding topsoil, which will be done by mechanical means. It is expected that there will be a sufficient amount of topsoil and/or subsoil moved and stockpiled during the construction phase to facilitate rehabilitation.
- If required, potential areas or land for extracting topsoil or subsoil will be identified. The land capability characteristics of such areas should be similar to the affected soils (same texture, colour, permeability, etc.).

- Vegetation will be re-established. The plant species used will match those naturally occurring in the area. This will be conducted in consultation with a biodiversity specialist.

b) Aftercare and Maintenance

Following rehabilitation, a period of maintenance and aftercare will be required to ensure that rehabilitation is successful. In this regard, the following activities are relevant:

- Fertilisation of soil depending on soil fertility test results.
- Control and removal alien/invasive species.
- Implementation of erosion controls (if required).
- Auditing of vegetation recover and adaption of strategies where necessary.

Table 15-3: Impacts, Management/ Mitigation Measures during Decommissioning Phase

Id.	Impact	Mitigation / Management Measures	Responsible Person	Frequency and/or Time Period	Method of Monitoring
Decommissioning Phase					
Equipment associated with the proposed Project would only be decommissioned once it has reached the end of its economic life. It is most likely that decommissioning activities of the infrastructure of the facility would comprise the disassembly and replacement of the infrastructure with more appropriate technology/infrastructure available at that time. » Site Preparation Site preparation activities will include confirming the integrity of the access to the site to accommodate required equipment, preparation of the site (e.g. lay down areas, construction platform) and the mobilisation of construction equipment. » Disassemble and Remove Infrastructure Disassembled components will be reused, recycled, or disposed of in accordance with regulatory requirements or any other requirements deemed applicable by the Original Equipment Manufacturer. .					

16 MONITORING

This chapter deals with Compliance Monitoring as well as specific monitoring requirements, as per the Specialist Studies, during construction and operational phases. The key to a successful EMPr is appropriate monitoring and review to ensure effective functioning of the EMPr and to identify and implement corrective measures in a timely manner. An audit of the environmental monitoring and management actions undertaken is essential to ensure that it is effective in operation, is meeting specified goals, and performs in accordance with relevant regulations and standards.

Regular monitoring of all the environmental management measures and components shall be carried out by the Developer's PM and independent ECO to ensure that the provisions of this plan are adhered to. Ongoing and regular reporting of the progress of implementation of this Programme should be done. Various points of compliance will be identified with regard to the various impacts that the construction will have on the environment.

Prior to the start of construction activities, an audit schedule should be drawn up, on basis of the environmental authorisation requirements and with input from ECO. The audit schedule should include target dates for implementation of recommendations and timeframes for submission to the Developer's EM, Developer's appointed PM and DEA. The audits should be timed to coincide with scheduled project meetings, where possible.

16.1 Auditing

The key to a successful EMPr is appropriate monitoring and review to ensure effective functioning of the EMPr and to identify and implement corrective measures in a timely manner. An audit of the environmental monitoring and management actions undertaken is essential to ensure that it is effective in operation, is meeting specified goals, and performs in accordance with relevant regulations and standards.

Regular monitoring of all the environmental management measures and components shall be carried out by the Developer (Eskom) and the ECO to ensure that the provisions of this plan are adhered to. Ongoing and regular reporting of the progress of implementation of this Programme should be done. Various points of compliance will be identified with regard to the various impacts that the construction will have on the environment.

Inspections and monitoring shall be carried out to assess the implementation of the EMPr. Visual inspections on all environmental aspects shall be carried out on a regular basis.

Prior to the start of construction activities, an audit schedule should be drawn up, on the basis of the EA requirements and with input from ECO. The audit schedule should include target dates for implementation of recommendations and timeframes for submission to the Developer's appointed PM and the DEA. The audits should be timed to coincide with scheduled project meetings, where possible.

16.2 Site Documentation or Reporting

Site documentation standard shall be used to keep records on site. In addition, all non-compliances to the EA will be reported to the assigned PM within 24 hours. All documents as listed below shall be kept on site and be available for monitoring and auditing purposes. Site inspections by an Environmental Audit team may require access to this documentation for auditing purposes. The documentation shall be signed by all parties to ensure that such documents are legitimate. Regular monitoring of all site works by the ECO is imperative to ensure that all problems encountered are solved punctually and amicably. When the ECO is not available, the PM shall keep abreast of all works to ensure no problems arise.

The following documents must be kept on site:

- Access negotiations and physical access plans;
- Site instructions;
- Pre-construction audit report undertaken by ECO;
- Complaints register;
- Records of all remediation / rehabilitation activities;
- Copy of this EMPr;
- Copy of the Environmental Authorisation;
- Environmental Awareness Plan;
- Monthly compliance report;
- Environmental training records; and
- Emergency response procedures.

The monthly compliance report should include:

- Complaints received from I&APs and details of the actions taken;
- Environmental incidents, spills of hazardous substances, *etc.*
- Environmental damage which requires rehabilitation; and
- Damages of private property such as buildings or crops.

16.3 Monitoring

16.3.1 Undertaking audits

The Developer or PM shall appoint a qualified and experienced ECO to ensure implementation of and adherence to the EMPr.

The ECO shall conduct audits to ensure that the system for implementation of the EMPr is operating effectively. The audit shall check that a procedure is in place to ensure that:

- The EMPr and the Method Statements being used are the up to date versions;
- Variations to the EMPr, Method Statements and non-compliances and corrective actions are documented; and
- Emergency procedures are in place and effectively communicated to personnel.

The audit programme shall consist of the following at a minimum:

- First audit no later than 1 month after the commencement of construction activities; and
- Thereafter audits at monthly intervals, at a minimum or as per EA requirement.

16.3.2 Compliance with the EMPr

The Developer and/or its agents are deemed not to have complied with the EMPr and remedial action if:

- There is evidence of contravention of the EMPr clauses within the boundaries of the site or extensions;
- Environmental damage ensues due to negligence; and
- The Developer fails to comply with corrective or other instructions issued by the PM, within a time period specified by the PM.

16.4 Environmental Contact Person

To be confirmed prior commencement of the proposed development should DEA grant an EA to proceed with the project.

16.5 Emergency Numbers

- Police: 10111
- Ambulance 10177
- Netcare 911 082 911

17 SITE REHABILITATION

17.1 Removal of structures and infrastructure

During and following the completion of the construction activities, the area must be rehabilitated by appropriate landscaping, levelling, topsoil dressing, land preparation, alien plant eradication

and vegetation establishment. All construction plant, equipment, storage containers and temporary fencing must be removed from site.

17.2 Waste and pollution control

- Waste minimisation, the re-use, recycling and recovery of waste must be promoted;
- Rubble, including surplus rock, foundations and batching plant aggregates will be removed from the construction site and firstly recycled and re-used, where possible, before disposed of at a registered landfill site;
- All waste storage containers will be removed from site on a regular basis;
- All portable sanitation facilities will be removed by a certified contractor. It must be ensured that no leaks or spillage from sanitation facilities occurs during the removal thereof; and
- All hazardous waste which is temporary stored on site, including the storage containers must be removed from site and disposed of at a registered hazardous landfill site.

17.3 Topsoil replacement and soil amelioration

- The principle of Progressive Reinstatement must be followed wherever possible. This includes the reinstatement of disturbed areas on an ongoing basis, immediately after the specified construction activities for that area are concluded;
- Execute top soiling activity prior to the rainy season or any expected wet weather conditions;
- Execute topsoil placement concurrently with construction where possible, or as soon as construction in an area has ceased;
- Replace and redistribute stockpiled topsoil together with herbaceous vegetation, overlying grass and other fine organic matter in all disturbed areas of the construction site, including temporary access routes and roads. Replace topsoil to the original depth. These areas will be quantified by the ECO;
- Place topsoil in the same area from where it was stripped. If there is insufficient topsoil available from a particular soil zone to produce the minimum specified depth, topsoil of similar quality may be brought from other areas of similar quality;
- The suitability of substitute material will be determined by means of a soil analysis addressing soil fraction, fertility, pH and drainage, and approved by the ECO; and
- Do not use topsoil suspected to be contaminated with the seed of alien vegetation.

18 CONCLUSION

It is the opinion of the EAP that the implementation of the management and mitigation measures provided in the EMPr is sufficient to manage the environmental impacts associated with the proposed project. This EMPr will furthermore contribute to realizing the following over-arching objectives set out to be reached using the document as an environmental management tool:

- Ensure that sufficient monetary provision, aligned with the significance of the environmental impact and scale of the project, is made to remediate and rehabilitate the environment impacted on by the construction activities;
- Verify environmental performance through information on impacts as they occur;
- Respond to unforeseen events and environmental incidents; and
- Provide feedback to drive continual improvement in environmental performance.

The effectiveness of this EMPr will to a large degree rest on adherence to and fulfilling the roles and responsibilities of each role player and stakeholder. The roles and responsibilities for management actions contained in the EMPr (refer to Section 9 of this document) and arrangements for coordination among the role players are clearly defined in this document.

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		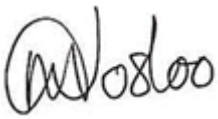
Jessica Morwasehla **Junior EAP**	Tebogo Mapinga **Project Manager**	Mathys Vosloo **Project Associate**

APPENDIX A: EAP's CV

ZITHOLELE CONSULTING

Professional Registrations:

- South African Council for Natural Scientific Professions (SACNASP)
- International Association for impact assessment- South Africa (IAIAsa)

Occupation:

- Snr. Environmental Scientist

Specialisation:

- Project Management
- Environmental Impact Assessment, Permitting and Licensing
- Public Participation
- The review of BARs, EIARs, and EMPr's

Education:

- BSc (Zoology and Physiology), 2007
  University of Limpopo
  Turfloop Campus

Tebogo Mapinga

KEY EXPERIENCE

Tebogo Mapinga is a professional evironmental scientist with 12 years' experience in the environmental management field in both public and private sectors. Her competencies lie in management and co-ordination of environmental projects, environmental impact assessments, compliance monitoring ensuring compliance to legislation and guidelines and public participation for small and large scale projects.

PROJECT EXPERIENCE

2019 Doornkop Farm EIA
Basic Assessment Process for the proposed development of a Maize Mill, Silo and associated infrastructure on Portion 12 of the Farm Doornkop 246, Mpumalanga Province

2018 – 2019 Hartebeestpoort Housing Development BAR
Basic Assessment Process for the proposed Housing Development on Portion 237 of the Farm Hartebeestpoort 328 in Koedoespoort, Gauteng Province

2018 – 2019 Eskom Battery Storage System BARs
Basic Assessment Process for the proposed installation of the Eskom Grid-scale Battery Storage at various Substations (6) in the Western Cape Province

2018 – 2019 BA for KEMJV Slimes Pipeline
Basic Assessment Process for the construction of slimes pipeline for Kimberley Ekapa Mine Joint Venture, Northern Cape Province

2018 Kendal SPR Investigation
Part 2 Amendment for the Environmental Authorisation for the Kendal Power Station's existing Ash Disposal Facility, Mpumalanga Province

2018 – 2019 EIA and WULA for the retrofitting of the FGD at Medupi Power Station
EIA and Water Use Licence Application for the proposed restrofitting of a Flue Gas Desulphurisation (FGD) System at the Medupi Power Station, Lephalale, Limpopo Province

2018 BAR Review for Lidwala
Installation of water borne sewage infrastructure and construction of Waste Water Treatment Works (WWTW) associated with the Haartebeesfontein low cost housing development within the Mkhondo Local Municipality; and
Installation of water borne sewage infrastructure and construction of Waste Water Treatment Works (WWTW) associated with the Rustplaas low cost housing development within the Mkhondo Local Municipality

2017 Thabametsi Coal Fired Power Station
Biodiversity and Heritage Permitting for the Thabametsi Coal Fired Power Station

2017 Richards Bay CCPP Power Project
Environmental Screening and Environmental Impact Assessment – EIA

2017 Roggeveld Wind Farm
Environmental Management Programme (EMPr) Amendment and all work required to reach financial close- permitting (Building Energy and G7)

2017 Klawer Wind Farm
EMPr Amendment and all work required to reach financial close- permitting (Building Energy and G7)

2017 Roggeveld Wind Farm
Environmental Management Programme (EMPr) Amendment and all work required to reach financial close- permitting (Building Energy and G7)

2017 Adams PV Facility Upgrading of Charles Street
All work required to reach financial close- permitting (Aurora Power Solutions (Pty)

2016 Bellatrix PV Facility
All work required to reach financial close- permitting (Aurora Power Solutions (Pty) Ltd**)**

2016 Great Karoo EA amendment
2015 Karusa Wind Farm Jhb
Part 2 EA Amendments (Enel Green Power)

PROJECT EXPERIENCE (continued)

2017 Thabametsi Coal Fired Power Station
Biodiversity and Heritage Permitting for the Thabametsi Coal Fired Power Station

2017 Richards Bay CCPP Power Project
Environmental Screening and Environmental Impact Assessment – EIA

2017 Roggeveld Wind Farm
Environmental Management Programme (EMPr) Amendment and all work required to reach financial close- permitting (Building Energy and G7)

2017 Klawer Wind Farm
EMPr Amendment and all work required to reach financial close- permitting (Building Energy and G7)

2017 Roggeveld Wind Farm
Environmental Management Programme (EMPr) Amendment and all work required to reach financial close- permitting (Building Energy and G7)

2017 Adams PV Facility Upgrading of Charles Street
All work required to reach financial close- permitting (Aurora Power Solutions (Pty)

2016 Bellatrix PV Facility
All work required to reach financial close- permitting (Aurora Power Solutions (Pty) Ltd**)**

2016 Great Karoo EA amendment

2015 Karusa Wind Farm Jhb
Part 2 EA Amendments (Enel Green Power)

2009 Bobididi Solar Facility
Environmental Screening- Root 60FOUR Energy (Pty) Ltd

2009 Great Fish River Watercourse Crossing BAR
African Clean Energy Developers (Pty) Ltd (ACED)

2009 Bedford Watercourse Crossing BAR-
African Clean Energy Developers (Pty) Ltd (ACED)

2008 EIA's at Phaki Phakanani Environmental Consultants

- Construction of Khetho Bridge, Greater Giyani Local Municipality
- Demolition and Relocation of Malamulele High School
- Construction of Malamulele Shopping Complex
- The Subdivision of land in Ellisrus
- Construction of the Senwabarwane Filling Station
- Residential Development in Tlapeng Village
- Township Development in Maphosa Village
- Establishment of a Piggery in Mogalakwena Local Municipality

- Establishment of two Piggeries in Elias Motsoaledi Local Municipality
- Establishment of a Piggery in Modimolle Local Municipality
- Township Development in Rietfontein
- Public Participation and Section 24G Application for the National Taxi Scrapping Project

2008 EIA's at Strategic Environmental Focus

- Establishment of a Guest House (ECA application
- Establishment of a Waste Management Depot in Rustenburg
- Establishment of a Waste Management Depot in Tzaneen and Nkowa-Nkowa
- Langkuil Industrial Development, (Environmental Manager and Project Manager);
- Township Development in Reitfontein
- Upgrading of the BP Golf Course
- Construction of the BP Soshanguve VV Filling Station
- Construction of the BP Soshanguve ZZ Filling Station
- Shell Filling Stations(Project Manager and Client Liaison
- Eskom- Komati Water Augmentation
- Rainbow Junction Residential Development
- Township Development in Delmore Park Extension 7
- West Rand District Municipality- Bulk Water Supply
- West Rand District Municipality Air Quality Assessment
- Lonmin K4 Shaft Mine Upgrading
- Westlake Residential Development
- Montana Spruit Upgrading

EMPLOYMENT RECORD

2018 - Present	Zitholele Consulting	Senior Environmental Scientist
2010	Savannah Environmental	Principal Env. Manager
2013	DEA	Env. Officer Specialised duction
2010	Strategic Environmental Focus	Env. Project Manager
2008	Phaki Phakanani Environmental Consultants	Environmental Consultant

ZITHOLELE CONSULTING

Professional Registrations:

- (SACNASP) South African Council for Natural Scientific Professions
- (IAIAsa) International Association for Impact Assessment – South Africa

Occupation:

- Senior Environmental Scientist

Specialisation:

- Environmental and Social Impact Assessments
- Strategic Environmental Assessments
- Estuarine Ecological Assessments
- Project Management and GIS

Education:

- Ph.D., Zoology, 2012 Nelson Mandela Metropolitan University
- M.Sc., Zoology, 2003 University of Port Elizabeth
- B.Sc. Hons, Zoology, 2001 University of Port Elizabeth
- B.Sc., Zoology and Botany, 2000 University of PE

Dr. Mathys Vosloo

KEY EXPERIENCE

Dr. Mathys Vosloo is a well-qualified and technically proficient environmental and natural scientist with more than 12 years environmental management experience. His experience include Environmental Impact Assessments (EIAs) and the development of Environmental Management Programmes during environmental assessments of construction projects, environmental compliance monitoring and reporting, and Environmental Control Officer (ECO) services for construction projects. Recent experience includes project management and execution of large waste related projects, such as the application for development of Ash Disposal Facilities, and large linear projects such as the management EIA process for the implementation of extensive power lines for renewable projects. Mathys also has substantial experience in Geographical Information Systems (GIS), creating and analysing digital terrain models, runoff and stream flow analysis, stormwater design and map-making for projects in Africa. Further experience include the development and completion of State Of the Environment Reporting (SOER), Strategic Environmental Assessments (SEA) and feasibility studies. Mathys' experience in natural science include aquatic ecological assessments, project management and sample collection in several west, south and east coast estuaries, including ecosystem analysis of estuaries in the Eastern Cape and former Transkei area.

PROJECT EXPERIENCE

2017 PPP and WOP for Kusile PS 60year ADF R 2.8m
Public participation process for Wetland Offset Strategy and implementation of Wetland Offset Plan for the Kusile Power Station 60year Ash Disposal Facility.

2017 BA for KEMJV slimes pipeline R 230 000
Basic Assessment for construction of slimes pipeline for Kimberley Ekapa Mine Joint Venture, Northern Cape.

2016 - 2017 Asbestos Mine Rehabilitation Programme R 1.3 million
Undertaking environmental site investigations and project scoping for the rehabilitation of 10 derelict and abandoned asbestos mines in Limpopo and Mpumalanga Provinces.

PROJECT EXPERIENCE (continued)

2016 Walkdown & WULA for Kuruman Powerline upgrade R 355 000
Specialist walkdown of approved 132 kV powerline servitude between Kuruman and Kathu, Northern Cape.

2016 - 2017 EA Amendment for Kuruman Powerline Upgrade R 60 000
EA Amendment application i.t.o. EIA 2014 regulations for amendment to the approved 132 kV powerline corridor between Hotazel, Kuruman and Kathu, Northern Cape.

2016 Breede-Gourits CMS: Estuarine component R 81 000
Estuary Situation Assessment to inform the Breede-Gourits Catchment Management Strategy for Breede-Gourits Water Management Area.

2016 - 2017 BA for Tshepisong Extension 4 development R 198 000
Basic Assessment for Mixed Business and Residential Development within Portion 64 of Farm Vlakfontein 238 IQ, Tshepisong Extension 4, Johannesburg West, Gauteng Province.

2016 - 2017 BA for Patensie Housing Development R 283 000
Basic Assessment for the Patensie Housing Development, Eastern Cape.

2016 Specialist Walkdown for Kuruman Powerline upgrade R 355 000
Specialist walkdown of approved 132 kV powerline servitude between Hotazel and Kuruman, Northern Cape.

2016 Solar Park EA Amendment R 248 000
Environmental Authorisation (EA) Amendment application i.t.o. EIA 2014 regulations for amendments to the Solar Park to Nieuwehoop 400 kV power line corridor near Upington, Northern Cape.

2015 - 2016 Solar Park WULA R 547 000
WULA for Solar Park to Nieuwehoop 400 kV powerline development near Upington, Northern Cape.

2015 - 2016 BA Clanwilliam Weirs R 409 000
Proposed Re-alignment of the Bulshoek Dam and Doring River Weirs near Clanwilliam, Western Cape.

2015 - 2016 BA Klipspruit Valley R 244 000
BA and WULA for the Klipspruit Valley Road Upgrade.

2014 - 2016 EIA Koffiefontein Slimes Dam R1 million
EIA for the new Koffiefontein Slimes Dam Development, Kimberley.

2014 - 2015 BA and WULA Kuruman Upgrade R1.3 million
BA and WULA for 132kV power line upgrade from Hotazel to Kuruman and Kathu, Northern Cape.

2013 - 2016 EIA Kendal 30 year Ash Disposal Facility R6 million
EIA, WMLA and WULA for a new Ash Disposal Facility for Kendal Power Station near Ogies in Mpumalanga.

2013 - 2014 Design of 3 canals R 700 000
3 x BAs for the proposed prevention of water ingress into previously mined out areas in the Witwatersrand Mining Basin (canalisation of 3 streams), Gauteng.

2013 - 2014 BA for Vaalbank Switching Station R 380 000
Basic Assessment for Vaalbank Switching Station and 2 x 88 kV Powerlines, Free State.

PROJECT EXPERIENCE (continued)

2012 - 2015 EIA Solar Park **R5 million**
EIA, EMP &WULA for the Solar Park 132/400 kV Sub Station and Associated lines, Northern Cape.

2012 - 2015 Kusile 60 year Ash Disposal Facility **R11 million**
EIA, WML and WULA for the 60 year Ash Disposal Project near Balmoral in Mpumalanga.

2012 - 2015 WULA Wilge Pipeline **R 900 000**
WULA for the sewage and water pipeline from Wilge Township to Phola, Mpumalanga.

2012 BA Kouga Dam Wall **R 250 000**
The rehabilitation of the Kouga Dam wall and associated mining activities.

2012 EMP City of Cape Town Stormwater **R1.5 million**
Maintenance and management interventions undertaken by the City of Cape Town in its surface stormwater systems.

2012 BA Melkhout Powerlines **R 100 000**
The installation of 132kV transmission lines from Melkhout to Dieprivier, including the construction of a new substation at Dieprivier, Cacadu District.

2012 BA Diepriver Powerlines **R 100 000**
The installation of 132kV transmission lines from Dieprivier to Kareedouw, including the extension of the existing substation at Kareedouw, Cacadu District.

2012 BA Patensie Powerlines **R 100 000**
The installation of 132kV transmission lines from Melkhout to Patensie, including the construction of a new substation at Patensie, Cacadu District.

2012 Mmnthatha River System
Catchment delineation and stream calculation for the Mnthatha River System, GIBB Durban.

2011 - 2012 PRASA Passenger rail and shunting yard proposed sites
Environmental Screening for the PRASA passenger rail and shunting yard proposed sites in Cape Town, Gauteng and Durban.

2010 - 2012 ATTP Flow Limiters installation
NMBM Assistance to the poor (ATTP) and schools leakages repairs and flow limiters installation.

2010 - 2012 ATTP Database ManagementFlow Limiters installation **R4 million**
NMBM Assistance to the poor (ATTP) and schools leakages repairs and flow limiters installation database management.

2010 - 2011 Nelson Mandela Bay Provincial Department of Housing
Nelson Mandela Bay and Cradock low cost housing rectification audits. Management of incoming and outgoing GIS data and GIS mapping, Provincial Department of Housing.

2010 - 2011 ECO Bulk Stormwater Infrastructure Motherwell
Installation of bulk storm water infrastructure in Motherwell NU29 and 30 and Implementation of an artificial wetland at the Motherwell stormwater canal outlet structure.

PROJECT EXPERIENCE (continued)

2010 BA McAdam Street Upgrade **R 60 000**
The extension of McAdam Street from Worraker to Mangold Street, NMBM.

2009 - 2011 EIA Motherwell Housing Development **R 270 000**
Motherwell NU 31 housing development, NMBM.

2009 - 2011 Coega Integrated Stormwater Management Plan
Coega IDZ Eastern Sector Integrated Stormwater Management Plan, Coega Development Corporation.

2009 - 2011 EIA KougaWind Farm **R 350 000**
Kouga 300 MW wind farm, Kouga Local Municipality.

2009 - 2010 ECO Swartkops River Artificial Wetland
Swartkops River, NMBM.

2009 - 2010 ECO Humewood Road Upgrade
Realignment of the S-bend section of Humewood Road in Humewood.

2009 - 2010 ECO Paapenkuils Sewer Augmentation
Paapenkuils Main Sewer Augmentation in Port Elizabeth NMBM.

2009 - 2010 SOER State of the Environment Report **R 350 000**
NMBM State of the Environment Report.

2009 - 2010 ISWMP Coega IDZ **R 350 000**
Coega IDZ Eastern Sector Integrated Stormwater Management Plan, CDC.

2009 - 2010 SOER Flood Plain and Spatial Analysis
Nelson Mandela Metropolitan Municipality SOER flood plain and spatial analysis, NMBM.

2009 - 2010 EIA – Red Cap Developments
Kouga Local Municipality wind farm development EIA, RedCap Developments.

2008 - 2009 Port Harcourt City Open Space System Plan
Port Harcourt City Open Space System Plan, Government of Nigeria.

2008 - 2009 ECO Kwazakhele stormwater infrastructure
Construction of stormwater detention ponds and upgrading of stormwater infrastructure in Kwazakhele, Phase 3.

2008 ECO Sherwood Road Upgrade
Upgrading of Devon and Fairley Roads in Port Elizabeth, NMBM.

2008 OR Tambo District Municipality water conservation and demand management
OR Tambo District Municipality water conservation and demand management.

2008 SOER Eden District Municipality
Eden District Municipality SOER, Eden District Municipality.

2008 Kouga Local Municipality catchment and flood attenuation analysis
Jeffreys Bay Marina Martinique catchment and flood attenuation analysis, Kouga Local Municipality.

2008 EIA Bethelsdorp Housing Development **R 230 000**
Bethelsdorp Phase 3 social housing development, NMBM.

PROJECT EXPERIENCE (continued)

2008 **BA Beacon Maritime Navigational Structure Upgrade** **R 60 000**
Beacon maritime navigational structure upgrading, NMBM.

2008 **BA Moffet Dam Rehabilitation** **R 60 000**
Moffet Dam breach remedial works, Kouga Local Municipality.

2008 **BA Pollok Beach light mast installation** **R 50 000**
Pollok Beach light mast installation, NMBM.

2008 **BA Humewood Road Re-alignment** **R 60 000**
Humewood Road re-alignment along the S-bend section, NMBM.

2008 **SOER Hessequa Local Municipality** **R 200 000**
Hessequa Local Municipality State of the Environment Summary Report.

2008 **SEA Coastline redevelopment** **R 250 000**
North End Coastline redevelopment SEA, NMBM.

2008 **Mzimkhulu River catchment and flood attenuation analysis**
Mzimkhulu River catchment and flood attenuation analysis, Umzimkhulu Municipality.

2008 **PE Paapenkuils River catchment and flood attenuation analysis**
Port Elizabeth Paapenkuils River catchment and flood attenuation analysis, NMBM.

2007 - 2008 **ECO Mavuso Road Upgrade**
Construction of Mavuso Road in Kwazakhele, NMBM.

2007 **BA Jagersfontein Chicken Farm** **R 40 000**
Jagersfontein farm 432 commercial production of chicken and operation of an abattoir, Kouga Local Municipality.

2007 **BA Zwide Roads Upgrade** **R 55 000**
Tarring of roads in Zwide, NMBM.

2007 **BA McAdam Street Construction** **R 40 000**
Construction and extension of McAdam Street, NMBM.

2007 **BA Tygerbay Reconstructiontion** **R 60 000**
Repair and reconstruction of water retaining structures at Tyger Bay EIA NMBM.

2007 **BA Lorraine Infill development** **R 40 000**
Erf 306 Lorraine Infill development, NMBM.

2007 **BA Sherwood Roads Upgrade** **R 40 000**
Tarring of roads in Sherwood, NMBM.

2007 **BA Zwide Roads Upgrade** **R 40 000**
Tarring of Ntsele, Mkutuka, Nanto and Vabaza Streets in Zwide, NMBM.

2007 **BA Pollok Beach Parking Lot** **R 50 000**
Pollok Beach, Summerstrand, parking lot relocation, NMBM.

2007 **BA Uitenhage Roads Upgrade** **R 40 000**
Tarring of Dube, Grootboom and Luzipho Streets in Uitenhage, NMBM.

PROJECT EXPERIENCE (continued)

2007 BA PE ICC Site Assessment **R 150 000**
Port Elizabeth International Convention Centre Rapid site assessment, NMBM.

2007 EIA Exemptions Applications Motherwell
Motherwell/Coega outfall canal upgrade.

2007 EIA Exemptions Applications Lorraine Infill Development
Erf 17, Lorraine, infill development.

2007 EIA Exemptions Applications Korsten Upgrade
Korsten Modal Interchange Upgrade.

2007 GIS SANRAL outdoor advertising opportunities
SANRAL outdoor advertising opportunities in the Eastern Cape, SANRAL.

2007 Coega Integrated Stormwater Plan
Coega Integrated Stormwater Plan, Coega Development Corporation.

2007 Uitenhage Stormwater Master Plan
Uitenhage Stormwater Master Plan, NMBM.

2006 Nelson Mandela Metropolitan University exchange programme
Analyses and identification of nematode collected samples from the Mngazi Estuary in the Eastern Cape (former Transkei), South Africa, University of Ghent, Belgium – Nelson Mandela Metropolitan University exchange programme.

2005 - 2006 Berg River Reserve Determination Study **R 150 000**
Hyperbenthos and zooplankton field assessment in Berg River estuary.

2005 Olifants River Reserve Determination Study, Western Cape **R 300 000**
Specialised field ecologist - Field assessment: subtidal macrozoobenthos, hyperbenthos and zooplankton in Olifants River estuary for the Olifants River Reserve Determination study, Western Cape., Contracted sampling for CSIR Stellenbosch (Environmentek).

2004- 2005 DWAF - Kromme and Seekoei Estuary Reserve Determination Study **R 200 000**
Specialised field ecologist - Kromme and Seekoei Estuary Catchment Reserve Study. Contracted sampling for Department of Water Affairs and Forestry (DWAF).

2003 - 2004 Berg River Baseline Monitoring Program (UCT) **R 350 000**
Berg River Baseline Monitoring Program (UCT). Collecting subtidal macrozoobenthos.

2002 - 2006 University of Port Elizabeth Ecological analysis **R4 million**
Specialised field ecologist - Field assessment: subtidal macrozoobenthic and hyperbenthic invertebrates, zooplankton, microzooplankton, meiofauna at Mngazi and Mngazana River estuaries.

2002 - 2003 University of Port Elizabeth Ecological analysis
Ecological analysis of the functioning Sundays, Swartkops, Kromme, and Gamtoos estuaries using Ecopath with Ecosim, and assessment of the impact of recreational fishing on these ecosystems. MSc dissertation, University of Port Elizabeth.

PROJECT EXPERIENCE (continued)

2002 Sylt Ecosystem, Germany R 250 000
Assistant ecosystem modeller - Assisting in preparation and balancing of ecosystem carbon flow models of the Sylt Ecosystem, Germany.

2002 Field assessment: subtidal macrozoobenthos, hyperbenthos and zooplankton in Rooiels R 400 000
Specialised field ecologist - Field assessment: subtidal macrozoobenthos, hyperbenthos and zooplankton in Rooiels, Palmiet, Heuningnes, Breede, Klein Brak and Kaaimans River estuaries, Western Cape.

2002 Field Assessment - intertidal invertebrates Eastern Cape R 150 000
Specialised field ecologist - Field assessment: intertidal invertebrates in Kabeljous, Gamtoos, Swartkops, Sundays and Kariga River estuaries, Eastern Cape.

PAPERS, PUBLICATIONS, PRESENTATIONS AND PROFESSIONAL SOCIETIES

PAPERS, PUBLICATIONS

1. Vosloo, M C and Hendricks, M G J. 2017. Marine and estuarine nematodes in South Africa, Book Chapter. In *Nematology in South Africa: A view from the 21st Century*. Fourie, Spaull, Jones, Daneel, De Waele (Eds).
2. Vosloo, M.C. 2012. Network analysis of trophic linkages in two sub-tropical estuaries along the south-east coast of South Africa. PhD thesis, Nelson Mandela Metropolitan University.
3. Vosloo, M.C. 2009. Marine and estuarine meiofauna: Contribution to the National Marine Ecosystem Diagnostic Analysis. Agulhas and Somali Current Large Marine Ecosystems.
4. Vosloo, M.C. 2004. A comparative assessment of the impact of recreational and subsistence fishing on selected Eastern Cape estuarine ecosystems using the Ecopath modelling approach. MSc Dissertation, University of Port Elizabeth, Port Elizabeth.

PROFESSIONAL SOCIETIES

1. Member of International Association for Impact Assessment – South Africa (IAIAsa)
2. Registered member of South African Council for Natural Scientific Professions, (SACNASP)

EMPLOYMENT RECORD

2013 - Present	Zitholele Consulting	Manager: Licencing and Permitting, Senior Environmental Consultant
2012	GIBB Engineering and Science	Senior Environmental Scientist
2007 – 2011	GIBB Engineering and Science	Environmental Scientist

2008 – 2011	Nelson Mandela Metropolitan University	Postgraduate (part-time) Student
2005 – 2007	Nelson Mandela Metropolitan University	Full time Postgraduate (PhD) Student
2001 - 2003	University of Port Elizabeth	Full time postgraduate (MSc) Student
2006	University of Ghent, Belgium	Exchange Ecologist

ZITHOLELE CONSULTING

Professional Registrations:

- None

Occupation:

- Junior Environmental Assessment Practitioner

Specialisation:

- Project Administration
- PPP
- IWULA Application and Amendments
- ECO

Education:

- BSc (Environmental and Resource Studies), 2016, University of Limpopo Turfloop Campus

Jessica Morwasehla

KEY EXPERIENCE

Jessica is an Junior Environmental Assessment Practitioner. Her competencies lie Public Participation Processes for EIA, BA and NEMAQA Postponement for Compliance Timeframe projects. She also worked on projects that includes IWULA applications and Amendments, and GIS.

PROJECT EXPERIENCE

2019 Doornkop Farm EIA
EA Application and GIS.

2019 Steelpoort mine Rehabilitation
Environmental Control Officer, having monthly audit for the rehabilitation of the asbestos mine in Tubatse Local Municipality

2019 Msauli Mine Rehabilitation
Environmental Control Officer, having monthly audit for the rehabilitation of the asbestos mine in Msauli.

2018 AEL Consol Furnace
Compiling of PPP documents for Basic Assessment and NEMAQA postponement for Compliance timeframe

2018 Duvha WULA Amendment.
Uploading application form on the eWULAA and IWULA Amendment report

2018 Kendal 30yr Ash Disposal Facility
Engaging with the stakeholders for the wetland offset strategy and WULA Appliaction.

2018 Khathu EMPr Walkdown
eWULAA applications

2018 Farm 238JR722FR BA
Public Participation Process for the Proposed Housing Development in Koedoespoort.

2018 Farm 238JR722FR BA
Public Participation Process for the Proposed Housing Development in Koedoespoort.

PROJECT EXPERIENCE (continued)

2018 Kendal SPR Investigation
Public Participation Process and IWULA Amendment.

EMPLOYMENT RECORD

2018 – Current	Zitholele Consulting	Junior Environmental Assessment Practitioner

Residential/Business address:	Postal address:	Contact details:
34 Farm Street, Bryanston, 2191 Gauteng Province, SA	PO Box 369, Wendywood, 2144 Gauteng Province, SA	m:: + 27 (0)82 293 5752 e: mathew@enviross.co.za

Dr Mathew James Ross

I.D. no.:	780724 5132 080
Date of birth:	24 July 1978
Nationality:	South African
Passport no.:	M00085961
Business owner:	Enviross Environmental Impact Studies CC (*Trading as* Enviross CC) (CK/2007/051532/23; VAT no 481/02/3499/9) Position: Founder/Managing member, Senior Scientist BBEEE Rating: Exempt micro-business.
Driver's licence:	Code 08 EB (vehicle owner) No endorsements
Marital status:	Married
Home owner:	Yes
Dependants:	Yes
Criminal record:	None
Highest qualifications:	PhD – Aquatic Health (University of Johannesburg). Design and development of fishways in SA; SASS5 accredited practitioner; SACNASP Professional Natural Scientist (Reg no: 400061/09 - Ecological Sciences),

Tertiary Education

1998 – 2000 Rand Afrikaans University

- BSc (Biological Sciences)

Subjects: Zoology & Botany (majors)

2001 Rand Afrikaans University

- BSc (Hons) – Zoology: Aquatic Health

2002 – 2004 Rand Afrikaans University

- MSc – Aquatic Health (Dissertation)

(Assessment of international practices on the use of fish in toxicity testing and application to South African conditions).

2005 – 2016 University of Johannesburg

PhD – Aquatic Health

(Determining the biological requirements of important migratory fish species to aid in the design of fishways in South Africa).

- Planning and construction of fish housing system capable of simulating natural conditions and environmental cues so as to stimulate migratory behaviour in fish;
- Monitoring existing fishways throughout the country to determine functionality of the fishways;
- Determining the biological requirements of selected important migratory fish species throughout South Africa;
- Undertaking migratory studies of fish throughout South Africa;
- Compile a guidelines document for the planning, design and operation of fishways specifically for South African conditions.

Further qualifications and courses

- Introduction to quantitative research using sample surveys (2002);
- Attended workshop on algal toxicity testing – Environmentek, CSIR (2003);
- Grass identification course – Witwatersrand Botanical Gardens (2003);
- Venomous snake handling and first aid (2003);
- First Aid – Level 3 – Netcare 911 (2004);
- Advanced 4x4 driving (2001, 2003 & 2006);

- Soil Classification course with emphasis on wetland delineations (TerraSoil Science) April 2009;
- Qualified as an Advanced Scuba Diver;
- Advanced grass identification course (Africa Land Use Training) Feb 2010.

Publications, Presentations and Awards.

- Awarded the best BSc (Hons) presentation in the post graduate colloquium in the Zoology Department, RAU.
- Published research article entitled: 'Exploring the ichthyocidal properties of *Euphorbia ingens* – Euphorbiaceae. *African Journal of Aquatic Science, 29 (2): 2004.*
- Awarded the Juan Heyns certificate for best PhD presentation in the post graduate colloquium in the Zoology Department, RAU '**Determining the biological requirements of important migratory fish species to aid in the planning and construction of fishways in South Africa'** – June 2005.
- Presented research project entitled: **'Preliminary study to validate the use of zebrafish (*Danio rerio* – Cyprinidae) as a suitable test species for standardized fish acute toxicity testing'** at SASAqS conference 2003 – Cape Town.
- Presented a poster study entitled: '**An investigation into finding suitable alternative fish species for use in the standard fish acute toxicity test'** – July 2005 – Rhodes University.
- Awarded best poster presentation by SASAqS examination committee – July 2005, Rhodes University.
- Presented a poster study entitled: '**An investigation into finding suitable alternative fish species for use in the standard fish acute toxicity test'** – Environmentek (CSIR) Aquatox forum, Rand Water Head Offices, Glenvista (2005).
- Presented a paper entitled: **'Preliminary results from laboratory tests of a vertical slot prototype fishway channel design'** – SASAqS conference, Maputo, June 2006.
- Presented paper entitled: **Assessing biological criteria to facilitate fishway designs for South African rivers.** Tenth annual *River Symposium* (Rivers Festival) on environmental flows, Brisbane, Australia, September, 2007.
- Written fishway and fish ecology-related articles that have appeared in *Engineering News, Die Beeld, The Star* and *Westrand Review.*
- Published research report (co-author)*: Guidelines for the planning, design and operation of fishway in South Africa WRC Report No TT/287/07*
- Presented radio interviews for *RSG* on fishways and fish-related topics.
- Presented a television interview for *Careers (SABC2).*
- Published research article (co-author) entitled: 'Sexual dimorphism of four owl species in South Africa' *Ostrich, 79 (1): 2008*. Ansara-Ross, T.M., Wepener, V., Verdoorn, G.H. & Ross, M.J.
- Published research article (co-author) entitled: 'Probabilistic risk assessment of the environmental impacts of pesticides in the Crocodile (west) Marico Catchment, Northwest Province' *Water SA, 34 (5):2008.* Ansara-Ross, T.M., Wepener, V., van den Brink, P.J. and Ross, M.J.
- Published research article (co-author) entitled: 'Application of a direct toxicity assessment approach to assess the hazard of potential pesticide exposure at selected sites on the Crocodile and Magalies rivers, South Africa'. *African Journal of Aquatic Science, 34 (3): 2009*. Ansara-Ross, T.M., Wepener, V., van den Brink, P.J. and Ross, M.J.
- Published research article (co-author) entitled: 'A review of pesticides in South African freshwaters'. *African Journal of Aquatic Science: 2011*. Ansara-Ross, T.M., Wepener, V., van den Brink, P.J. and Ross, M.J.
- Published research article (co-author) entitled: 'The use of feathers in monitoring bioaccumulation of metals and metalloids in the South African endangered African grass-owl (*Tyto* capensis). *Ecotoxicology. Vol 22 (6) 2013.* T. M. Ansara-Ross, M.J. Ross & V. Wepener;
- Keynote speaker at 2016 World Fish Migration Day (WRC, Pretoria);
- Keynote speaker at 2018 Africa Swimways Project Workshop, University of Mpumalanga;
- Co-author of a presentation delivered at the World Fish Migration conference in Cambodia (Nov 2018). Keynote speaker at the From Source to Sea: Fishways Africa workshop/conference entitled "Review of fishways in Africa: Design & Implementation", University of Mpumalanga, February 2019;
- Published research article (co-author) entitled: 'River connectivity and fish migration considerations in the management of multiple stressors in South Africa'. Marine & Freshwater Research (*accepted for publication 1 July 2019*).

Memberships, affiliations & further interests.

- South African Council for Natural Scientific Professionals (SACNASP) Reg no: 400061/09 in Ecological Sciences;
- South African Society for Aquatic Scientists (SASAqS);
- Aquatox Forum (Environmentek, CSIR);
- Gauteng Wetland Forum;
- African Grass Owl Action Group (EWT) – Specialist consultant;
- Spider Club of South Africa;

- Herpetological Society of South Africa;
- Scubaversity club member (PADI advanced);
- 4x4 trails; photography, videography and underwater photography.
- Federation of Boxer Clubs of Southern Africa; Panel of Trainers (Chairman) & Meridian Rottweiler League. Boxer breed, trials and disposition judge (for breeding, training, working trials and showing of dogs). Accredited international working trials assailant and trainer.

Scope of recent prominent consultancy projects.

Biomonitoring and Aquatic/Wetland Specialist Assessments:

- Undertaking fish migration barrier and fish assessments for fishway specialist studies.
- Contracted by the Water Research Commission to determine the biological requirements for new fishway designs and implementation.
- Maintenance and culturing of critically endangered fish from the Cedarberg area (Water Research Commission).
- Design of indigenous fish display aquarium as well as design and building of filtration system – Walter Sisulu National Botanical Gardens, SANBI.
- Indigenous fish speciality surveys, collection and relocation for various stocking and rehabilitation programmes.
- Design and construction of a self-sustaining zebrafish culturing facility; training of staff in the successful maintenance and culturing of zebrafish for routine laboratory purposes – CSIR, Environmentek.
- Design and construction of a self-sustaining zebrafish culturing facility; training of staff in the successful maintenance and culturing of zebrafish for routine laboratory purposes – Hydrobiology, Rand Water, Vereeniging.
- Currently undertaking an aquatic ecological assessment of the Crocodile (west) Marico River System as a research assistant (University of Johannesburg).
- Proficient in the following biomonitoring indices: FAII, FRAI, SASS5, MIRAI, IHAS, RVI, VEGRAI and water quality determinations.
- Proficient in wetland delineation and wetland verification studies.
- Biomonitoring and water quality analyses for rehabilitation procedures at OR Tambo International Airport, ACSA.
- Biomonitoring for all watercourse crossings pertaining to Gautrain Rapid Rail Link development.
- Co-author for the status quo of wetlands for the whole of the Dinokeng Hub area.
- Wetland characterisation modelling for the Klipspruit /Klip River catchment.
- Co-author of the current "Jo'burg State of Environment Report" dealing with the biodiversity and surface waters resource aspects in both the status quo phase as well as determining the present state.
- Wetland specialist surveys for the Orlando Ekhaya and Soweto Music Centre Developments.
- Wetland and terrestrial surveys for the proposed Dhlamini Kliptown, Mofolo (south) & Klip (north) and Orlando (west) & Dube developments, Soweto;
- Wetland and riparian rehabilitation plan development for Gautrain (Bombela CJV);
- Wetland and aquatic specialist surveys for Mokolo Crocodile West Water Augmentation Project (MCWAP);
- Wetland rehabilitation plan development for Orlando Ekhaya and Heroes Bridge developments, Soweto;
- Wetland surveys for proposed ESKOM Johannesburg Strengthening Scheme;
- Aquatic impact assessments for proposed Solar Power Plan development, Orange River, Upington;
- Aquatic impact assessment for proposed upgrading of Bray Border Post (SA/Botswana) for the Molopo River;
- Wetland surveys for Neotel data cable installation (Jhb to CT);
- Wetland surveys for ESKOM powerlines, Delareyville;
- Aquatic impact assessments for various hydropower schemes on the Ash River, Bethlehem;
- Fishway development for DWS gauging weirs, dams and various bridges throughout SA;
- Aquatic impact surveys for the proposed Mooifontein Uranium Mine, Edenburg;
- Wetland delineation and impact surveys for various Rand Water pipelines throughout Gauteng;
- Wetland delineation and impact surveys for various Bloem Water pipelines throughout Free State Province;
- Fishway design for Lower Thukela River;
- Aquatic and fish ecological survey for the Ncwabeni Off-Channel Storage Scheme;
- Author of the surface water resource section of the UmKhanyakude and uThukela District Municipality Environmental Management Framework;
- Fishway evaluations and routine fishway and aquatic biomonitoring for the Kakamas Hydro-electrical Scheme (KHEP) at Neusberg Weir, Orange River;
- Development strategies for the provision of a fishway at the Vaal River Barrage;
- Aquatic ecological and impact surveys and fishway development for hydropower schemes on the Orange River at Riemvasmaak (Augrabies Falls);

- Full terrestrial and aquatic ecological and fishway (fish migrations impacts and fishway design) of the proposed Sidala Energy Solutions Rooikat and Meerkat Hydropower Schemes, Orange River;
- Aquatic & wetland ecological and impact surveys for the uMkhomazi Water Project, KZN, including fish migrations and fishway evaluations;
- Wetland and aquatic ecological and impact surveys for the ESKOM Kuruman Strengthening Scheme, NC;
- Aquatic & wetland ecological and impact surveys for the construction of Foxwood Dam, Adelaide, EC, including fish migrations and fishway evaluations;
- Fishway assessments for Sasol, Secunda;
- Fishway assessments and design for Doornkloof Weir, Sesmylspruit, Centurion;
- Full ecological surveys (terrestrial biodiversity, aquatics and wetlands) for the ESKOM Intabazwe powerline walk-down component;
- Full ecological surveys for the proposed Tina Falls Hydropower Scheme (aquatics, fishways, terrestrial fauna and flora and avifauna), Mthatha, EC;
- Fishway design and implementation for the MCWAP (Mokolo Crocodile Water Augmentation Project) Phase 2 development;
- Fishway design and implementation for the proposed Mhlabatsane River Water Abstraction Project, Umgeni Water, KZN.

Terrestrial Biodiversity Specialist Assessments:

- Biodiversity, wetlands, aquatic and avifaunal impact assessments for pipeline and powerline developments (*Petronet (New Multi Product Pipeline), Rand Water,* and *ESKOM – transmission and distribution overhead lines*);
- Biodiversity walk-down survey for the ESKOM Zeus-Mercury powerline surveys and EMP development (eastern Gauteng);
- Ecological surveys and development of an Environmental Management Plan for University of Johannesburg (Soweto Campus and UJ Island, Vaal Dam);
- Full ecological assessment (aquatic, wetland, fauna & flora, avifaunal and vegetation) surveys for CSIR Satellite Application Centre, Hartbeeshoek;
- Full ecological assessment (aquatic, wetland, fauna & flora, avifaunal and vegetation) surveys for proposed KwaCeza Mountain Colliery, Swart Umfolozi, KZN;
- Full ecological survey (Avifaunal impacts, general fauna & flora, wetlands & aquatics) for the proposed ESKOM Highveld Northwest-Lowveld Strengthening Scheme), LP;
- Full ecological survey (Avifaunal impacts, general fauna & flora, wetlands & aquatics) for the proposed ESKOM Neptune-Poseidon powerline, Eastern Cape;
- Ridge rehabilitation for the Rand Water BG3 pipeline;
- Full ecological survey for the proposed SolAfrica (Bokpoort) water pipeline, Upington, including walk-down;
- Full ecological survey for the development of 132 kV powerlines for the Redstone Solar Power Plant, Lime Acres;
- Full ecological survey (including avifaunal impacts) for the development of 132 kV powerlines for the ESKOM Mookodi Integration Phase 2;
- Full ecological survey (including avifaunal impacts) for the development of 88 kV powerlines for the ESKOM Frankfort Strengthening Project;
- African Grass-owl specialist surveys at various localities throughout Gauteng, Northwest Province and Mpumalanga;
- Full ecological survey (Avifaunal impacts, general fauna & flora, surface water ecosystems) for the proposed ESKOM Melkspruit-Rouxville 132 kV powerline, Free State & Eastern Cape;
- Full ecological survey (Terrestrial fauna & flora, wetlands & aquatics) for the proposed DWS Bultfontein bulk water pipeline, FS;
- Full ecological surveys (surface water ecosystems, terrestrial fauna & flora and avifaunal impact surveys for the ESKOM Klipkop-Lehating 132 kV powerline, Black Rock, NC.
- Avifaunal impact surveys for the ESKOM Mahikeng-Mookodi 400 kV powerline, NWP.

International experience:

- Development of an EMP for mining rehabilitation aspects, Mutanda Mine, DRC;
- Riparian vegetation analysis and mapping for the development of an EMP for a game farm development – Limpopo-Lipadi, Botswana;
- Aquatic and wetland impact surveys for Bokai Platinum (Todal Mining), Zimbabwe;
- Surface water quality and ecological impact evaluation for the proposed Mkuju River Platinum Project, Selous Game Reserve, Tanzania;
- Aquatic biomonitoring and ecological surveys for the Perkoa Zinc Project, Nantou Mining, Burkina Faso;

- Surface water quality, aquatic biomonitoring and ecological surveys for the Papillon Resources: Fekola (Medinandi) Gold Mine, Mali;
- Aquatic, water quality and wetland impact assessments for the Esaase Gold Project, Ghana;
- Aquatic ecological and impact assessment for the Orange Falls Hydroelectric Power Scheme, Orange River, Namibia;
- Ecological flow and migration surveys for augmentation and upgrading of the Lunsemfwa Hydro Power Schemes, Zambia;
- Surface water quality, aquatic and wetland ecological and impact surveys for the Kalana Gold Mine, Mali;
- Peer-review aquatic ecological and impact analysis senior consultant for the proposed Ngonye Falls Hydro Power Scheme, Zambezi River, Zambia;
- Fish migrations and fishway design for the proposed Ngonye Falls Hydro Power Scheme, Zambia;
- Design of a fishway facility for the Nyamagasani Hydropower Scheme, Uganda;
- Fish migrations and fishway design for the Kikagati-Murongo Hydropower Project, Kagera River, Uganda/Tanzania;
- Development of aquatic impact monitoring plans for the Kikagati-Murongo Hydropower Project and implementation thereof, Uganda;
- Fish ecological surveys, fish migrations and fishway designs for the Achwa 1 and 2 Hydropower Schemes, Achwa River, Uganda.

Ecological modelling:

- Proficient in GIS modelling and mapping (ArcGIS);
- Proficient in design and modelling in AutoCAD for fishway (and other ecological infrastructure) designs;
- Proficient in hydraulic analyses of fishways and flow gauging structures.

Jaco van der Walt
Archaeologist
Email: Jaco@heritageconsultants.co.za
Cell: 082 373 8491

Professional Profile

I come from a tourism background but have been actively involved as a professional archaeologist within the heritage management field in Southern Africa for the past 20 years. I worked at various universities and in the private sector, and I have also been involved with groundbreaking research in the archaeological field providing me with an excellent balance between academia, research and the practical challenges of cultural resource management and the relevant legislation. I completed my Master's Degree on ceramic analysis of material from Mapungubwe Hill in 2012 and was the site manager for the rehabilitation project on Mapungubwe Hill in 2003. I am currently enrolled for a PhD at the University of Johannesburg focussing on the Middle and Later Stone Age. In addition to the aforementioned excavations I was also involved in excavations in the Kruger National Park as well as world-renown sites such as Klasies River providing me with a sound understanding of excavation techniques and site management.

I have more than 20 years' experience conducting heritage assessments, grave relocation projects, heritage mitigation and management projects complying with both national heritage legislation and IFC Requirements. I published in internationally peer-reviewed journals and presented my findings on various national and international conferences. Work experience includes projects in South Africa, Lesotho, Zambia, Zimbabwe, Mozambique, Botswana, the Democratic Republic of the Congo, Tanzania and Guinea.

Key Skills and Experience

- Project management and coordination;
- Management of non- renewable heritage resources within the framework of national and international legislation;
- Archaeological site identification and spatial analysis;
- Archaeological Excavations and research skills;
- Proficient in GIS;
- Heritage Impact Assessments;
- Data capturing in field using Fulcrum
- Practical instruction and training of both students and interns;
- Management of staff and general project management including management of finances, logistics and tasks;
- Team focused, both working as part of a team and managing teams;
- Planning and organisational skills, able to prioritise effectively and bring motivation to any task;
- Strong interpersonal skills, able to build productive relationships with others;
- Analytical problem solver, uses initiative to deliver outcomes;
- Meticulous level of attention to detail, ability to analyse data and compile reports;
- Good communication skills, written and verbal, able to engage with a range of people at all levels;
- Target driven, works with accuracy to challenging deadlines;
- Committed to professional development;
- Excellent IT skills in MS Excel, MS Word, BaseCamp and Power Point;
- Proficient in both English and Afrikaans.

Education

Name of University or Institution:	University of Johannesburg
Degree:	PhD
Year:	Currently Enrolled
Name of University or Institution:	University of the Witwatersrand
Degree Obtained:	MA (Archaeology)
Year of Graduation:	2012
Name of University or Institution:	University of the Witwatersrand
Degree obtained:	BA Hons Archaeology
Year of graduation:	2002
Name of University or Institution:	University of Pretoria
Degree obtained:	BA Heritage Tourism & Archaeology
Year of graduation:	2001

Employment History

2011 – Present	**HCAC Heritage Contracts and Archaeological Consulting CC** • Archaeologist and Project Manager
2007 - 2010	**Managed the Heritage Contracts Unit at the University of the Witwatersrand -** • CRM Archaeologist and Project Manager as well as lecturing a course on CRM Archaeology
2005 – 2007	**Director of Matakoma Heritage Consultants** • CRM Archaeologist and project manager
2004	**Department of Anatomy University of Pretoria –** • **Technical Assistant**,
2003	**Mapungubwe World Heritage Site** • Archaeologist and site supervisor
2001 – 2002	**R & R Cultural Resource Consultants, Polokwane** • CRM Archaeologists
2000	**Fort Klapperkop** • Museum Assistant

Membership of Professional Associations:

- Association of Southern African Professional Archaeologists. Member number 159
- Association of Professional Heritage Practitioners. Member Number #114
- Accredited CRM Archaeologist with SAHRA
- Accredited CRM Archaeologist with AMAFA
- Co-opted council member for the CRM Section of the Association of Southern African Association Professional Archaeologists (2011 – 2012)

Countries of work experience

Republic of South Africa, Botswana, Zimbabwe, Mozambique, Tanzania, The Democratic Republic of the Congo, Lesotho, Zambia and Guinea.

Selected Projects

Archaeological Impact Assessments (Phase 1)

Linear Developments

Selected Linear Phase 1 Cultural Resource Management (Heritage and Archaeological Impact Assessment) Projects:

Archaeological Impact Assessment, Sekuruwe Pipelines, Mokopane, Limpopo.
Archaeological Impact Assessment, Seema Pipelines, Mokopane, Limpopo.
Archaeological Impact Assessment, Tshamahansi Pipelines, Mokopane, Limpopo.
A cultural heritage evaluation for the proposed Spencer Venulu Power line
Archaeological Impact Assessment for the Mamelodi – Hatherley Power Line, Mamelodi, Gauteng Province.
Archaeological Impact Assessment Medupi – Spitskop Power Line, Limpopo Province
Archaeological Impact Assessment Amendment To The Existing Report For The Grootvlei-Balfour Powerline, Burnstone Gold Mine Project, Balfour, Mpumalanga
Archaeological Impact Assessment for the Simmerpan Strengthening Project - Powerlines And New Substation, Johannesburg, Gauteng Province
Archaeological And Cultural Land Assessment For The Lethabo Power Station, On The Farm Lethabo Power Station 1814, Vereeniging, Free State Province
Archaeological Impact Assessment Proposed Marula 132/11kv Substation On A Remainder Of Portion 2 Of The Farm Hartebeestfontein 258 IQ, Randfontein, Gauteng Province
Archaeological Impact Assessment Proposed Cot Wildebees 400/132 Kv Substation And Loop In Lines, On Portions Of The Farms Pienaarspoort 338 & 339 JR And Hatherley 331 JR, Gauteng Province
Heritage Desktop Study for Eskom Tonki project.
Archaeological Impact Assessment for Majuba, Tutuka and Lethabo PV Facilities
Archaeological Walkdown of the Mareetsane Powerline, North West Province.
Phase 1 Heritage Assessment of Doornpoort 312 JS Witbank, Mpumalanga.

Renewable Energy developments

HIA for the proposed Karoshoek Solar Project Kenhardt PV
HIA for the proposed Kotulo Tsatsi Solar Development, Northern Cape.
HIA for the proposed Karoshoek Solar Development, Northern Cape.
HIA for the proposed Buffels Solar Farm 1 , Klerksdorp, North West Province
HIA for the proposed Buffels Solar Farm 2 , Klerksdorp, North West Province
HIA for the proposed Woodhouse Solar Development, North West Province
HIA for the proposed Orkney Solar Farm, Orkney, North West Province
HIA for the proposed Henneman Solar AIA, Free State Province.
Archaeological Impact Assessment for the infrastructure component of the Batoka Gorge Hydro-Electric Scheme, Zambia.
Cultural heritage assessment for the Kalungwishi Hydropower Project in the Luapula and Northern Provinces, Zambia

Grave Relocation Projects

Relocation of graves and site monitoring at Chloorkop as well as permit application and liaison with local authorities and social processes with local stakeholders, Gauteng Province.
Relocation of the grave of Rifle Man Maritz as well as permit application and liaison with local authorities and social processes with local stakeholders, Ndumo, Kwa Zulu Natal.
Relocation of the Magolwane graves for the office of the premier, Kwa Zulu Natal
Relocation of the OSuthu Royal Graves office of the premier, Kwa Zulu Natal

Phase 2 Mitigation Projects

Field Director for the Archaeological Mitigation For Booysendal Platinum Mine, Steelpoort, Limpopo Province. Principle investigator Prof. T. Huffman
Monitoring of heritage sites affected by the ARUP Transnet Multipurpose Pipeline under directorship of Gavin Anderson.
Field Director for the Phase 2 mapping of a late Iron Age site located on the farm Kameelbult, Zeerust, North West Province. Under directorship of Prof T. Huffman.
Field Director for the Phase 2 surface sampling of Stone Age sites effected by the Medupi – Spitskop Power Line, Limpopo Province

Heritage management projects

Platreef Mitigation project – mitigation of heritage sites and compilation of conservation management plan.
The South African Radio Astronomy Observatory Square Kilometre Array – Heritage Impact Assessment and Conservation Management Plan (Specialist input for Digby Wells)

Publications and Presentations

- A Culture Historical Interpretation, Aimed at Site Visitors, of the Exposed Eastern Profile of K8 on the Southern terrace at Mapungubwe.
    - J van der Walt, A Meyer, WC Nienaber
    - Poster presented at Faculty day, Faculty of Medicine University of Pretoria 2003
- 'n Reddingsondersoek na Anglo-Boereoorlog-ammunisie, gevind by Ifafi, Noordwes-Provinsie. South-African Journal for Cultural History 16(1) June 2002, with A. van Vollenhoven as co-writer.
- Fieldwork Report: Mapungubwe Stabilization Project.
    - WC Nienaber, M Hutten, S Gaigher, J van der Walt
    - Paper read at the Southern African Association of Archaeologists Biennial Conference 2004
- A War Uncovered: Human Remains from Thabantšho Hill (South Africa), 10 May 1864.
    - M. Steyn, WS Boshoff, WC Nienaber, J van der Walt
    - Paper read at the 12th Congress of the Pan-African Archaeological Association for Prehistory and Related Studies 2005
- Field Report on the mitigation measures conducted on the farm Bokfontein, Brits, North West Province.
    - J van der Walt, P Birkholtz, W. Fourie
    - Paper read at the Southern African Association of Archaeologists Biennial Conference 2007
- Field report on the mitigation measures employed at Early Farmer sites threatened by development in the Greater Sekhukhune area, Limpopo Province. J van der Walt
    - Paper read at the Southern African Association of Archaeologists Biennial Conference 2008

- Ceramic analysis of an Early Iron Age Site with vitrified dung, Limpopo Province South Africa.
    - J van der Walt. Poster presented at SAFA, Frankfurt Germany 2008

- Bantu Speaker Rock Engravings in the Schoemanskloof Valley, Lydenburg District, Mpumalanga (*In Prep)*
    - J van der Walt and J.P Celliers
- Sterkspruit: Micro-layout of late Iron Age stone walling, Lydenburg, Mpumalanga. W. Fourie and J van der Walt. A Poster presented at the Southern African Association of Archaeologists Biennial Conference 2011
- Detailed mapping of LIA stone-walled settlements' in Lydenburg, Mpumalanga. J van der Walt and J.P Celliers
    - Paper read at the Southern African Association of Archaeologists Biennial Conference 2011
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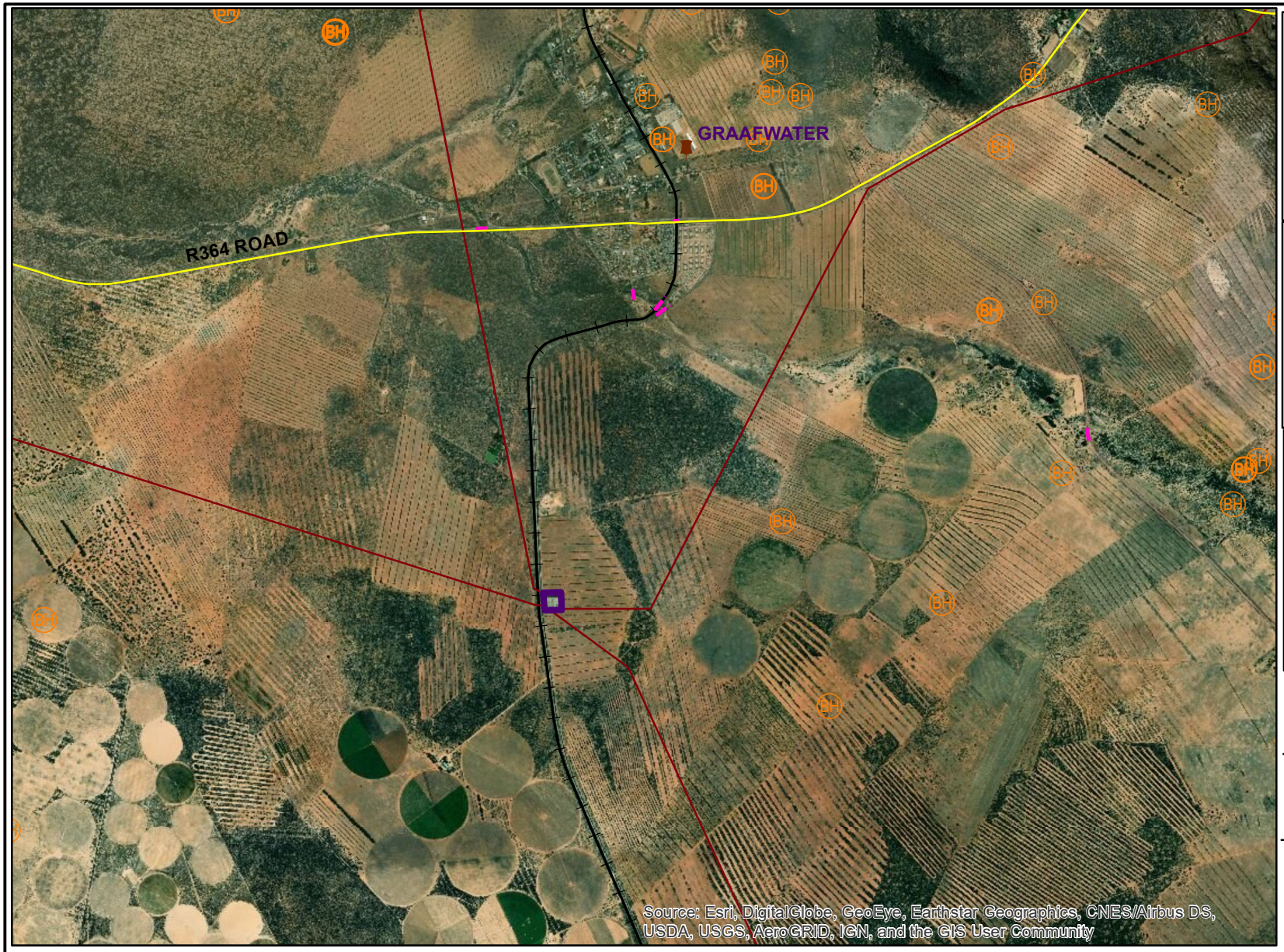
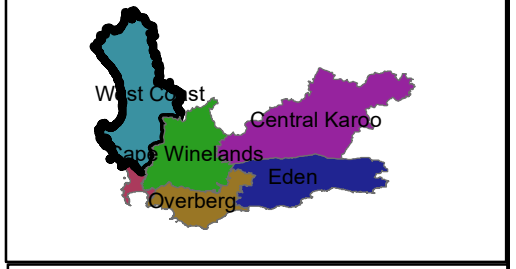
    - Matthew V. Caruana, Jaco van der Walt, Marlize Lombard

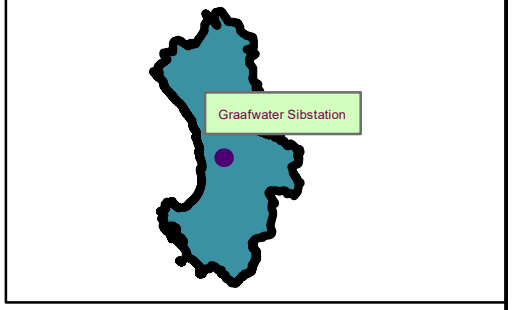
References:

1. Prof Marlize Lombard — Senior Lecturer, University of Johannesburg, South Africa
   E-mail: mlombard@uj.ac.za
2. Prof TN Huffman — Department of Archaeology Tel: (011) 717 6040
   University of the Witwatersrand
3. Alex Schoeman — University of the Witwatersrand
   E-mail: Alex.Schoeman@wits.ac.za

APPENDIX B: MAPS







PROJECT

GRAAFWATER BESS & EIA

TITLE

LEGEND

- Graafwater Substation
- RSA Towns
- Borehole
- Regional Road
- Bridge
- Eskom_Powerlines_HV

RESOURCES

REFERENCE

PROJECTION WGS 1984 Web Mercator Auxiliary Sphere

GRAAFWATER SUBSTATION LOCALITY MAP

GIS	JM	2020/05/25	PROJECT No. 19108	
CHECK	TM	2020/05/25	SCALE 1:50 000	
REVIEW	TM	2020/05/25	A3	REV 0

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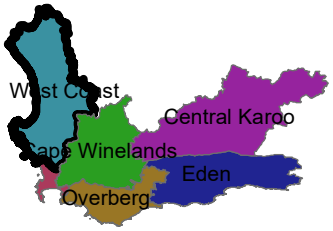

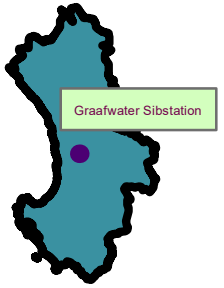

PROJECT

GRAAFWATER BESS & EIA

TITLE

GRAAFWATER SUBSTATION ENVIRONMENTAL SENSITIVITY MAP

LEGEND

Graafwater Substation

Western Cape C-plan

Ecological Support Area

CBA

RESOURCES

REFERENCE

PROJECTION WGS 1984 Web Mercator Auxiliary Sphere

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REVIEW	TM	2020/05/22	A3	REV 0

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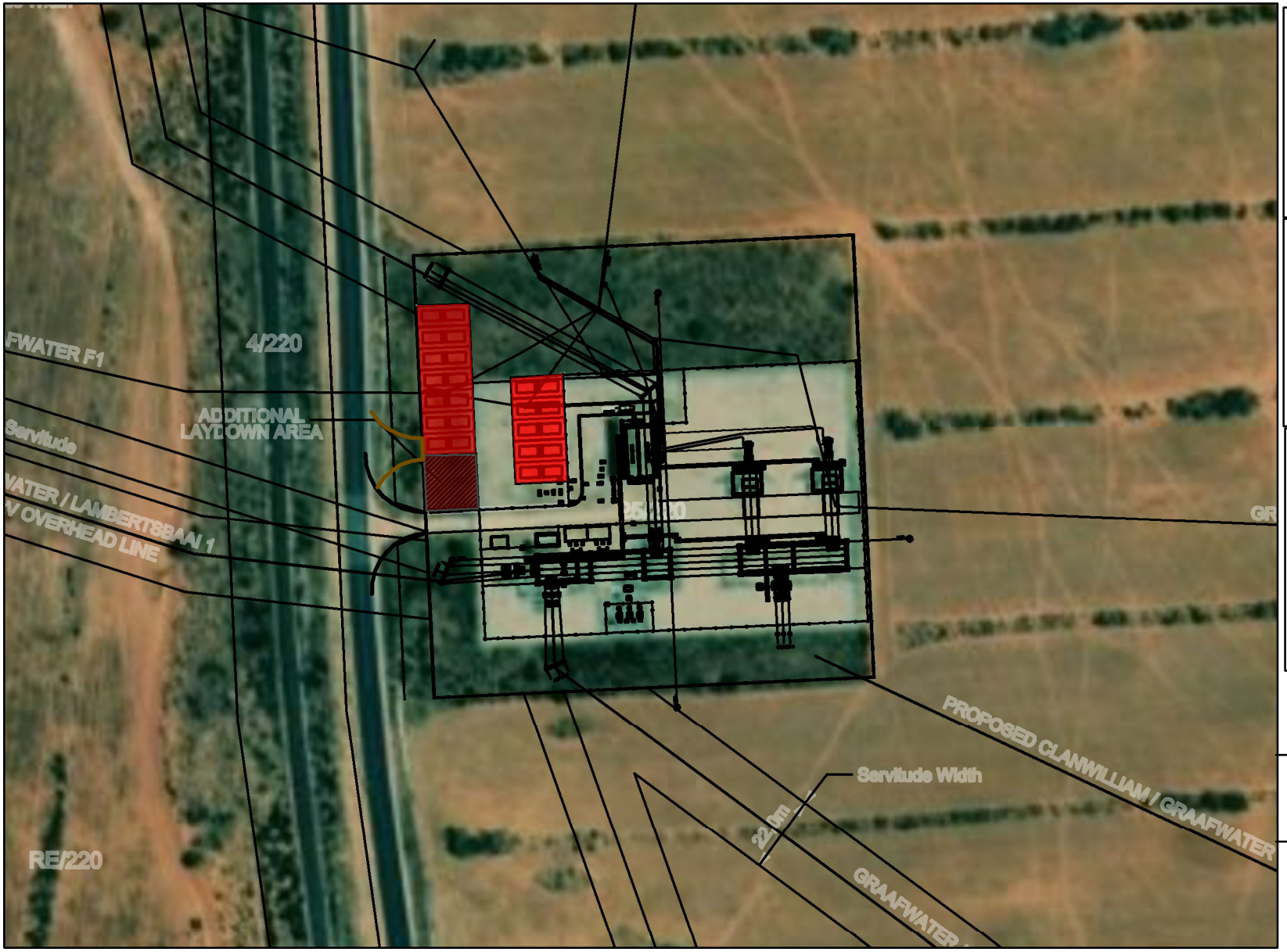

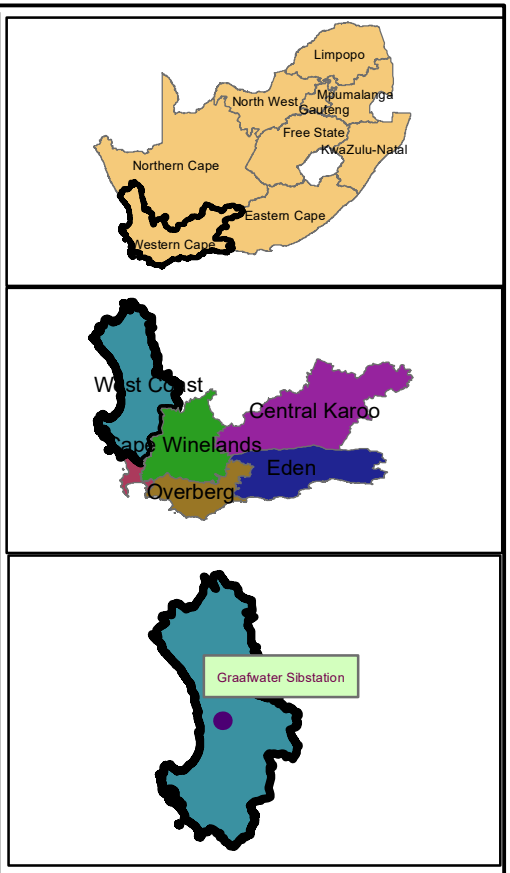

LEGEND

- Existing_substation_infrastructure
- BESS Access Road
- Laydown_area
- BESS Storage area

RESOURCES

0 0.015 0.03 0.06 0.09 0.12 Kilometers

REFERENCE

PROJECTION WGS 1984 Web Mercator Auxiliary Sphere

PROJECT

GRAAFWATER BESS & EIA

TITLE

GRAAFWATER SUBSTATION OPTIMISED LAYOUT MAP

ZITHOLELE CONSULTING

GIS	JM	04 Nov 2020	PROJECT No.	19108
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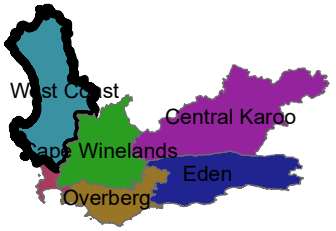

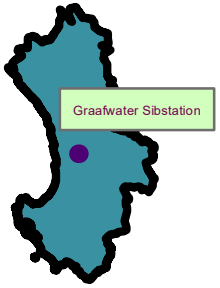

PROJECT

GRAAFWATER BESS & EIA

TITLE

GRAAFWATER SUBSTATION SENSITIVITY MAP

LEGEND

- BESS Access Road
- BESS Storage area
- Laydown_area
- Ecological Support Area

RESOURCES

0 0.015 0.03 0.06 0.09 0.12 Kilometers

REFERENCE

PROJECTION WGS 1984 Web Mercator Auxiliary Sphere

ZITHOLELE CONSULTING

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APPENDIX C: GRIEVANCE MECHANISM GUIDELINE

GRIEVANCE MECHANISM / PROCESS

PURPOSE

This Grievance Mechanism has been developed to receive and facilitate resolution of concerns and grievances about the Graafwater BESS Project's environmental and social performance. The aim of the grievance mechanism is to ensure that grievances or concerns raised by local landowners and or communities are addressed in a manner that:

» Provides a predictable, transparent, and credible process to all parties, resulting in outcomes that are seen as fair, effective, and lasting.
» Builds trust as an integral component of broader community relations activities.
» Enables more systematic identification of emerging issues and trends, facilitating corrective action and pre-emptive engagement.

The aim of this Grievance Mechanism is to address grievances in a manner that does not require a potentially costly and time-consuming legal process.

PROCEDURE FOR RECEIVING AND RESOLVING GRIEVANCES

» Local landowners, communities and authorities should be informed in writing by the Proponent of the grievance mechanism and the process by which grievances can be brought to the attention of the Proponent through its designated representative.
» A company representative should be appointed as the contact person for grievances to be addressed to. The name and contact details of the contact person should be provided to local landowners, communities and authorities.
» Project related grievances relating to the construction, operational and or decommissioning phase should be addressed in writing to the contact person. The contact person should assist local landowners and or communities who may lack resources to submit/prepare written grievances.
» The grievance should be registered with the contact person who, within 2 working days of receipt of the grievance, should contact the Complainant to discuss the grievance and agree on suitable date and venue for a meeting in order to discuss the grievances raised. Unless otherwise agreed, the meeting should be held within 2 weeks of receipt of the grievance.
» The contact person should draft a letter to be sent to the Complainant acknowledging receipt of the grievance, the name and contact details of Complainant, the nature of the grievance, the date that the grievance was raised, and the date and venue for the meeting (once agreed).

- Prior to the meeting being held the contact person should contact the Complainant to discuss and agree on the parties who should attend the meeting. The people who will be required to attend the meeting will depend on the nature of the grievance. While the Complainant and or proponent are entitled to invite their legal representatives to attend the meeting/s, it should be made clear that to all the parties involved in the process that the grievance mechanism process is not a legal process. It is therefore recommended that the involvement of legal representatives be limited.
- The meeting should be chaired by the Proponent's representative appointed to address grievances. The Proponent should provide a person to take minutes of and record the meeting/s. Any costs associated with hiring venues should be covered by the Proponent.
- Draft copies of the minutes should be made available to the Complainant and the Proponent within 4 working days of the meeting being held. Unless otherwise agreed, comments on the Draft Minutes should be forwarded to the company representative appointed to manage the grievance mechanism within 4 working days of receipt of the draft minutes.
- In the event of the grievance being resolved to the satisfaction of all the parties concerned, the outcome should be recorded and signed off by the relevant parties. The record should provide details of the date of the meeting/s, the names of the people that attended the meeting/s, the outcome of the meeting/s, and where relevant, the measures identified to address the grievance, the party responsible for implementing the required measures, and the agreed upon timeframes for the measures to be implemented.
- In the event of a dispute between the Complainant and the Proponent regarding the grievance, the option of appointing an independent mediator to assist with resolving the issue should be discussed. The record of the meeting/s should note that a dispute has arisen, and that the grievance has not been resolved to the satisfaction of all the parties concerned.
- In the event that the parties agree to appoint a mediator, the Proponent will be required to identify three (3) mediators and forward the names and CVs to the Complainant within 2 weeks of the dispute being declared. The Complainant, in consultation with the Proponent, should identify the preferred mediator and agree on a date for the next meeting. The cost of the mediator should be borne by the Proponent. The Proponent should provide a person to take minutes of and record the meeting/s.
- In the event of the grievance, with the assistance of the mediator, being resolved to the satisfaction of all the parties concerned, the outcome should be recorded and signed off by the relevant parties, including the mediator. The record should provide details on the date of the meeting/s, the names of the people that attended the meeting/s, the outcome of the meeting/s, and where relevant, the measures identified to address the grievance, the party

responsible for implementing the required measures, and the agreed upon timeframes for the measures to be implemented.

» In the event of the dispute not being resolved, the mediator should prepare a draft report that summaries the nature of the grievance and the dispute. The report should include a recommendation by the mediator on the proposed way forward with regard to the addressing the grievance.

» The draft report should be made available to the Complainant and the Proponent for comment before being finalised and signed by all parties. Unless otherwise agreed, comments on the draft report should be forwarded to the company representative appointed to manage the grievance mechanism within 4 working days. The way forward will be informed by the recommendations of the mediator and the nature of the grievance.

A Complaint is closed out when no further action can be or needs to be taken. Closure status will be classified in the Complaints Register as follows:

» Resolved. Complaints where a resolution has been agreed and implemented and the Complainant has signed the Confirmation Form.

» Unresolved. Complaints where it has not been possible to reach an agreed resolution and the case has been authorised for close out by the Appeals Committee.

» Abandoned. Complaints where the Complainant is not contactable after one month following receipt of a Complaint and efforts to trace his or her whereabouts have been unsuccessful.

The grievance mechanism does not replace the right of an individual, community, group or organization to take legal action should they so wish. In the event of the grievance not being resolved to the satisfaction of Complainant and or the Proponent, either party may be of the opinion that legal action may be the most appropriate option.

APPENDIX D: STORMWATER MANAGEMENT PLAN

Zitholele Consulting
Reg. No. 2000/000392/07

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TECHNICAL MEMORANDUM

Graafwater Substation, Western Cape Province - Stormwater Management Plan

Tech Memo No : 19108-45-Mem-001-Rev0

Submitted to :

Eskom SOC Ltd.
Megawatt Park, Maxwell Drive,
Sunninghill,
Sandton,
Johannesburg

01 September 2020 19108

DOCUMENT CONTROL SHEET

Project Title : **Graafwater BESS EIA**

Project No : **19108**

Document Ref. No : **19108-45-Mem-001-Stormwater Management Memo-Rev0**

DOCUMENT APPROVAL

ACTION	DESIGNATION	NAME	DATE	SIGNATURE
Prepared	Civil Engineering Technologist	Jyothika Heera Pr Tech Eng.	13.05.2020	
Reviewed	Junior EAP	Jessica Morwasehla	14.05.2020	
Approved	Senior Environmental Scientist	Tebogo Mapinga	20/05/2020	

RECORD OF REVISIONS

Date	Revision	Author	Comments
13.05.2020	0	JH	Issued to client for comments.

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5 RECOMMENDATIONS & CONCLUSION 5

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LIST OF ACRONYMS

MAP	Mean Annual Precipitation

1 INTRODUCTION

Eskom Holdings SOC intends to install a grid-scale battery storage system and associated infrastructure at the Graafwater Substation near Graafwater in the Western Cape Province. Four technology alternatives are proposed to be installed at substation: Solid State Battery (Electrochemical capacitors, Lithium-ion); Vanadium Flow Battery; Redox Flow Battery and Zinc-Bromide Flow Battery. The chemical composition of all these technology alternatives is considered to be hazardous, containing toxic material. All the batteries will be containerized and makes provision for secondary containment to accommodate any spills as a result of normal operation and maintenance.

This Stormwater Management Plan addresses the management of stormwater runoff from the proposed development site. The main factors influencing the planning of storm water management measures and infrastructure are:

- Area of catchment;
- Topography and slope gradients;
- Soil and vegetation cover;
- Placing of infrastructure and infrastructure design;
- Annual average rainfall; and
- Rainfall intensities.

The objective of the plan is therefore to provide measures to address runoff from disturbed portions of the site. The effective management would require that possible pollution conditions of storm water be addressed adequately as it may result in the impact of ground water and water bodies downstream.

This Stormwater Management Plan must be updated and refined once the construction/civil engineering plans have been finalised following detailed design.

2 SITE CHARACTERISTICS

2.1 Locality

Graafwater is a town in the Sandveld in the Western Cape province of South Africa situated 300 km from Cape Town, about halfway between Clanwilliam and Lamberts Bay. Graafwater falls within the Cederberg Municipality. The Graafwater Substation is situated approximately 3kms outside the town of Graafwater at coordinates Co-ordinates 32°10'57.78"S, 18°35'59.11"E. The Graafwater Substation is located on Portion 25 of the Farm Bueroskraal 22

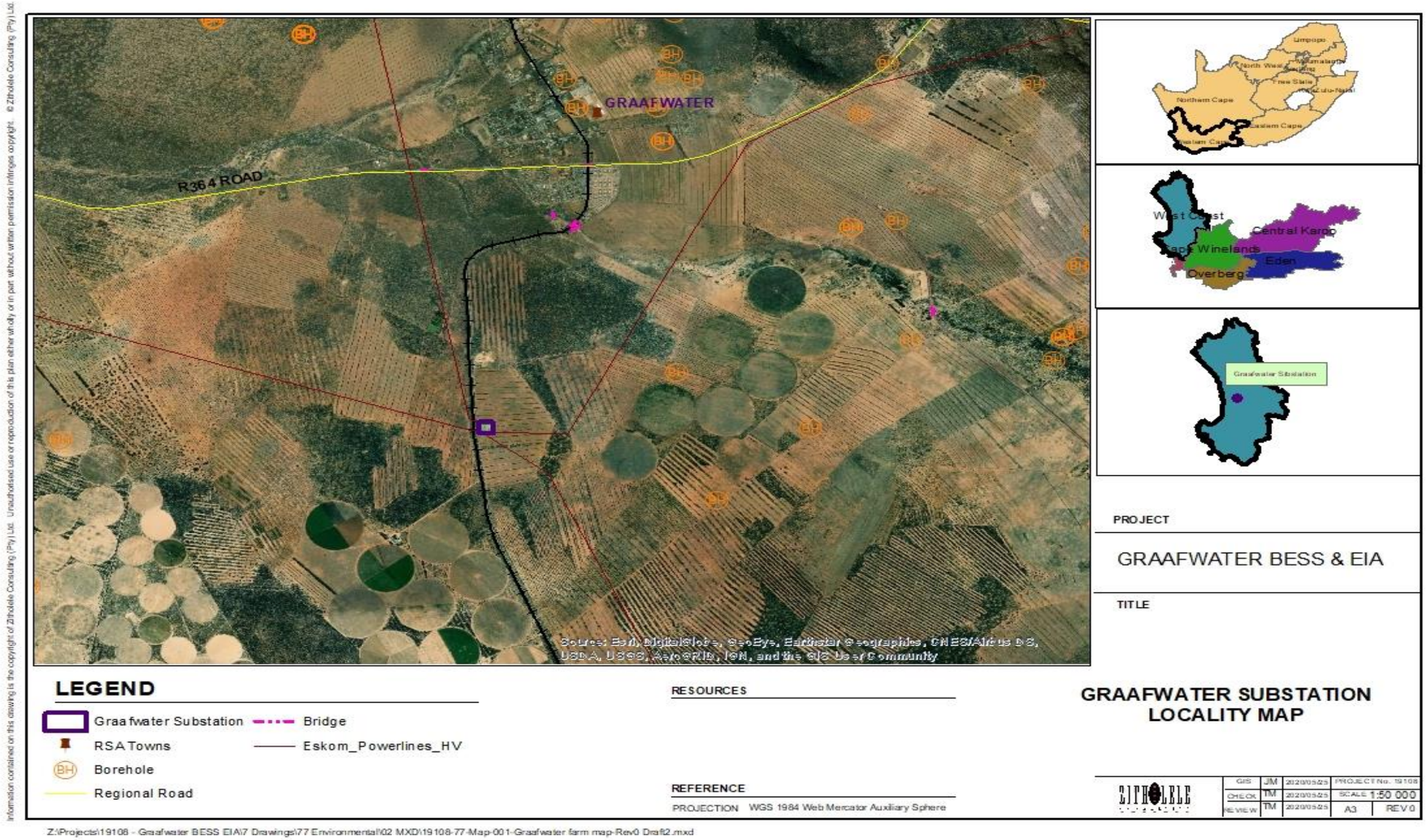

Figure 1 Graafwater Substation Locality Map

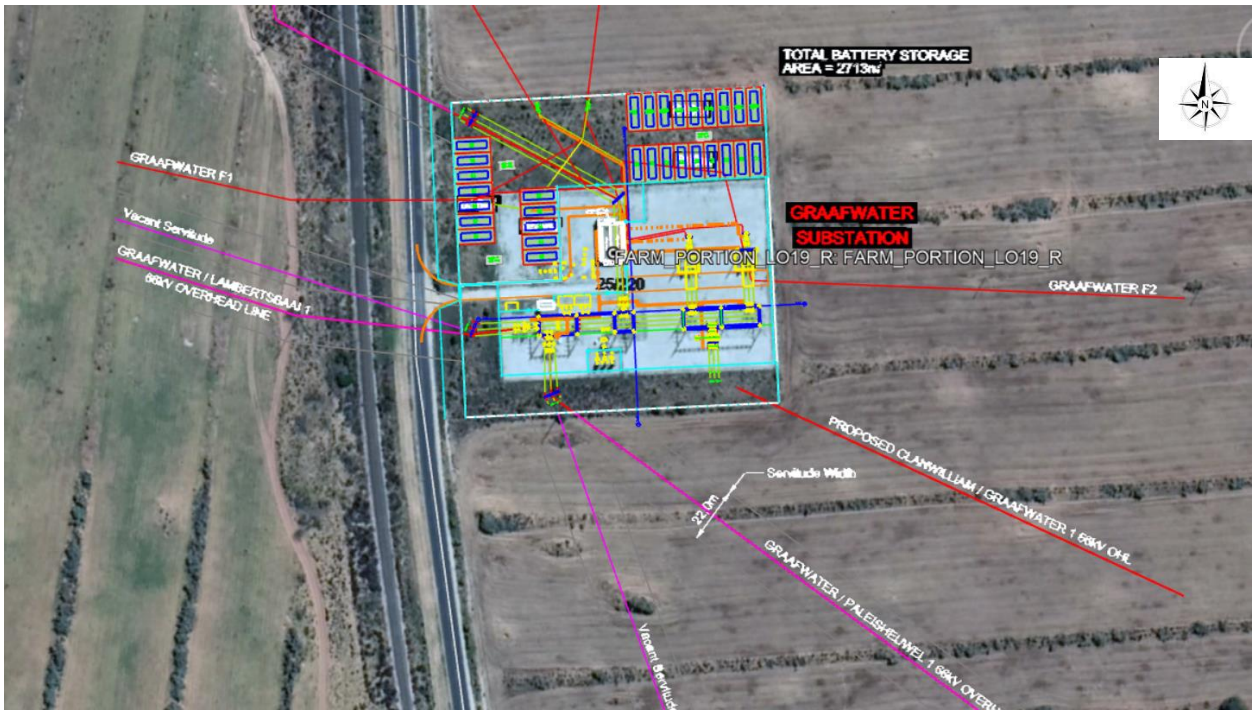

Figure 2: Graafwater Substation Layout

The Graafwater Substation has an approximate footprint area of 15,630 m^2. There are four proposed battery storage footprints, as shown in the above figure, with a total battery storage footprint area of 2,713 m^2. The surrounding area of the Graafwater Substation is vegetation and veld area, with an access road that joins the R364 and R365 running adjacent to the site.

2.2 Topography

The terrain of the Graafwater Substation can be characterised as partly grassed terrain with existing concrete surfaced areas. The proposed battery storage footprint area has grassed terrain with a gentle sloping ground.

2.3 Hydrology

The substation falls within the Olifants/Doorn Water Management Area. The closest rainfall station to the Graafwater Substation is Graafwater KO-OP Rainfall Station (0084159_A). The

Mean Annual Precipitation (MAP) recorded at this station is 240 mm. ``

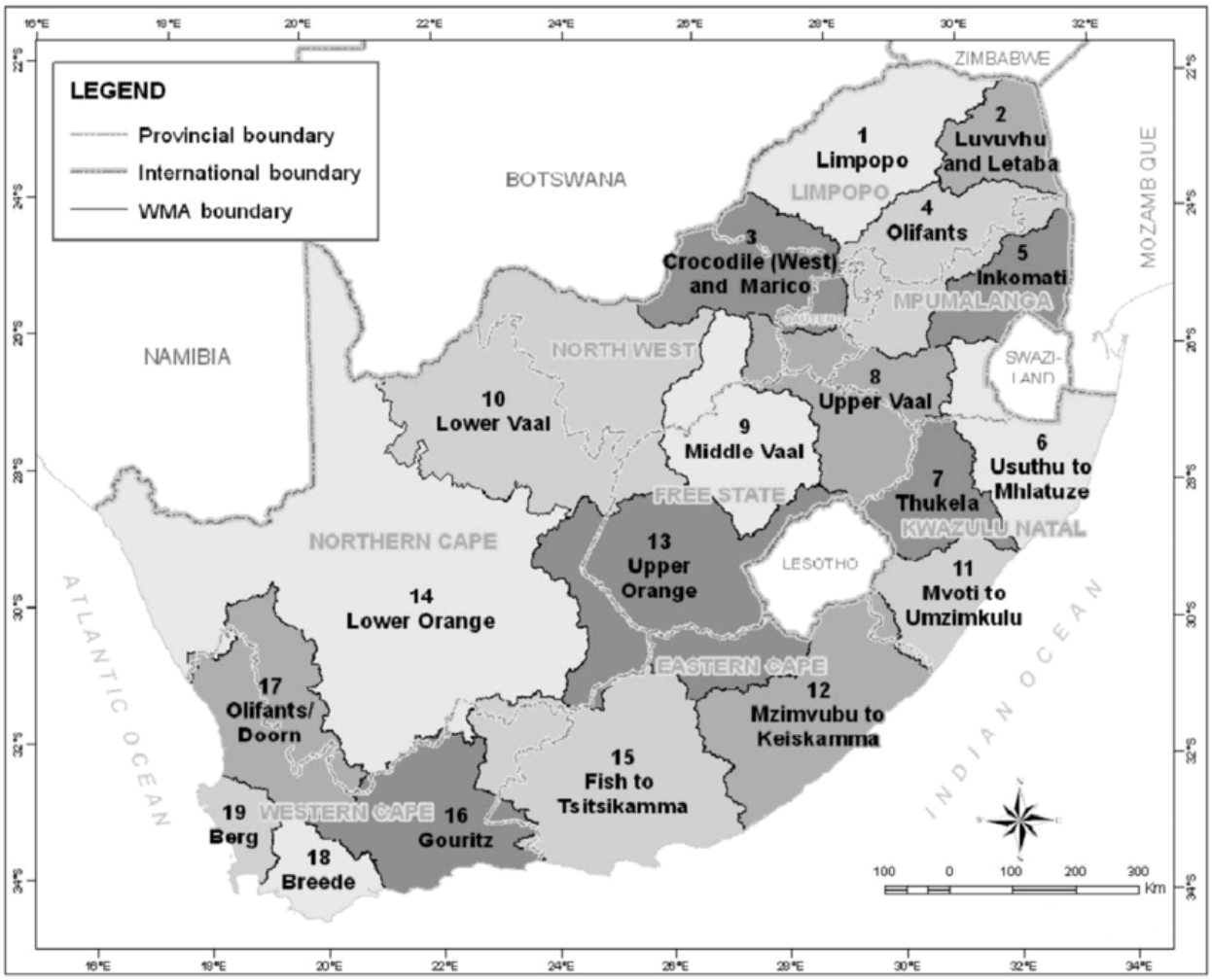

Figure 3 South Africa Water Management Areas

The recorded one-day rainfall depths for the Graafwater KO – OP Rainfall Station are as follows:

Table 1. One Day Rainfall Depth

Return Period (years)	Rainfall per Day (mm)
2	23.5
5	32.6
10	38.7
20	44.7
50	52.6
100	58.7

From the above rainfall statistics, it can be seen that the Graafwater vicinity is characterised by low rainfall.

3 INFRASTRUCTURE

3.1 Planned Infrastructure

Eskom proposes to install grid-scale battery storage at the Graafwater Substation. Four types of technology alternatives are being considered, namely (i) Solid State Battery (Electrochemical capacitors, Lithium-ion, nickel-cadmium, Sodium Sulphur), (ii) Vanadium flow battery, (iii) Redox Flow Battery and (iv) Zinc-Bromide Flow Battery. The chemical composition of all three types of technologies is considered hazardous, containing toxic materials. All the batteries will be containerised and makes provision for secondary containment to accommodate any spill as a result of normal operation and maintenance.

3.2 Existing Infrastructure

The existing infrastructure on site comprises of pylons, underground and overhead electricity cables and electrical network grid infrastructure.

4 STORMWATER MANAGEMENT

4.1 Engineering Specification

Due to the hazardous and toxic nature of the proposed battery storage system, the footprint area of the system is proposed to be concrete bunded with a concrete surface slab to contain any hazardous spillages that may occur during normal and maintenance operations. The bund wall will be located along the perimeter of the battery storage site and will be approximately 500 mm high. A concrete surface slab is proposed to be constructed below the battery storage units on a levelled earth terrace. The concrete surface slab should be constructed with a gentle surface slope with falls towards a low point within the bunded area. A sump is proposed to be constructed at the lowest point of the bunded area. The sump will be used to contain any hazardous spills that may occur and will also include a pump, which will pump any contained hazardous spill from the sump at a later stage when de-sludging of the sump is required.

The hazardous waste material emptied from the sump will need to be disposed of in an environmentally friendly manner at a licenced hazardous waste site.

4.2 Pre-Construction Phase

In the pre-construction (design) phase, various stormwater management principles should be considered including:

- Prevent concentration of stormwater flow at any point where the ground is susceptible to erosion.
- Prevent an increased risk of flooding.
- Reduce stormwater flows as far as possible by the effective use of attenuating devices (such as swales, berms, silt fences). As construction progresses, the stormwater control measures are to be monitored and adjusted to ensure complete erosion and pollution control at all times.
- Minimse the area of exposure of bare soils to minimse the erosive forces of wind, water and all forms of traffic.
- Ensure that development does not increase the rate of stormwater flow above that which the natural ground can safely accommodate at any point in the sub-catchments.
- Ensure that all stormwater control works are constructed in a safe and aesthetic manner in keeping with the overall development.
- Plan and construct stormwater management systems to remove contaminants before they pollute surface waters or groundwater resources. Implement the principle of separating clean and dirty run-off streams (typically from bunded areas or those areas associated with hydrocarbon storage or the facility substation).
- Contain soil erosion, whether induced by wind or water forces, by constructing protective works to trap sediment at appropriate locations. This applies particularly during construction.
- Avoid situations where natural or artificial slopes may become saturated and unstable, both during and after the construction process.
- Design and construct roads to avoid concentration of flow along and off the road. Where flow concentration is unavoidable, measures to incorporate the road into the pre-development stormwater flow should not exceed the capacity of the culvert. To assist with the stormwater run-off, gravel roads should typically be graded and shaped with a 2-3% crossfall back into the slope, allowing stormwater to be channelled in a controlled manor towards the natural drainage lines and to assist with any sheet flow on the site.
- Design culvert inlet structures to ensure that the capacity of the culvert does not exceed the pre-development stormwater flow at that point. Provide detention storage on the road and/or upstream of the stormwater culvert.
- Design outlet culvert structures to dissipate flow energy. Any unlined downstream channel must be adequately protected against soil erosion.

- Preferably all drainage channels on site are contained within the larger area of the property (i.e. including buffer zone) should remain in the natural state so that the existing hydrology is not disturbed.

4.3 Construction Phase

During the construction phase, the contractor must prepare a Stormwater Control Method Statement to ensure that all construction methods adopted on site do not cause, or precipitate soil erosion and shall take adequate steps to ensure that the requirements of the Stormwater Management Plan are met before, during and after construction. The designated responsible person on site must be indicated in the Stormwater Control Method Statement and shall ensure that no construction work takes place before the relevant stormwater control measures are in place.

4.4 Operation & Maintenance of the Facility

Proper operation and maintenance of the facility must be laid out in an operation and maintenance plan. The operation and maintenance plan should include the following:

- Identified required inspection actiivities;
- The maintenance schedule;
- Method for determining when maintenance is required.
- Erosion control measures;
- Sediment management; and
- Litter and debris removal procedures.

5 RECOMMENDATIONS & CONCLUSION

In conclusion, the proposed grid-scale battery storage footprint area needs to be designed as a concrete bunded area with a concrete surface slab, in order to contain any potential hazardous spills in a sump designed for this purpose. These engineering plans will need to be further defined in the basic and detailed design phases to follow.

We also recommend that an operations and maintenance plan be drafted and implemented, in order to ensure proper operations and maintenance of the facility post construction.

ZITHOLELE CONSULTING (PTY) LTD

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