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FINAL BASIC ASSESSMENT REPORT (FBAR)

PROPOSED ESKOM HOLDINGS (SOC) LIMITED BATTERY ENERGY STORAGE SYSTEM (BESS) ELANDSKOP SUBSTATION, LOCATED WITHIN THE MSUNDUZI LOCAL MUNICIPALITY, uMGUNGUNDLOVU DISTRICT MUNICIPALITY, KWAZULU-NATAL

[MARCH 2020]

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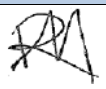
Author	EAP	Roschel Maharaj		07 February 2020
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Disclaimer:

This Basic Assessment Report has been based on information provided by Eskom Holdings (SOC) Limited. While due care is taken in presentation of information, 1World will not take responsibility for errors and/or exclusion of information. Two battery types are presented within the BAR namely Lithium-ion batteries and flow batteries. Eskom will not know the final technology solution that will be used until the tenders have been evaluated and the contract awarded. The Environmental Authorisation is required prior to going out to tender. The list of dangerous goods comes from the final technology selected. Once the Market comes back with solutions, Eskom will evaluate these options and will specify a preferred technology type. 1World acts as the independent Environmental Assessment practitioner (EAP) in this application and performs work in an objective manner.

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Executive Summary

1World Consultants (Pty) Ltd (1World) has been appointed by Eskom Holdings SOC Limited, as the independent Environmental Assessment Practitioner (EAP) tasked with undertaking an Application for Environmental Authorisation. A Basic Assessment Process has been followed for the proposed Eskom Distribution Battery Energy Storage System (BESS) to be located at the Eskom Elandskop Substation, Msunduzi Local Municipality, uMgungundlovu District Municipality, KwaZulu-Natal.

The Distribution Battery Energy Storage project will directly contribute towards the following three (3) Eskom's strategic objectives:

- Ensure reliable supply of electricity to all South Africans;
- Securing adequate future electricity supply at the optimal cost of renewable energy for South Africa; and
- Directly and indirectly supporting the socio-economic development objectives of South Africa.

Eskom is considering several BESS technology alternatives; some are solid state batteries and others are flow batteries. A single battery technology, or a combination of the two technology alternatives, may be implemented at each site. The chemical composition of the batteries can be dangerous and hazardous. Eskom has to follow the World Bank procurement strategy and the disclosure of particular information that could influence market competitiveness. The market for grid connected energy storage systems is rapidly expanding and the various deployment of these systems prove to offer many benefits to the future smart grid. Electrical Energy Storage (ESS) is becoming increasingly important for integrating intermittent renewable energy sources, achieving a better balancing of the grid, reducing total generation cost and limiting investment in new infrastructure. Storage is also an important element in micro-grids and decentralized generation where it permits better planning and management of local energy consumption.

The proposed BESS project triggers the need for a Basic Assessment Report. The impacts associated with the proposed development are focused on both the construction and operational phases. Additionally, impacts to Wetlands, Biodiversity and Heritage aspects were also deliberated and this report now provides all required information to advise on the applied Environmental Authorisation from DEA. Some key impacts were:

- Traffic pressures and access
- Soil erosion
- Stormwater management
- Ground water pollution
- Surface water pollution
- Risk of alien invasive encroachment
- Flora
- Fauna
- Waste management
- Noise disturbance
- Air quality
- Visual quality
- Public health and safety
- Heritage impacts
- Socio-economic impacts

Specialist studies were conducted to aid in a thorough investigation of the impacts and included:

- A **Geotechnical Study** by Eskom Holdings SOC Limited;

- A **Wetland Assessment** by Afzelia Environmental Consultants (Pty) Ltd to determine the impact the proposed development will have on watercourses;
- A **Biodiversity Assessment** by Afzelia Environmental Consultants (Pty) Ltd to determine the potential impact the proposed development may have on flora and fauna;
- An **Application for Exemption for HIA** by JLB Consulting to ensure that no items of cultural or historical value would be impacted on by the construction;

A total of 10 watercourse units were delineated within and around the development site. These include 8 wetland units (i.e. 4 channelled valley bottom wetlands and 4 seep wetlands,), 1 river unit and 1 artificial dam. Of the 8 wetland units, 4 were flagged as being at risk of being impacted by the proposed development. The other 4 wetland units were flagged as being not at risk to being impacted by the proposed development given their location on the landscape and distance from the proposed development area. The results of the PES assessment indicated that all wetland and river units are largely modified with a PES Class of D. Impacts likely to result from the construction of a BESS were grouped into the following broad categories for ease of assessment in terms of impact significance:

a. loss of aquatic habitat and biota;
b. degradation of aquatic habitat; and
c. water and soil pollution.

The assessment results indicate that without mitigation, the construction phase will have a “medium impact significance” on the “degradation freshwater habitat” impact and a “low impact significance” on the “soil and water pollution” impact whilst the operational phase will have a “low impact significance” on both impacts. With implementation of good mitigation measures, the significance of all impacts can be reduced to a “negligible” level for both the construction and operational phases of the project.

Sensitivity of the site is low as it is located within a disturbed landscape (peri-urban sprawl) and plantations. The site itself is also fully transformed as the substation is planned to be built on an existing cement platform. Although this report is based on desktop information and some photographs, it is considered highly unlikely that any conservation important vegetation or habitats are present on site, and the likelihood of Species of Conservation Concern occurring (both flora and fauna) is considered low.

Mitigation measures to minimise or eliminate impacts were identified by the specialists and EAP and were utilised towards the preparation of the Environmental Management Programme (EMPr). The EMPr must be read in conjunction with this BAR and is essential towards the protection of the environmental elements whilst establishing BESS.

A Public Participation Process (PPP) to review the BAR and EMPr involved consultation with the relevant authorities, the landowners affected along the way, community leaders and other identified Interested and Affected Parties (I&APs). Newspaper advertisements were published to inform the general public of the Basic Assessment Process. An advertisement was published in English and IsiZulu on 14 November 2019 in The Post Newspaper. Site notices were erected at the site in November 2019. Public Meetings will only be held should it be requested.

This BAR has been prepared in Accordance with the EIA Regulations, 2017 and follows the requirements for a BAR in Appendix 1 of GNR 326.

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1. INTRODUCTION

1World Consultants (Pty) Ltd (1World) has been appointed, by Eskom Holdings SOC Limited, as the independent Environmental Assessment Practitioner (EAP) tasked with undertaking an Application for Environmental Authorisation. A Basic Assessment Process has been followed for the proposed Eskom Distribution Battery Energy Storage System (BESS) to be located at the Eskom Elandskop Substation, Msunduzi Local Municipality, uMgungundlovu District Municipality, KwaZulu-Natal.

Eskom Holdings SOC Limited has identified distributed storage as an alternative to support renewable energy expansion in South Africa. Electricity generation from renewable sources is 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.

The Distribution Battery Energy Storage project will directly contribute towards the following three (3) Eskom's strategic objectives:

- Ensure reliable supply of electricity to all South Africans;
- Securing adequate future electricity supply at the optimal cost of renewable energy for South Africa; and
- Directly and indirectly supporting the socio-economic development objectives of South Africa.

Eskom will be faced with massive loan recalls and contract penalties if this project does not go-ahead. The World Bank and co-financiers approved distributed battery energy storage and Solar PV as an alternative to support renewable energy expansion in South Africa and to replace the terminated Kiwano CSP 100MW project. The Kiwano CSP (Concentrating Solar Power) plant project has been deemed too expensive to consider at this stage.

Given the global trends in the application of BESS to support National Electricity Grids, significant and scalable benefit can be derived in developing this technology application for South Africa.

Table 1: Summary of Site Details

Elandskop Substation			
Project Applicant	Eskom Holdings SOC Limited		
Ward	Ward 4 & 8		
Local Municipality	Impendle Local Municipality & Msunduzi Local Municipality		
District Municipality	uMgungundlovu District Municipality		
Property Description	**Farm Name**	**Farm/Erf Number**	**Portion**
	Zwaart Kop Native Location	4669	00000
	Van Vuuren's Post	942	00000
	Calderwood	1946	00000
	Calderwood	1946	00005
	Zwaart Kop Native Location	4669	00000
	Van Vuuren's Post	942	00005
Substation Reference	Elandskop 88kV Distribution Substation		
Site Extent	19 237m²		
New Development Footprint on the Ground Level	2 276m²		

1.1. Terms of Reference

In October 2018, an Environmental and Social Management Framework (ESMF) in the context of Eskom's Distributed Battery Storage with Distributed Solar Photo-Voltaic (PV) project, was conducted. The aim was to provide the framework for environmental and social screening, scoping assessment, management, monitoring and reporting during the development, execution, operation and maintenance of this project. The ESMF addressed the South African environmental and social legislative framework as well as Eskom's policies, standards and guidelines that apply the relevant safeguards for this investment that could have an impact on biophysical and social environments in which it is undertaken.

Liaising with the Department of Environmental Affairs (DEA) was also conducted to gain clarity on the application of the EIA Regulations. This is as per Section 28 of the South African National Environmental Management Act which legally obligates Eskom to ensure environmental duty of care in all that it does. Clarification was sought from DEA with regard to several aspects:

- *Whether BESS was considered 'storage' activity (as per Activity 14); i.e. shipping container which houses the lithium-ion batteries vs container tanks for flow batteries*
- *Approach to EA Applications and Project Groupings (EIA Regulations Section 11 relating Combination of applications)*
- *Applicability of Listed Activities and Level of Assessment i.e. Basic Assessment or Scoping and EIA*
- *Alternatives (Site & Technology) & Preferred Alternative Status*
- *Export of hazardous waste (Basel Convention Application)*

DEA advised that each Operating Unit (OU) arrange a Pre-Application Meeting with appointed EAPs. An initial twelve (12) sites across KZN were screened for the implementation of BESS. However, only two (2) substations were given the go-ahead due to funding from the World Bank, as well as, Eskom internal discussions based on BESS implementation. Consequently, a meeting with DEA was requested by 1World and held for the two (2) substation sites in KwaZulu-Natal namely Pongola Substation and

Elandskop Substation.

Ultimately, the outcome of an environmental authorisation process must be to provide the Competent Authority, the National Department of Environmental Affairs (DEA), with sufficient information to provide an informed decision on the Application, in terms of Environmental Authorisation (EA), in order to avoid or mitigate any detrimental impacts that the activity may inflict on the receiving environment.

1.2. Pre-application Meeting

A site inspection was conducted with officials from 1World and Eskom on 26/02/2019. The site inspection conducted, together with the desktop screening conducted informed this BA process and key discussion areas/topics. A pre-application meeting for two (2) substation sites was held on 05 July 2019, to confirm and clarify the above described issues. The following points summarise the pre-application meeting. Detailed minutes of the meeting together with the presentation can be reviewed under Appendix A.

- Detailed project background, introduction and scope was provided.
- The regional setting of each substation was presented whereby the location and municipalities were discussed.
- The Elandskop substation was discussed in detail under the following subsections:
    - General location of the substation;
    - Environmental sensitivities as per the desktop screening report (i.e. CBA; biodiversity; vegetation type; wetlands and watercourses);
    - Anticipated specialist studies to be undertaken at the Elandskop substation.
- The technology alternatives were discussed in conjunction with the listed activities identified. It was noted that it is important to understand the technology proposed as this directly influences the listed activities in terms of the EIA Regulations.

A Basic Assessment (BA) Process has been undertaken and the environmental outcomes, impacts and residual risks of the proposed Listed Activity/ies being applied for have been noted in this BA Report and assessed accordingly by the Environmental Assessment Practitioner (EAP). The requirements of the BA Process have been noted in Appendix 1 of the EIA Regulations, GNR 326 (2017) and are consequently adhered to in this report in the interests of best practice. The BA Report focuses on the potential impacts that may arise during the construction and operational phases and provides recommended mitigation measures.

1.3. Project Approach

The World Bank and co-financiers approved distributed battery energy storage as an alternative to support renewable energy expansion in South Africa and to replace the terminated Kiwano CSP (Upington CSP) 100MW project.

The Elandskop substation is an existing Eskom distribution substation in KwaZulu-Natal. Elandskop substation was identified to have sufficient space to accommodate BESS, without requiring further acquisition of land or rezoning. The proposed commission date for installation is December 2019.

The overall approach to the Basic Assessment Process included the following activities:

- Desktop Screening of the site in question, to identify environmental sensitivities and constraints, including proximity of airports;
- Specialist studies, as required per site, to further identify environmental constraints and elements of concern;

- Preparation of Basic Assessment Reports, that: -
    - Provide relevant background of the project,
    - Summarise key findings,
    - Identify and assess impacts of the project during installation and during operational phase,
    - Provide recommendations and mitigation measures for the responsible installation and operation of the facility,
    - Provide need and desirability, motivation and impact statement from an environmental perspective, and
    - Preparation of an Environmental Management Program (EMPr) for service providers and the Applicant to utilise as a guideline to allow and prohibit tasks, in keeping with the provided Environmental Authorisation that is granted.
- Public and Stakeholder Participation Process, which allows review of the afore-mentioned BAR, studies and EMPr, for positive engagement which allows holistic, legal and complete processes for the installation and operation of the facility,
- Application for Environmental Authorisation to the Department, which provides all the relevant information for the Competent Authority to make a decision regarding the development.

The Desktop Screening Report that was undertaken for the Elandskop Substation can be reviewed under Appendix A. Following receipt of the DEA comment, the original screening report as generated on the online tool can also be reviewed under Appendix A.

The following sections are the Basic Assessment Report for review and acceptance.

2. ROLE PLAYERS IN THE BASIC ASSESSMENT PROCESS

2.1. Environmental Assessment Practitioner

Business name of EAP:	**1World Consultants (Pty) Ltd**		
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E-mail:	fatima@1wc.co.za		

Table 2: Names and Expertise of Representatives of the EAP

Name and Title	Qualifications and Affiliations	Role	Experience at Environmental Assessments
Mohamed Peer	B.Sc (Electrical Eng) Pr. Eng	Project Manager	13 years
Fatima Peer	B.Sc (Hons) Pr. Sci. Nat., IAIAsa	Senior EAP	10 years
Adila Gafoor	B.Soc. Sci. (Geog) IAIAsa	EAP	5 years
Roschel Maharaj	B.Sc IAIAsa	EAP	4 year
Wasila Vorajee	B.Sc (Hons) IAIAsa	Junior EAP	1 year

A Company Profile, Project Experience and CV's for 1World Consultants (Pty) Ltd is provided in Appendix B.

2.2. Project Specialists

Table 3: Names and Expertise of Specialists

Name of specialist	Professional Affiliations	Field of expertise	Section/s contributed to in this basic assessment report	Title of specialist report/s as attached in Appendix E
G. Pillay	Civil Designer	Civil Designer	Summary of Specialist Study Findings and Impacts (Section 11)	Geotechnical Report: Battery Energy Storage System: Elandskop Substation
P. Chetty	Civil Design Manager Pr. Eng	Civil Design Manager		
Brian Mafela (Afzelia Environmental Consultants (Pty) Ltd)	BSc (Hons) Forest Resources and Wildlife Management SACNASP Cand. Sci. Nat (Ecological Science: 100214/15)	Ecological Science	Summary of Specialist Study Findings and Impacts (Section 11)	Wetland Habitat Impact Assessment: Proposed Construction of the Eskom Distribution Battery Energy Storage System (BESS) at Elandskop Substation Located Within the Msunduzi Local Municipality, KwaZulu-Natal
Andrew Briggs (Afzelia Environmental Consultants (Pty) Ltd)	MSc. Conservation Ecology SACNASP Pr. Sci. Nat: 116886	Conservation Ecology		
Leigh-Ann de Wet (Afzelia Environmental Consultants (Pty) Ltd)	MSc Botany SACNASP Pr. Sci. Nat: 400233/12	Botany	Summary of Specialist Study Findings and Impacts (Section 11)	Ecological Impact Assessment for the Proposed Elandskop Substation, Near Howick, KwaZulu-Natal
Jean Beater (JLB Consulting)	MA (Heritage Studies) MSc (Environmental Management) Association of South African Professional Archaeologists (No. 349)	Heritage Specialist	Summary of Specialist Study Findings and Impacts (Section 11)	Application for Exemption for Undertaking Phase 1 HIA for Battery Energy Storage System Elandskop Substation, Msunduzi Local Municipality, KwaZulu-Natal

The specialist declarations and CV's can be reviewed under Appendix B.

3. OBJECTIVES

According to the EIA Regulations (2017), Appendix 1 of GNR 326:

"The objective of the basic assessment process is to, through a consultative process—

- *(a) determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;*
- *(b) identify the alternatives considered, including the activity, location, and technology alternatives;*
- *(c) describe the need and desirability of the proposed alternatives;*
- *(d) through the undertaking of an impact and risk assessment process, inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine—*
  - *(i) the nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and*
  - *(ii) the degree to which these impacts—*
    - *(aa) can be reversed;*
    - *(bb) may cause irreplaceable loss of resources; and*
    - *(cc) can be avoided, managed or mitigated; and*
- *(e) through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to—*
  - *(i) identify and motivate a preferred site, activity and technology alternative;*
  - *(ii) identify suitable measures to avoid, manage or mitigate identified impacts; and*
  - *(iii) identify residual risks that need to be managed and monitored"*

4. LOCATION OF THE ACTIVITY

The proposed BESS facility is located within Ward 4 & 8 of the Impendle and Msunduzi Local Municipalities respectively, at the existing Elandskop Substation Site. The site details are as described in Table 4 below. Map 1 below depicts the general locality of the site projecting a larger overview of the project area. The site is currently used for an 88kV distribution substation. Further site details such as the 21-digit Surveyor General (SG) number for the property and site co-ordinates are provided in Table 4.

Table 4: Site Details

Property Description	**Farm Name**	**Farm/Erf Number**	**Portion**
	Zwaart Kop Native Location	4669	00000
	Van Vuuren's Post	942	00000
	Calderwood	1946	00000
	Calderwood	1946	00005
	Zwaart Kop Native Location	4669	00000
	Van Vuuren's Post	942	00005
Landowner	Eskom SOC Holdings Limited		
21-digit Surveyor General (SG) numbers	**Farm Name**	**Farm / Erf Number**	**21-Digit Code**
	Zwaart Kop Native Location	4669	N0FT00000000466900000
	Van Vuuren's Post	942	N0FT00000000094200000
	Calderwood	1946	N0FT00000000194600000
	Calderwood	1946	N0FT00000000194600000
	Zwaart Kop Native Location	4669	N0FT00000000466900000
	Van Vuuren's Post	942	N0FT00000000094200000
Property Size	19 237m²		
Development Footprint	2 276m²		
GPS Coordinates	29° 40' 17.21" S; 30° 4' 37.17" E		

The general area of the Elandskop Substation and site area is depicted in Figures 1 and 2 respectively.

Figure 1: Greater Msunduzi Municipality and Proposed Site Location (Yellow), (Google Earth Imagery, 2018)

Figure 2: Elandskop Substation (Purple), (Google Earth Imagery, 2018)

5. PROPOSED ACTIVITY

The proposed development is centered on the implementation of Battery Energy Storage System (BESS) proposed at the Elandskop Substation. The project is further discussed below.

5.1. Project Description and Plans

The Elandskop Substation has been identified and noted to have sufficient space to accommodate the proposed Battery Energy Storage System (BESS). No acquisition of land and rezoning is required. The following criteria was implemented to determine substations that qualify for the BESS project.:

- Network simulations identified constrained distribution feeders where BESS can provide a solution;
- Ownership of the property (Ph1 all Eskom Owned);
- Proximity of load customers to existing or confirmed future renewable generators (IPPs);
- Availability of sufficient Medium Voltage connection capacity for the BESS; and
- Availability of sufficient space at the substation for installation of the BESS containers.

Figure 3 below depicts the Elandskop Substation site with a sketch (white Block) indicating the area for the BESS. Figure 4 below is a conceptual design of the Elandskop Substation and the area proposed for BESS as provided by Eskom Holdings SOC Limited.

Figure 3: Elandskop Substation and Proposed Area for BESS (White), (Eskom, 2019)

Figure 4: Conceptual Design of the Elandskop Substation and Proposed Area for BESS (Red), (Eskom, 2019)

5.2. Layout and Sensitivity

Figure 5 below is a sensitivity map which indicates the location of the Elandskop Substation in relation to environmental sensitivities such as Critical Biodiversity Areas (CBA's), wetlands, drainage lines, buffer zones, etc. The sensitivity map presented as Figure 5 below was produced using the SANBI Biodiversity GIS Website. The National Wetlands indicated in the map are as per latest data available on the SANBI website. Shapefiles of the delineated wetlands as well as the drainage lines were provided by the specialist and uploaded onto the website in order to create a sensitivity map. As per the sensitivity map, the Elandskop Substation is an existing substation and the map confirms that the Elandskop substation does not intersect any area classified as a wetland/ watercourse or CBA.

Batteries will be housed in containers (e.g. shipping containers) which will be coupled together and placed on site. The batteries will charge at night and discharge at peak times. The GPS co-ordinates for individual batteries cannot be provided at this stage as this will only be confirmed once the battery system to be implemented is selected. The number of BESS implemented on site depends on the technology type. Certain types are self-contained containers (e.g. Li-ion) whereas others are sized according to the output required. For example, Vanadium will have tanks (usually two) which store the electrolytes. The capacity of the tanks will depend on the output requirements. There may be two large tanks or multiple smaller tanks on site.

Based on the above, co-ordinates are provided for the four (4) corners which will peg out the area proposed to be cleared, as per Table 5 below. The area that is to be cleared is depicted the in KML and KMZ file that is provided on the electronic/ USB copy. As per the Google Earth File provided electronically, the proposed area to be cleared is classified as disturbed.

Table 5: Co-ordinates of Area for Proposed BESS

Point	Co-ordinates
1	29° 40' 18.22" S; 30° 4' 36.00" E
2	29° 40' 17.91" S; 30° 4' 37.07" E
3	29° 40' 20.48" S; 30° 4' 36.83" E
4	29° 40' 20.16" S; 30° 4' 37.92" E

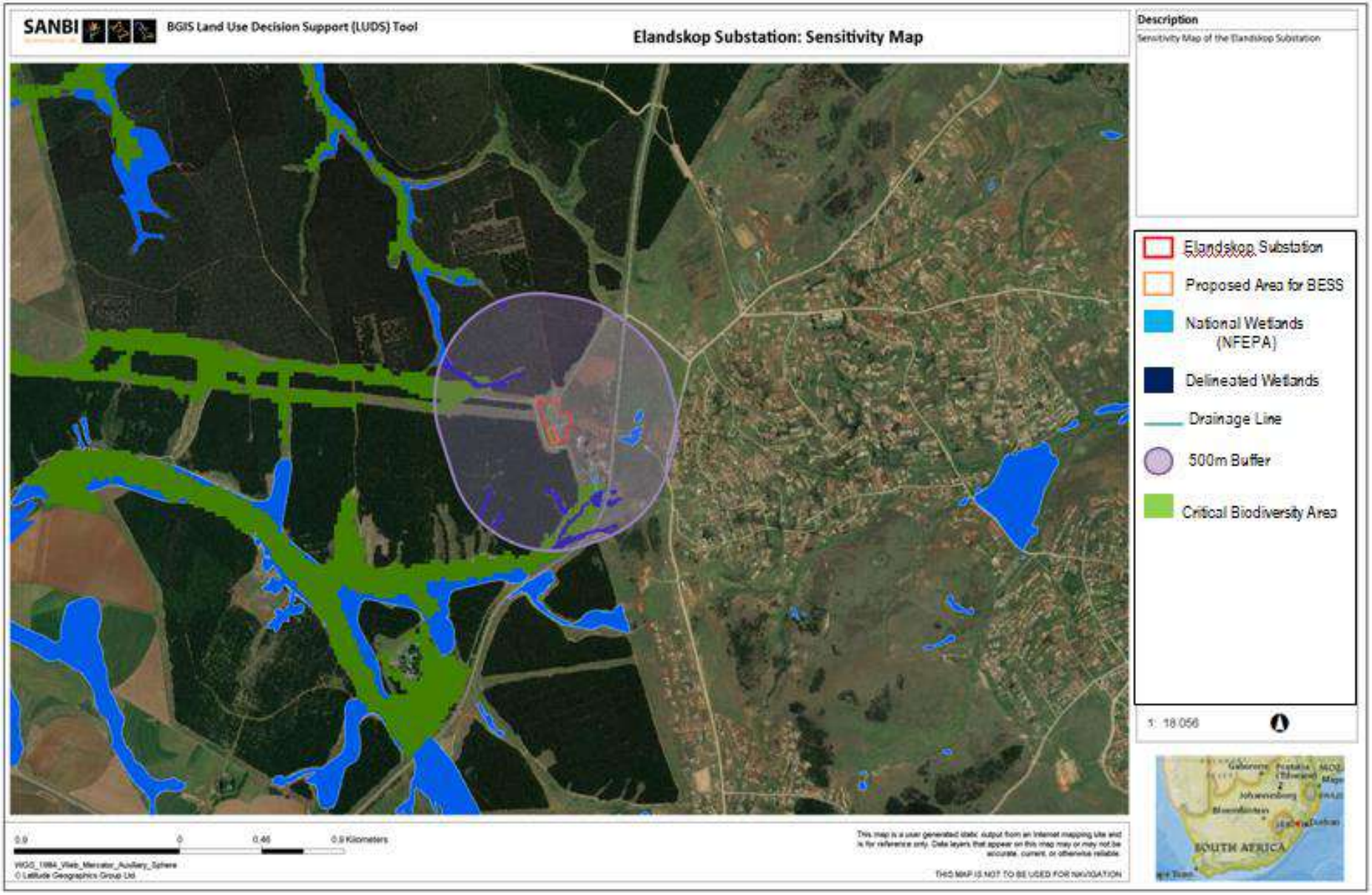

Figure 5: Sensitivity Map for the Elandskop Substation Site (SANBI GIS Tool, 2014)

5.3. Technology Type and Function

Eskom is responsible for 95% of South Africa's energy supply. The energy sector in South Africa has evolved over the recent years with the introduction of renewable energy power producers. Eskom has launched the new Battery Energy Storage System (BESS) project which is focused on storage technology and their evolution. Figure 6 below indicates the energy storage solutions identified over the years.

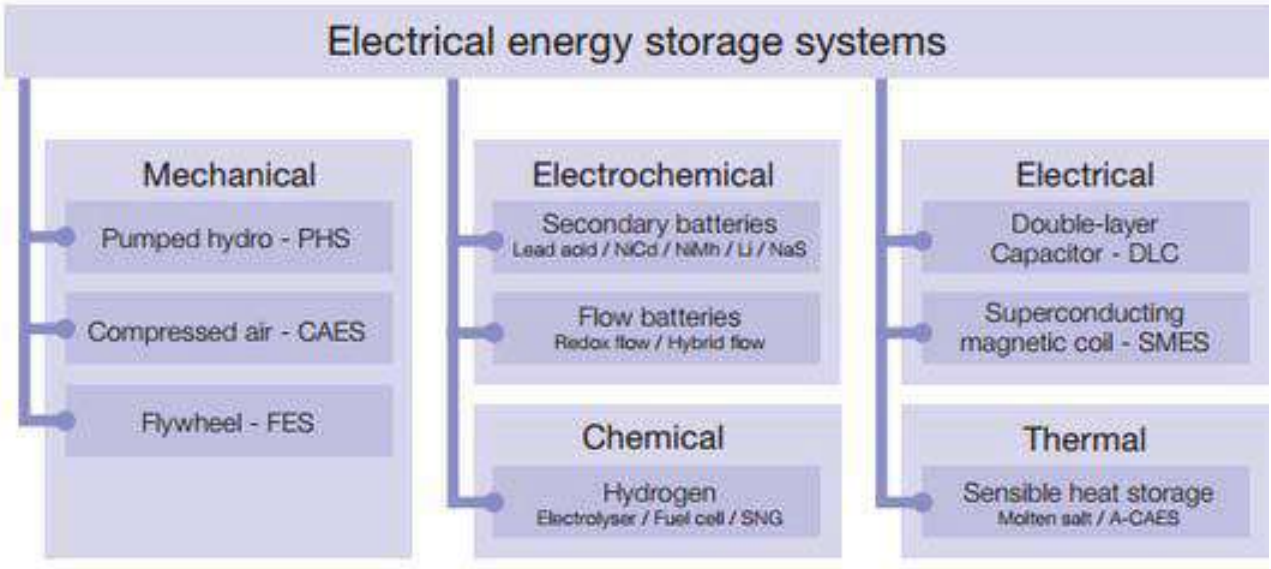

Figure 6: Electrical Energy Storage Systems (Eskom Technology, 2018)

BESS technology is categorised as Electrochemical and/or chemical solutions as per Figure 6 above. Research on battery technology is based on Lithium-ion and Flow Battery technologies. BESS technology is continuously developing and very fast leading to greater capacity and lower costs. The proposed battery energy storage system has not been classified as electricity generation nor distribution. The batteries are not able to charge itself. Electricity generation from renewable sources is 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 energy, store it temporarily and then converted back to electrical energy, therefore giving the utility considerable flexibility and control.

Eskom is considering several BESS technology alternatives; some are solid state batteries (i.e. Lithium-ion) and others are flow batteries. A single battery technology, or a combination of two or more technology alternatives, may be implemented at each site. The chemical composition of the batteries can be dangerous and hazardous. Eskom has to follow the World Bank procurement strategy and the disclosure of particular information that could influence market competitiveness.

Eskom does not anticipate exporting any hazardous waste for any of the technologies. The lifecycle of the technologies varies from 10 to 25 years. The supplier is responsible for recycling any hazardous waste emanating from the technology operation, maintenance and finally replacement as well as meet any legislative requirement this may require.

The proposed footprint to be cleared is inclusive of the BESS as well as areas that are necessary during construction such as laydown areas, material storage areas, waste storage areas and the site office. Eskom is considering two technology alternatives. A preferred alternative cannot be stated at this stage. Eskom will be exploring the markets once the EA is granted

by going out to tender. The results/ evaluation will influence the technology type that is selected to be implemented on site. The number if BESS on site (i.e. individual batteries) depend on the type of battery used. Certain types are self-contained containers (e.g. Li-ion) whereas others are sized according to the output required. For example, Vanadium (solid-state battery) will have tanks (usually two) which store the electrolytes. There may be two large tanks or multiple smaller tanks on site. However, this can only be confirmed once the technology type to be utilized is confirmed. The quantities and composition of the dangerous goods incorporated into the battery can only be determined once the technology alternative is selected. The quantities and combinations of hazardous substances will differ between the several manufactures; however, Eskom has confirmed that the dangerous goods will not exceed 500m^3.

5.4. Associated Activities and Infrastructure

A concept design report has been compiled by the Eskom Engineering team which focuses on the engineering requirements of the BESS. The implementation of BESS at the Elandskop substation requires the following:

5.4.1. Earthing Requirements

- The substation earth grid is existing and was designed according to 240-134369472, Substation Earth Grid Design Standard.
- Unless otherwise specified, the Contractor shall supply the copper and all the material necessary for extending the earth grid to accommodate the BESS installation.
- The Contractor shall further be responsible for the safekeeping of the copper.
- The existing earth grid comprises 10mm Ø round copper and where extended will be laid 1000mm below ground level to accommodate the new additional equipment.
- All new equipment will be connected to the main earth grid using 50 x 3mm flat copper earth straps.

5.4.2. General

- Civil scope of work shall include the design, detailing, micro siting, material procurement, layout, erection for the structural components of the BESS foundations as required, and conduit required for the complete BESS.
- All foundations shall be erected according to Eskom's standard foundation drawings and be in accordance the relevant SANS 1200 documents and the latest revision of drawing D-DT-5240.
- Risk of collapse and keeping excavations free of water shall be included in the quoted rate.
- All BESS foundations and structures, if any are required, shall be designed by a qualified registered professional engineer.
- All final designs (Issued for Construction) drawings, specifications and calculations shall be wet stamped by a Registered Civil/Structural licensed Engineer.
- The Contractor will self-perform or sub-contract with local Contractors the installation of the concrete pad/foundation and buried conduit installation based on the design provided by the BESS supplier.
- The Contractor shall supply, transport and off-load off all material and equipment necessary for completing all the civil works.
- The Contractor shall design the BESS yard to ensure that no electrolyte or any hazardous substance comes into contact with the soil.

5.4.3. Mounting System

a. The BESS Contractor shall install all BESS components per manufacturer requirements:

- All components shall be secured to floor or walls.
- Include structural load design calculations signed and sealed by a qualified professional engineer.
- All structural components shall be installed in a manner commensurate with attaining a minimum 25-year design life.
- Supply and erect complete foundations to standard Eskom drawings including formation, reinforcing, holding down bolts, back filling and compaction around the foundations.
- All material used for the foundations shall be in accordance to the relevant foundation drawings and SANS documents mentioned on these drawings.
- The tenderer shall supply all materials.
- All holding down bolts shall be galvanised to ISO 1461 for all foundations.
- All holding down bolts shall be in accordance to SANS 1700 series with a strength grade of minimum 4.8.
- For transformers, supply and erect complete plinths and runways/slipway according to drawing D-DT-5240 including formation and reinforcing.

b. Cable trenching and kerbing:
- Supply and install complete cable trench as required including back filling and compaction around the trenches in accordance to D-DT-5254 series.
- All ramps shall be a concrete slab reinforced with minimum steel as per SANS 1200 design document and D-DT-5254.

c. Herbicides, insecticides, etc. shall include:
- Treating of yard surface with Eskom approved herbicides, insecticides, etc.
- Forming of V-grooves along foundation walls and treating with additional insecticides approved by Eskom.
- All herbicides, insecticides, etc. and the application thereof shall be in accordance to Eskom's latest corporate Environmental Policy.
- A guideline for selecting herbicides used in substations shall be enquired from Eskom's Environmental Department.
- Prior to the use of any herbicides, insecticides, etc. approval from Eskom's environmental representative shall be obtained.
- Consultation on herbicides and the effectiveness thereof, as well as advice on any other aspect of herbicides, can be obtained from Eskom's Environmental Department.

5.4.4. BESS Internal Roads and Terrace (Temporary and Permanent)

- The design and construction of BESS pads lay down areas, and site access roads and terrace shall conform to the South African National Standards, local codes and regulations, and requirements specified below and in the Contract.

i. General Access and BESS Interlinking Roads
- The Contractor shall design and construct the Project Works BESS interlinking roads in accordance with the Contract. Roadway material and construction shall meet all requirements of the performance criteria set out in this Scope of Work.
- The Contractor shall provide permanent roads to and within the Project Works to provide adequate access to each BESS and other associated project facilities. The roads shall be designed in accordance with the design criteria for carrying all the vehicles likely to be used during construction and throughout the life of the Project Works. The Contractor shall rehabilitate his network of roads that provide access to the BESS sites prior to hand over to the Employer.

5.4.5. Fencing

- The Contractor shall erect and maintain, at its own expense, suitable and approved temporary fencing as the Contractor deems necessary to enclose his laydown area and works.
- Temporary fences shall be removed after the completion of construction.
- The permanent fence surrounding the BESS installation will be done with reference to the security rating of the area and in accordance to the relevant Eskom fencing standard and drawings, including the Elandskop S/S Earthmat and Security Fence Plan.

5.4.6. Foundations

- All new foundations will be installed in accordance SANS 1200 latest revision.
- All new foundation HD bolts to be aligned for casting of concrete to a tolerance of ± 2mm. Foundation tolerances to be in accordance with SANS 1200 G.6 GRADE II.
- All new foundations to have 25mm grout under baseplates only. Grout MIX 2:1. All HD bolts should have two nuts and two washers. Grout must be a feather finish to allow water to run free from the baseplate.

5.4.7. Trenching

- New control cable trench/es shall be added to accommodate any addition control cables required for the installation of BESS.
- All new trenching will be installed in accordance SANS 1200 latest revision.
- Existing control cables at Elandskop substation are laid in trenches excavated directly in the ground and backfilled with the same material where suitable.

5.4.8. General Steelwork

- The Contractor shall design, procure, for the structural components for the complete BESS unless otherwise specified, all steelwork shall be standard equipment supports according to 240-94743192, Eskom's standard equipment support drawings.
- Erecting Steelwork shall include:
    i. Supply and erect all steelwork shown on Steelwork Schedule and according to standard Eskom drawings.
    ii. The steel for the supporting structures shall be in accordance to the specific support structure drawings.

5.4.9. Installation of Equipment

- All work shall be in accordance to OEM and/or Eskom standards and specifications.
- Unless otherwise specified, all installed equipment shall be labelled.
- All BESS feeder bay equipment is installed other than a cable end support. The BESS contractor shall ensure that the installed equipment is suitable for the intended application of connecting to BESS.
- Where necessary, equipment shall be positioned, and all necessary stringing and earth bonding shall be done according to the relevant Elandskop Substation Drawings Cover Sheet ER00344-16-01.

5.4.10. General Electrical Equipment

- The project works shall be capable of meeting utility voltage and frequency response requirements at the point of interconnection.
- The output of the BESS shall be gathered via the Collection System Circuit(s) and delivered to the 11kV busbar on the existing sub-station.
- The Contractor's scope of responsibility includes all work from the Battery/container/enclosure and associated equipment to the 11kV busbar.
- The Contractor shall provide all electrical equipment required for a fully functional BESS including the 11kV and below interconnection to Elandskop Substation.

6. LEGISLATION AND GUIDELINES APPLICABLE

6.1. Applicable Listed Activities

In terms of the Environmental Impact Assessment (EIA) Regulations (2017), promulgated in terms of the National Environmental Management Act, 1998 (NEMA), certain Listed Activities are specified for which either a Basic Assessment (GNR 327 and 324 of 2017) or full Scoping and EIA (GNR 325 of 2017) is required. The following Listed Activity in Government Notice (GN) R327 (Listing Notice 1) and GN 324 (Listing Notice 3) of 2017 are triggered, requiring a Basic Assessment (BA) Process for the proposed BESS at the Elandskop 88kV Distribution Substation, uMgungundlovu District.

Table 6: Relevant Activities from EIA Regulations 2017

EIA Regulations 2017			
Regulation Year	**Listed Activity NEMA**	**Description of Activity**	**Applicability to the Project**
2017	LN 1, Activity 14	The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	The Battery is not regarded as a facility or infrastructure for the storage, or storage and handling of a dangerous good, there may indeed be instances where a battery is not fully assembled and the electrolyte (or substances making up such electrolyte) intended for such battery, may potentially be stored on site, in a container (e.g. tanks), prior to filling. In this instance, where the electrolyte, or the substances making up the electrolyte, are stored in a container, such facility or infrastructure will indeed be regarded as a facility or infrastructure for the storage, or storage and handling of a dangerous good, for the purposes of the Regulations, as these would have as its purpose then, not the storage of energy, but indeed the storage of that substance (if indeed a dangerous good). A letter was received by Eskom (Mr Prince Moyo), confirming the applicability of Listed and specified activities which relate to the development and related operation of facilities or infrastructure, for the storage, or storage and handling of a dangerous good. The letter can be reviewed under Appendix C of the Final BAR.

Hence, a BA Process is required. The Application for Environmental Authorisation has been lodged with the national Department of Environmental Affairs on 14/11/2019. The Acknowledgement receipt was received from the Department on 15/11/2019 and can be reviewed under Appendix C. Eskom has received a letter from DEA which confirm the applicability of Listed and specified

activities which relate to the development and related operation of facilities or infrastructure, for the storage, or storage and handling of a dangerous good. Based on the letter received, Eskom has provided a detailed letter of the chronology of events leading to the conclusions drawn. These letters can be reviewed under Appendix C.

6.2. Policy and Legislative Context

Table 7 provides a list of all applicable legislation, policies and/or guidelines of any sphere of government that are relevant to the application as contemplated in the EIA regulations.

Table 7: Applicable Legislation, Policies and/or Guidelines

Title of Legislation, Policy or Guideline	*Administering authority*	*Date*
National Environmental Management Act (Act 107 of 1998) – for its potential to cause degradation of the environment (Section 28).	Department of Environmental Affairs	1998
Environmental Conservation Act (Act 73) – for potential environmental degradation.	Department of Environmental Affairs	1989
National Water Act (Act 36 of 1998) – for potential to cause pollution of water resources defined under the Act (Section 19).	Department of Water Affairs and Forestry	1998
Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) – for protection of agricultural resources and for control and removal of alien invasive plants.	National Department of Agriculture	1983
National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) – for protection of biodiversity.	Department of Agriculture and Environmental Affairs & Ezemvelo KZN Wildlife	2004
The National Heritage Resources Act (Act No 25 of 1999 as amended) – for the identification and preservation of items of heritage importance.	South African Heritage Resources Agency	1999
KwaZulu-Natal Amafa and Research Institute Act, 2018 (Act No. 5 of 2018)	KwaZulu-Natal Amafa and Research Institute.	2018
EIA Regulations GNR 326 – for guidelines on the process to be followed and the format of the BAR.	Department of Economic Development, Tourism and Environmental Affairs	2017
Public Participation guideline in terms of NEMA EIA Regulations	Department of Economic Development, Tourism and Environmental Affairs	2017
National Climate Change Response Plan White Paper	Department of Environmental Affairs	2011
National Environmental Management: Waste Act	Department of Environmental Affairs	2008
National Environmental Management: Air Quality Act	Department of Environmental Affairs	2004
Spatial Development Framework	uMgungundlovu District	2015

Integrated Development Plan	Msunduzi Municipality	2018/2019

7. NEED AND DESIRABILITY

Eskom will be faced with massive loan recalls and contract penalties if this project as alternative to CSP is not executed. Given the global trends in the application of BESS to support National Electricity Grids, significant and scalable benefit can be derived in developing this technology application for South Africa. BESS offers several benefits to Eskom and solutions to some of the challenges it faces:

- Unlocking constrained networks (Reduction in loading / congestion of upstream High Voltage networks)
- Reducing voltage drops and improve quality of supply
- Deferment or replacement of future capital expansion projects
- Supports mini-grids in areas with limited access to bulk power
- Peak load reduction - 4 hours of battery storage increases dispatch time (thereby extending baseload and offset carbon emissions)

The Distributed Battery Storage with Distributed Photo Voltaic (PV) project will directly contribute towards the following three (3) Eskom's strategic objectives:

- Ensuring reliable supply of electricity to all South Africans,
- Securing adequate future electricity supply at the optimal cost of renewable energy for South Africa; and
- Directly and indirectly supporting the socio-economic development objectives of South Africa.

Eskom has proposed to implement the BESS technologies to effectively reduce carbon emissions as compared to coal fired power stations. BESS allows for improved emissions control and contributes towards large scale renewable energy development. The implementation of the BESS technology options will aid in releasing 'some' pressure on the current grids. The BESS technology types are space efficient ensuring that maintenance and management of the batteries can be undertaken at ease. Furthermore, the BESS infrastructure will blend in with existing land uses. Waste generation from BESS technology is expected to be minimal thus reducing impacts contributing towards pollution.

8. CONSIDERATION OF ALTERNATIVES

Ideally, alternatives are considered to evaluate the proposed plans against the No-Go option. Alternatives to the project site selection; layout plans as well as alternatives to construction methodologies and/ or materials used for the development are evaluated. The potential impacts of the preferred alternative are then evaluated in section 12 below.

8.1. Motivation for the Preferred Site, Activity and Technology Alternative

The proposed development triggers Listing Notice 1, GNR 327, and Listing Notice 3, GNR 324 of the EIA Regulations (2017). As per GNR 326 (2017), Appendix 1(2)(b) and 1(3)(g); alternatives for the proposed development to be identified and considered. Chapter 1 of the EIA Regulations provides an interpretation of the word "alternatives", which are options "in relation to a proposed activity, mean(ing) different means of meeting the general purpose and requirements of the activity, which may include alternatives to the-

a) Property on which or location where the activity is proposed to be undertaken;
b) Type of activity to be undertaken;
c) Design or layout of the activity;
d) Technology to be in the activity; or
e) Operational aspects of the activity;
And includes the option of not implementing the activity."

Based on the above, the following alternatives are presented for the proposed BESS project at the existing Elandskop 88kV Distribution Substation, uMgungundlovu District.

8.2. Alternatives to Site Selection – Preferred Site Alternative

Figure 7 below provides an aerial view of the existing Elandskop Substation site, located within the Impendle and Msunduzi Local Municipality. No site alternatives have been proposed as the existing property is Eskom owned. The Elandskop Substation is already existing, and BESS aims to supplement energy to this existing substation. It is therefore feasible for the proposed development to take place within this property.

Figure 7: Aerial Snapshot of the Existing Elandskop 88kV Distribution Substation (Google Earth Image, 2018)

At 19 237m² in size, the site is large enough to accommodate the BESS infrastructure. The property is fenced; however, the site is categorized as "disturbed". Agricultural activities have not been undertaken on the site, however, during the site inspection remains of foundation was found on site. This is an indication that there previously was a building erected and demolished on site. The Elandskop 88kV Distribution Substation was established in 1993, hence the site is regarded as significantly and irreversibly transformed. The BESS project for this site does not require expansion of the site footprint from current.

	Site Photographs	
	Snapshot	**Description**
1	 	**Snapshot 1:** depicts the entrance point and access roads at the Elandskop Substation.

2		**Snapshot 2:** depicts containers / offices located at the entrance of the access point at the Elandskop Substation.
3		**Snapshot 3:** depicts water storage on site by means of a Jo-Jo tank.

	Snapshot	Description
4		**Snapshot 4:** depicts the Elandskop Substation.
5	 	**Snapshot 5:** depicts the area for BESS.

	Snapshot	Description
6	 	**Snapshot 6:** depicts proof of foundation within the area proposed for BESS, thus indicating proof of previous development.

8.3. Alternatives to Layouts and Designs

Figure 8 below is an Environmental Sketch of where BESS is proposed. The battery storage will remain within the property boundary.

No layout alternatives were considered as the proposed battery storage is restricted to the property. The site is also constrained in terms of layouts that allow maximum usage of the property.

Refer to Appendix C for conceptual designs.

Figure 8: Location of the Proposed BESS at the Elandskop Substation

8.4. Preferred Technology Alternative

The market for grid connected energy storage systems is rapidly expanding and the various deployment of these systems prove to offer many benefits to the future smart grid. Electrical Energy Storage (ESS) is becoming increasingly important for integrating intermittent renewable energy sources, achieving a better balancing of the grid, reducing total generation cost and limiting investment in new infrastructure. Storage is also an important element in micro-grids and decentralized generation where it permits better planning and management of local energy consumption.

A complete BESS is regarded to include, but not be limited to:

- the core electrical energy storage medium (e.g., a battery bank),
- the Battery Management System (BMS),
- the associated bi-directional Power Conversion System (PCS),
- the Energy Management System (EMS),
- the Communications and alarms systems,
- the Balance-of-System (BoS) which includes the HVAC and auxiliary power system, and
- the associated Network Integration Equipment (NIE)

Requirements such as technology maturity, proven technical performance, track record, safety and environmental criteria are taken into consideration in selecting suitable technologies. Most BESS chemistries have a lifetime that is dependent on duty cycle. Lithium-ion batteries can last up to ten years, while flow batteries have a theoretically unlimited lifecycle.

A BESS specification includes critical parameters such as container dimensions, weight, operating temperature range, chemistry, round-trip efficiency, fire safety systems, rated continuous power charge and discharge and communication protocols. The battery module, inverter and balance of system specifications are implied in these parameters.

Eskom is considering several BESS technology alternatives at the substations; some are solid state batteries and others are flow batteries.

8.4.1. Solid State Batteries: Solid State Batteries comprise of Lithium-ion, approximately 4.08 Cubic Meters per 1MWh (Exact amount of hazardous substance is unknown at this stage and will differ from supplier to supplier).

Solid state batteries consist of Lithium-ion, lead acid etc. Lithium-ion is used extensively in the Electrical Energy Storage systems. Current estimates indicate that approximately 85% of the electrochemical systems installed use Lithium-ion batteries. "Lithium-ion" refers to a wide array of chemistries in which Lithium-ions are transferred between the electrodes during the charge and discharge reactions. The construction/composition of the Lithium-ion battery varies from manufacturer to manufacturer. Lithium-ion has the smallest installation footprint when compared to the technologies for the similar energy capacity (African Development Bank Group, 2018).

Table 8 highlights the risk, advantages and disadvantages of Lithium-ion Battery technology.

Table 8: Risk, Advantages and Disadvantages of Lithium-ion Battery Technology (African Development Bank Group, 2018 & Eskom BESS Technology Standard, 2018)

Maturity Level	Risks / Barriers	Advantages	Disadvantages
Commercial	• Safety - thermal runaway • More expensive than Lead-Acid	High round trip efficiency	Limited but improving cycle life
		High energy-to-weight ratio	Deep discharge cycles lower lifetime
		Continuing performance improvements	Requires monitoring / Battery Management System
		Continuing manufacturing cost reductions	

Figure 9 below is a typical setting / layout of Solid-State Batteries.

Figure 9: Solid State Batteries (Lithium-ion)

8.4.2. Flow Batteries:

Flow Batteries is where chemical energy is provided by two chemical components dissolved in liquids contained within the system and separated by a membrane. Typical systems use Vanadium or Zinc Bromine.

Flow Batteries comprise of Venadium Redox (52 500 litres per 1 MWh) and Zinc Bromide (1700 litres per pod; 13.6 Cubic Meters per 1MWh).

a. Vanadium Battery:
   - The vanadium redox battery (VRB), also known as the vanadium flow battery (VFB) is a rechargeable flow battery that employs vanadium-ions in different oxidation states to store chemical potential energy (African Development Bank Group, 2018).
   - The battery consists of an assembly of cells in which the two electrolytes are separated by a proton exchange membrane; both half-cells are additionally connected to storage tanks and pumps so that the electrolytes can be circulated through the cell (African Development Bank Group, 2018).

Table 9 lists the risks, advantages and disadvantages of Vanadium Battery technology.

Table 9: Risks, Advantages and Disadvantages of Vanadium Battery Technology (African Development Bank Group, 2018 & Eskom BESS Technology Standard, 2018)

Maturity Level	Risks / Barriers	Advantages	Disadvantages
Commercial	New at utility scale	Vanadium Redox battery can offer almost unlimited energy capacity simply by using larger electrolyte storage tanks.	Vanadium Redox technology is a relatively poor energy-to-volume ratio.
		The battery can be left completely discharged for long periods with no ill effects.	Requires mechanical systems
		If the electrolytes are accidentally mixed, the battery suffers no permanent damage.	High cost of Vanadium
		A single state of charge between the two electrolytes avoids the capacity degradation due to a single cell in non-flow batteries.	
		The electrolyte is aqueous and inherently safe and non-flammable.	

Figure 10 below is a typical Vanadium Redox Battery.

Figure 10: Flow Batteries - Vanadium Redox Battery

b. Zinc Bromine Battery:

- Zinc Bromine flow battery uses a solution of Zinc bromide stored in two tanks the electrolyte is pumped from one tank to the other tank during the charging and discharging process.

Table 10 lists the risks, advantages and disadvantages of Zinc Bromine Battery technology.

Table 10: Risks, Advantages and Disadvantages of Zinc Bromine Battery Technology (African Development Bank Group, 2018 & Eskom BESS Technology Standard, 2018)

Maturity Level	Risks / Barriers	Advantages	Disadvantages
Demo	• Not proven at utility scale • Potential bromine toxicity • Limited module capacities • Dendrite formation	The battery can offer almost unlimited energy capacity simply by using larger electrolyte storage tanks.	Zinc Bromine technology is a relatively poor energy-to-volume ratio.
		The battery can be left completely discharged for long periods with no ill effects.	Lower round trip efficiency
		If the electrolytes are accidentally mixed, the battery suffers no permanent damage.	Requires mechanical systems
		A single state of charge between the two electrolytes avoids the capacity degradation due to a single cell in non-flow batteries.	Power and energy not fully independent

		The electrolyte is aqueous and inherently safe and non-flammable.	Requires occasional full discharge for dendrite removal

Figure 11 below is a typical Zinc Bromide Battery.

Figure 11: Flow Batteries - Zinc Bromide

A single battery technology, or a combination of two or more technology alternatives, may be implemented at each site. The chemical composition of the batteries can be dangerous and hazardous and listed in SANS10234. Eskom does not anticipate exporting any hazardous waste for any of the technologies. The Lifecycle of the technologies vary from 10 to 25 years. The exact volume of dangerous goods will only be confirmed once the technology option or combination of technologies is known. However, Eskom has committed to ensuring that the amount of hazardous substances will not exceed more than 500m^3.

The battery storage systems will be containerized, and the containers installed primarily on already disturbed areas within existing electrical sub-stations, generating low environmental impacts. Additionally, the operation and maintenance of the facilities will be mostly carried out remotely. Therefore, no potential indirect or long-term environmental impacts are expected from the project (African Development Bank Group, 2018).

The battery storage technology is currently being piloted in South Africa. Should the technology prove successful, there is a potential of scaling up similar technology to allow increased capacity in energy storage from future wind and solar powered projects. This, in turn, will lead to increased access to energy in other geographical areas of South Africa. Electricity storage can also be used to help integrate more renewable energy into the electricity grid. Electricity storage can also help generation facilities operate at optimal levels and reduce use of less efficient generating units that would otherwise run only at peak times. The added capacity provided by electricity storage can delay or avoid the need to build additional power plants or transmission and distribution infrastructure (African Development Bank Group, 2018).

8.5. No-Go Alternative

Eskom will be faced with massive loan recalls and contract penalties if this project does not go-ahead. The World Bank and co-financiers approved distributed battery energy storage and Solar PV as an alternative to support renewable energy expansion in South Africa and to replace the terminated Kiwano CSP 100MW project. The Kiwano CSP (Concentrating Solar Power) plant project has been deemed too expensive to consider at this stage. Given the global trends in the application of BESS to support National Electricity Grids, significant and scalable benefit can be derived in developing this technology application for South Africa.

The No-Go Alternative is the option of not undertaking the proposed Battery Energy Storage System (BESS) at the Elandskop Substation. There would be no negative environmental implications that may have resulted from the construction phase. Based on the current needs and desirability, the anticipated environmental impacts to be caused by the proposed BESS project, a no-go alternative does not seem necessary. The No-Go Alternative also takes away the potential of increasing local employment and local business opportunities. This facility will stimulate positive economic benefits across the entire value chain and contribute towards the reduction of fossil fuels.

9. PUBLIC PARTICIPATION

The Public Participation Process (PPP) is a requirement in terms of the 2017 EIA Regulations of the National Environmental Management Act, 1998 (Act 107 of 1998) and it forms an integral part of any EIA process. This section provides information pertaining to the PPP that was conducted by 1World Consultants during this Basic Assessment Process. The purpose of this process is to gather information from the community and relevant Stakeholders that could ultimately affect the decision-making process concerning the planning, construction and operational phases of the proposed development. The community and public have been identified as I&APs and have been given the opportunity to participate in this process. Their comments, whether positive or negative, will influence the decision of the Authorities and the developer's final actions.

9.1. Objectives of the PPP

The PPP has the following objectives:

- To inform I&APs as well as all Stakeholders of the proposed development;
- To provide an opportunity for I&APs and Stakeholders to raise concerns and make suggestions;
- To promote transparency and an understanding of the project and its consequences;
- To serve as a structure for liaison and communication with I&APs and Stakeholders.

Any conclusions agreed upon must be socially, financially and technically acceptable and feasible in order to meet the requirements of the National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998), and the vision of the proposed development.

9.2. Public Participation Process Followed

The Draft BAR was subject to a 30-day commenting period. The complete I&AP database / register can be reviewed under Appendix D. The following was conducted:

9.2.1. Written Notifications

Interested and Affected Parties (I&APs) were identified and notified of the Basic Assessment. A Background Information Document (BID) was prepared and distributed via email. The BID provided information on the proposed development, the site and on the process to be followed by the EAP. A copy of the BID and proof of distribution can be reviewed under Appendix D.

9.2.2. Newspaper Advertisement

Newspaper advertisements were published to inform the public of the BA Process. The advertisements were published in English and IsiZulu in The KZN Post Newspaper on Thursday, 14/11/2019. Copies of the advertisements can be reviewed under Appendix D.

9.2.3. Site Notice Boards

Site notice boards were erected on the site and in surrounding areas on 19/11/2019. As per Chapter 6, Regulation 41(4)(a) of 2017, the size of the notice boards was approximately 60cm by 42cm (size A2). The notice boards were provided in English and IsiZulu with illustrations of the property. The purpose of the notice board was to inform the community members of the ongoing BA Application and the proposed development. Details of the EAP were also provided to facilitate public participation.

During the PPP conducted on 19/11/2019, the Department of Social Development as well as the Eskom Howick CNC was consulted. Representatives were made aware of the proposed development and a BID was made available which included contact details of the EAP. The register was signed and can be reviewed under Appendix D.

The site notice boards were placed strategically at three points. The co-ordinates of the three locations are provided in Table 11 below:

Table 11: Location of Site Notice Boards

Location	Number of Boards Placed	Co-ordinates of the Location
1 - Elandskop Substation Site	1 x English Site Notice Board 1 x IsiZulu Site Notice Board	29° 40' 14.11" S 30° 4' 37.15" E
2 – Entrance of Access Path Leading to the Substation	1 x English Site Notice Board 1 x IsiZulu Site Notice Board	29° 40' 0.48" S 30° 4' 49.40" E
3 – Boundary Fence of the Department of Social Development	1 x English Site Notice Board 1 x IsiZulu Site Notice Board	29° 40' 6.56" S 30° 5' 0.08" E

Figure 12 below indicates the three locations at which the site boards were placed.

Copies of the site notice boards as well as related photographic evidence can be reviewed under Appendix D of this BAR.

Figure 12: Site Locations at which Site Notice Boards were Placed (SANBI GIS Tool, 2014)

9.2.4. Public Meeting

Public Meetings are held only if requested. No public meetings have been requested nor required following distribution of the BID, publication of the advertisement, erection of the site notice boards and distribution and conclusion of the 30-day commenting period.

9.3. Issues Raised by the I&APs

Copies of the draft BAR was circulated to the following I&APs for review and comment:

- KZN Department of Transport
- Ezemvelo KZN Wildlife
- Department of Water and Sanitation
- KwaZulu-Natal Amafa and Research Institute
- KZN Corporate Governance and Traditional Affairs
- Impendle Local Municipality Ward Councilor - Ward 4
- Msunduzi Local Municipality Ward Councilor - Ward 4
- Msunduzi Local Municipality Ward Councilor - Ward 8
- Commission on Restitution of Land Rights
- National Department of Environmental Affairs
- National Department of Environmental Affairs (DEA) – Biodiversity and Conservation
- Umgungundlouv District: Department of Economic Development, Tourism and Environmental Affairs
- Impendle Local Municipality
- Msunduzi Local Municipality: Environmental Management Division
- uMngeni Local Municipality
- uMgungundlovu District Municipality
- Department of Health Head Office – Pietermaritzburg (Health Care Waste Management)
- Department of Agriculture and Rural Development
- Sappi Forests Regional Office
- Mondi Forestry South Africa
- Eskom Howick CNC

All registered I&APs were notified on the availability of the draft BAR. All I&APs were reminded that in terms of the EIA Regulations (2017), GNR 326 43(2), all State Departments that administer a law relating to a matter affecting the environment, specific to the Application, must submit comments within 30 days to the Environmental Assessment Practitioner (1World Consultants (Pty) Ltd). Should no comment be received within the 30-day commenting period, it is to be assumed that the relevant State Department has no comment to provide. Comments received on the BID and draft BAR are summarized below. All comments received as well as the corresponding response letters are presented in a Comments and Responses Report (C&RR) which can be reviewed under Appendix D.

Issues / Comments Raised Following Review of the BID:

1. Commission of Restitution of Land Rights

Issues / Comments Raised Following Review of the Draft BAR:

1. KwaZulu-Natal AMAFA and Research Institute
2. National Department of Environmental Affairs
3. Msunduzi Municipality: Environmental Management Unit - Esmeralda Ramburran
4. Msunduzi Municipality: Environmental Management Unit - Ms. A. Qulu
5. uMgungundlovu District: Department of Economic Development, Tourism and Environmental Affairs – KZN
6. Ezemvelo KZN Wildlife
7. DEA: Biodiversity and Conservation Unit

10. ENVIRONMENTAL ATTRIBUTES

10.2. Geographic Location

Pietermaritzburg is situated in the basin of the uMsunduzi River and its tributaries. An escarpment rises approximately 400m above the city to the West and North-West. Altitude within the Municipality ranges from 495 to 1795 metres above sea level, and the Municipality generally slopes from west to east. The mountains around the city bowl create a distinction between the urban and rural parts of the Municipality. While this has provided opportunities to manage the urban/rural interface, it has limited the city's expansion potential, resulting in the formation of a number of small urban hubs outside the city (IDP, 2018/2019).

10.3. Climate and Air Quality

The climate and local weather in Msunduzi are strongly influenced by topography; the higher lying areas in the north and west of the Municipality are cooler and receive more rainfall. Average annual temperature varies between 16.3°C and 17.9°C. Msunduzi falls within a summer rainfall area, characterized by dry winters and wet summers, with thunderstorms being very common in summer. Average rainfall within the Municipality varies between 748mm and 1017mm per annum (IDP, 2018/2019).

Msunduzi is located in a hollow formed by the valleys of the uMsunduzi River and its tributaries. On clear winter nights, katabatic flow occurs, resulting in the movement of air from upslope areas down to the city bowl, much like water. This fills the valley floor with cold, dense air, creating an inversion that does not allow pollutants to escape. This air movement also brings pollutants from the entire Municipality into the valley, where it remains trapped by the inversion layer. The majority of industrial development within Msunduzi has been established within this inversion layer, as this land is both flat and in close proximity to both road and rail transport routes. As a result, the city suffers short-term peaks in pollution, despite relatively few heavy industries (IDP, 2018/2019).

10.4. Soils and Vegetation

According to the desktop screening conducted, the existing soil type is classified as National Soils. National soils are freely drained, structureless soils. These soils may have restricted soil depth, excessive drainage, high erodibility and low natural fertility. National soils and generally red and yellow soils with low to medium base status. The subject site is dominated by the Midlands Misbelt Grassland vegetation type which belongs to the Grassland Biome. The Midlands Grassland vegetation is classified as endangered. However, it is important to note that Elandskop Substation is an existing substation where land is largely transformed.

10.5. Biodiversity

The topography, geology, and other land characteristics in Msunduzi give rise to diverse habitats and species richness. High levels of transformation have, however, resulted in a significant loss of natural habitat and hence a range of species. Natural ecosystems deliver a range of free goods and services which have a direct and significant impact on the quality of life of residents, and on the development of a sustainable city. These goods and services include recreation, genetic resources, raw materials, food production, refugia, biological control, pollination, waste treatment, nutrient cycling, soil formation, erosion control, water supply, water regulation, disturbance regulation, climate regulation, and cultural opportunities. Indiscriminate and/or poorly planned and sited development, illegal dumping, unsustainable utilisation of natural resources, and the uncontrolled encroachment of alien invasive plant and animal species all have a significant negative effect on the ability of natural systems to deliver these goods and services (IDP, 2018/2019).

According to the KwaZulu-Natal Biodiversity Spatial Planning (KZN BSP), two patches of land were identified as CBA: Irreplaceable that occur within the 500m regulated area. This means identified areas are critical for the support of

conservation important biota particularly molluscs, millipedes, grasshoppers and reptiles, therefore, they should not be transformed. Refer to Figure 13 below.

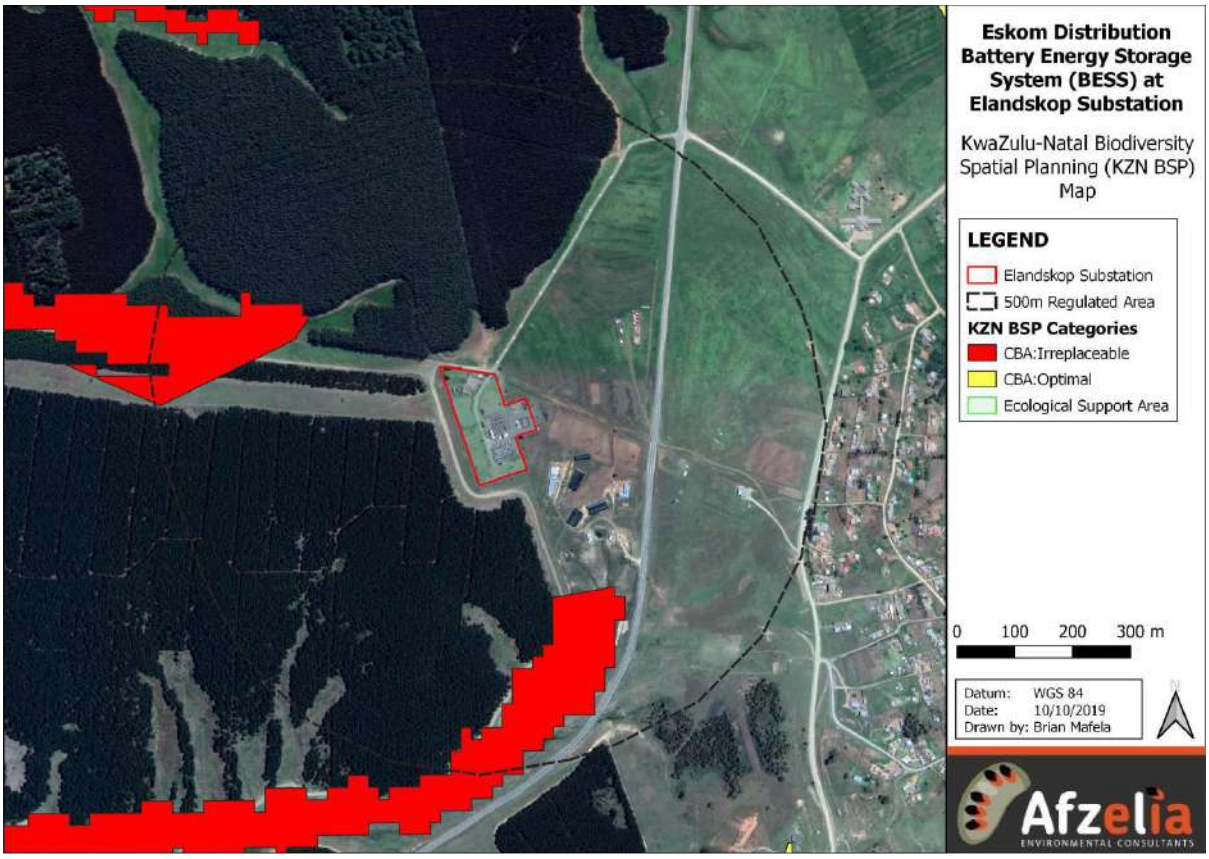

Figure 13: KZN Biodiversity Spatial Planning Map for the Study Area (Wetland Habitat Impact Assessment, 2019)

10.6. Wetlands and Watercourses

Several wetlands were found in proximity of the development site. Two natural wetlands fall within a 500m buffer of the Elandskop substation. It is unlikely that either construction and/or operational impacts would be experienced by these watercourses due to the location away from the Elandskop Substation. The site area is situated within the quaternary catchment U10G which is drained by the Elands River. The Elands river is fed by numerous smaller rivers and streams. A desktop assessment by the Department of Water Affairs (2014) indicates the Elands River is largely natural and of high ecological importance and sensitivity. The Elandskop substation is located approximately 4.5km from the Elands River.

10.7. National Freshwater Ecosystem Priority Area

According to the National Freshwater Ecosystem Priority Areas (NFEPA) GIS dataset (CSIR. 2011) the development area falls within 2 sub-catchments (No. 4405 and 4473) but the Elandskop substation largely falls within sub-catchment 4405 which is classified as an Upstream Management Area. According to Driver *et al.* (2011) "*Upstream Management Areas are sub-quaternary catchments in which human activities need to be managed to prevent degradation of downstream river FEPAs and Fish Support Areas*." The NFEPA GIS dataset flagged the presence of 2 wetland FEPAs within 500m of the Elandskop Substation. The 2 wetland FEPAs are situated at least 230m away from the substation. Refer to Figure 14 below.

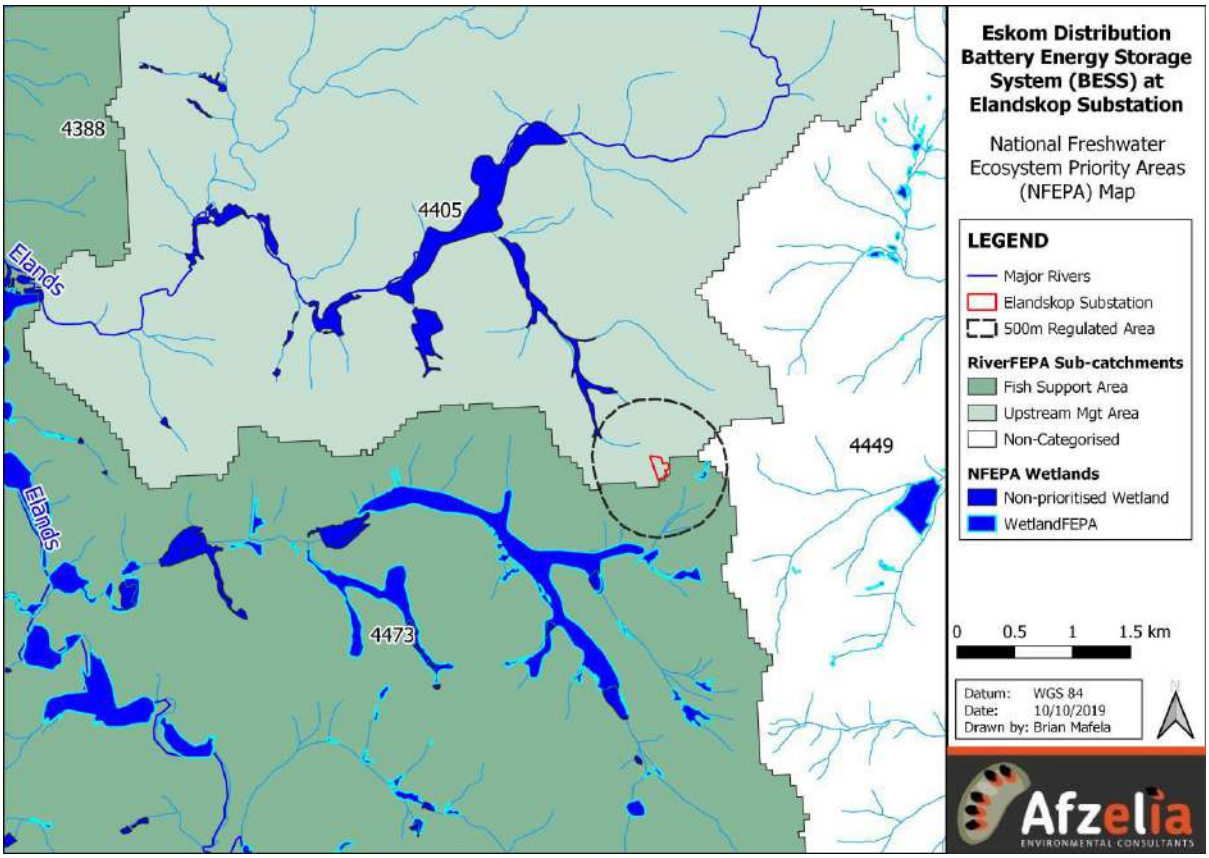

Figure 14: Freshwater Ecosystem Priority Area Map (Wetland Habitat Impact Assessment, 2019)

11. SUMMARY OF SPECIALIST STUDY FINDINGS AND IMPACTS

11.2. Geotechnical Investigation

A geotechnical investigation was conducted on 20 May 2011 and was re-evaluated on 14 August 2019 to include the BESS scope and requirements. It was noted that the soil encountered was soft, red, and sandy soils. No water table was encountered. During the fieldwork, four Dynamic Cone Penetrometer (DCP) Tests were undertaken. The tests were conducted with a 1m rod on the access road and terrace extension. The test position is indicated in Figure 15 below.

Figure 15: DCP Test Positions (Geotechnical Report, 2019)

The proposed site for the BESS was visually inspected on 14 August 2019. There is an existing stone filled trench coming from the substation yard which dissipates at the proposed BESS site via headwall and dissipater. In terms of the soil classification, dry loose cohesion less soil or very soft to soft cohesive soil was observed.

The Geotechnical Report can be reviewed under Appendix E.

11.3. Wetland Habitat Impact Assessment

A field survey was undertaken by Afzelia Environmental Consultants on 09 September 2019 to undertake a wetland habitat impact assessment. For the purpose of this assessment, wetlands are considered as those ecosystems defined by the National Water Act as:

"land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil."

Wetland Delineation

A total of ten (10) watercourse units were delineated within and around the development site. These include:

- Eight (8) wetland units;
    - Four (4) channelled valley bottom wetlands
    - Four (4) seep wetlands
- One (1) river unit; and
- One (1) artificial dam.

Of the 8 wetland units, 4 were flagged as being at risk of being impacted by the proposed development. The other 4 wetland units were flagged as being not at risk due to their location on the landscape and distance from the proposed development area. A list of desktop and infield watercourses is provided in Table 12 below.

Table 12: List of Desktop and Infield Delineated Watercourses (Wetland Habitat Impact Assessment, 2019)

HGM ID	HGM Type	Size	Risk
S1	Seep Wetland	0.735 Ha	
S2	Seep Wetland	0.262 Ha	
CVB1	Channelled Valley Bottom Wetland	0.065 Ha	
R1	River (Mountain Stream)	0.134 Ha	
S3	Seep Wetland (Includes sub-units S3-A and S3-B)		Not assessed further
S4	Seep Wetland		Not assessed further
S5	Seep Wetland		Not assessed further
CVB2	Channelled Valley Bottom Wetland		Not assessed further
CVB3	Channelled Valley Bottom Wetland		Not assessed further
D1	Artificial Dam		Not assessed further

Figure 16 below indicates the desktop and infield delineated watercourses.

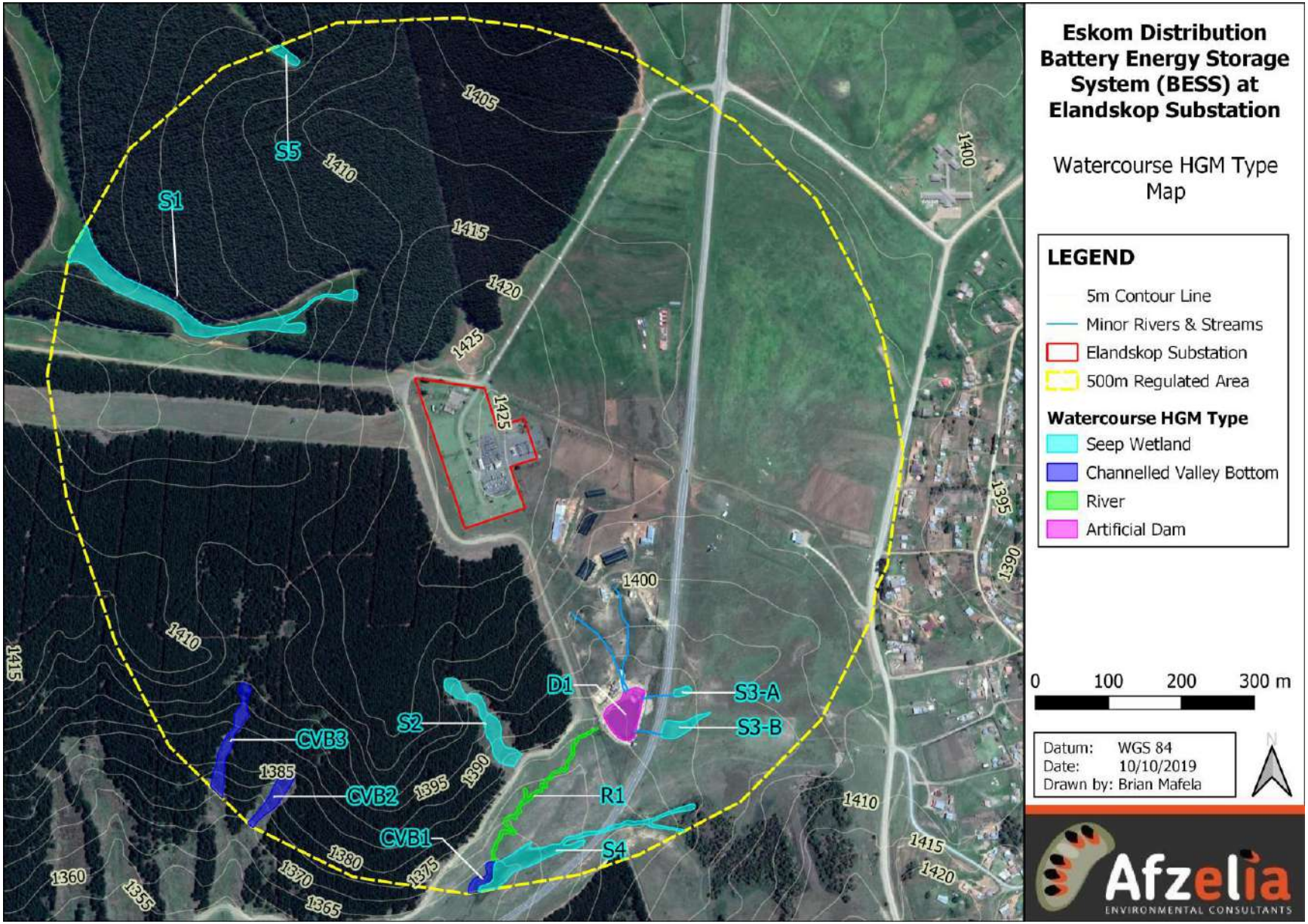

Figure 16: Desktop and Infield Delineated Watercourses (Wetland Habitat Impact Assessment, 2019)

Present Ecological State (PES)

The Present Ecological State (PES) of the wetlands were assessed. The results indicate that Wetland S1, S2 and CVB1 are largely modified with a PES class of D. Refer to Table 13 below for results.

Table 13: PES Assessment Results for all Wetland Units (Wetland Habitat Impact Assessment, 2019)

HGM Unit	PES Components			PES Score & Category	Impact Description
	Hydro	Geo	Veg		
S1	7,5	1,1	4,0	4,7 D PES	**PES: Largely Modified** Key impacts recorded include (i) a significant reduction in water inputs owing to 80% of the wetland's catchment being under Gum forestation (ii), reduced surface roughness and poor species composition resulting from poor wetland management (iii) increased water losses and decreased vegetation quality caused by weeds and woody invasive alien plants growing within the wetland and (iv) limited gully erosion resulting in loss of sediment.
S2	7,5	1,0	3,6	4,5 D PES	**PES: Largely Modified** Key impacts recorded include (i) a significant reduction in water inputs owing to 100% of the wetland's catchment being under Gum forestation (ii), reduced surface roughness and poor species composition resulting from poor wetland management and (iii) increased water losses and decreased vegetation quality caused by weeds and woody invasive alien plants growing within the wetland.
CVB1	7,5	1,5	3,5	4,6 D PES	**PES: Largely Modified** Key impacts recorded include (i) poor veld management (overgrazing, over-burning etc.) which has decreased the quality of the wetland vegetation community, (ii) poor veld management has also increased surface runoff resulting in erosion of the wetland habitat, and (iii) limited habitat transformation by the road infrastructure.

The PES of the River Unit R1 was assessed as being largely modified with a PES class of D owing largely to the presence of an instream dam upstream of the river unit. Refer to Table 14 below.

Table 14: PES Assessment Results for River Unit R1 (Wetland Habitat Impact Assessment, 2019)

Unit	Component	PES Score	PES Rating	Impact Description
R1	Instream	59/100	D	Key impacts recorded include (i) damming of water upstream which has significantly modified flow patterns, flow volume and resulted in desiccation of the instream habitat, (ii) limited water quality impact resulting from livestock farming and road stormwater and (iii) overgrazing which has resulted in limited active channel erosion.
	Riparian	N/A	N/A	
	Overall	**59/100**	**D**	**Largely modified. A large loss of natural habitat, biota and basic ecosystem functions has occurred.**

Ecological Importance and Sensitivity (EIS)

The ecological importance of the wetlands was undertaken. The results of the EIS assessment indicate that Wetland Units S1 and S2 are of moderate EIS and CVB1 of low EIS. Refer to Table 15 below for results.

Table 15: EIS Assessment Results for River Unit R1 (Wetland Habitat Impact Assessment, 2019)

HGM Unit	EIS Components		EIS Rating & Category	Impact Description
	EI	ES		
S1 and S2	1.50	1.83	**1.83 Moderate EIS**	**EIS: Moderate** Wetland Units S1 and S2 were assessed as being of moderate EIS and the rating is driven by the sensitivity of the wetlands to changes in low flow. Furthermore, Wetland Unit S1 contains a provincially protect plant (*Zantedeschia spp.* - Lily) which requires seasonal saturation to thrive.
CVB1	1.20	1.17	**1.20 Low EIS**	**EIS: Low** The channelled valley bottom wetland unit CVB1 was assessed as being of low EIS. The poor rating is also attributed to (i) high degradation of the wetland habitat resulting from poor management of the veld (ii) lack of conservation important or sensitive vegetation and (iii) lack of conservation important aquatic biota.

River Unit R1 was assessed as being of low EIS. Refer to Table 16 below for results.

Table 16: EIS Assessment Results for all Wetland Units (Wetland Habitat Impact Assessment, 2019)

Unit	EIS Score	EIS Rating	Impact Description
R1	1.0	Low	River Unit R1 was assessed as being of low EIS due to the lack of both conservation important habitat and biota which is attributed to the inherent low flow quantities and ideal habitat for biota. The seasonal availability of low flows which often are characterised by a trickle renders the river of low importance in providing refugia during times of environmental stress. Despite the river unit being at high risk of pollution given its low assimilative capacity, it was assessed as being of low sensitivity owing to the lack lacks sensitive biota and plants.

Buffer Recommendations

As it stands, the proposed development footprint is located at least 135m from the nearest watercourse which is Wetland Unit S1. Given the low environmental risk associated with the proposed development, the 135m distance was considered more than sufficient to manage surface impacts such as sedimentation, erosion etc. The use of a formal buffer tool was therefore not warranted.

The specialist is off the opinion that the proposed development proceeds. The wetland assessment can be reviewed under Appendix E.

11.4. Ecological Impact Assessment

The Elandskop substation is surrounded by plantation and is within a completely transformed area. There are cement remains that have been observed on site thus indicating that the area is heavily transformed. No indigenous flora or fauna are expected to occur within the proposed footprint. Based on these findings, a desktop ecological assessment has been undertaken.

Protected Areas: Protected areas ensure ecological sustainability and adaptation to climate change. Protected areas provide continuous ecosystem services such as the provision of clean water, flood attenuation, erosion prevention, carbon sequestration and aesthetic and spiritual value. It can be noted that the Impendle Nature Reserve is located within 10km from the project site. However, there are no focus areas within 10km of the site.

Important Bird Areas: An Important Bird Areas (IBA) is located within 5km from the project site. This IBA comprises a population of the Endangered White-winged Flufftail *(Sarothrura ayresi)* as well as forming habitat for the Corn Crake *(Crex crex)*, Little Bittern *(Lxobrychus minutus)*, Baillon's Crake *(Porzana pusilla)*, Red-chested Flufftail *(Sarothrura rufa)* and African Rail *(Rallus caerulescens).* It also contains breeding populations of the African Marsh Harrier *(Circus ranivorus),* Grey Crowned Crane *(Balearica regulorum)* and African Grass Owl *(Tyto capensis).*

Critical Biodiversity Areas: The substation does not occur within a CBA but is within close proximity to both irreplaceable and optimal CBAs. Natural areas in the region should be maintained as natural areas to meet conservation targets for the province, however, considering the existing disturbed nature of the site, it is safe to assume no natural areas remain.

It is recommended that the development go ahead provided the following conditions are met:

- Development and application of an alien invasive management plan.
- A walk through of the full site prior to construction to determine the presence and identity any protected plants and the relevant permits applied for; and
- The development and application of a rehabilitation plan.

The complete Ecological Impact Assessment can be reviewed under Appendix E.

11.5. Heritage Impact Assessment

An application for exemption for undertaking a Phase 1 Heritage Impact Assessment was conducted by JLB Consulting. The substation was established post 1972 and is surrounded by forestry. There are no signs of agricultural activities on site. However, there are foundation remains that have been observed on site. The remains of foundation are an indication of previous disturbance to the site as a building may have been planned for this area or a building was built and then demolished thus leaving the foundation remains on site. Furthermore, that site is already disturbed due to the established Elandskop substation.

Figure 17 below shows that the substation falls into an area of very high fossil sensitivity which usually indicates that a field assessment is required. However, due to the presence of foundations of a structure and probable disturbance to the area during the construction of the substation, the specialist recommends that no further studies are undertaken but that a protocol for fossil finds is necessary. Section 14 highlights the conditions and protocol for fossil finds.

1 in 250 000 geological formation layers are courtesy of the Council for GeoScience
For more information, go to How to Use the Palaeontological (fossil) Sensitivity Map

Colour	Sensitivity	Required Action
RED	VERY HIGH	field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	desktop study is required and based on the outcome of the desktop study, a field assessment is likely
GREEN	MODERATE	desktop study is required
BLUE	LOW	no palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	no palaeontological studies are required
WHITE/CLEAR	UNKNOWN	these areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

Figure 17: Fossil Sensitivity of the Project Area (Exemption HIA, 2019)

Due to the disturbed and transformed nature of the proposed site for the Elandskop BESS facility, it is unlikely that intact heritage resources will be found on the site therefore it is recommended that the exemption from undertaking a Phase 1 HIA is approved.

The exemption application can be reviewed under Appendix E.

12. IMPACT ASSESSMENT

Impact assessment takes into account the nature, scale and duration of positive and negative effects on the environment. All activities that are related to the proposed construction and operation of the proposed development that could have some impact on the environment were identified. These impacts can be environmental, socio-economic or cultural in nature. Impacts are often not only confined within the direct scope of the proposed activity and can accumulate as a network of indirect impacts on the surrounding area. Different impacts are associated with the construction and operational phases of the proposed activity.

The following potential impacts were identified for the construction phase:

- Traffic pressures and access
- Soil erosion
- Stormwater management
- Ground water pollution
- Surface water pollution
- Risk of alien invasive encroachment
- Flora
- Fauna
- Waste management
- Noise disturbance
- Air quality
- Visual quality
- Public health and safety
- Heritage impacts
- Socio-economic impacts

The following potential impacts were identified for the operational phase:

- Stormwater Management
- Surface runoff
- Flora
- Fauna
- Air Emissions
- Noise and disturbance
- Visual quality
- Safety of Employees

The project is likely to induce only site-specific environmental and/or social impacts. The project is proposed to be implemented at relatively contained areas.

12.2. Methodology

EIA Regulation and GNR 326 (2017) prescribes the requirements and aims of environmental impact assessments. In terms of the regulations, the following objectives are specified:

- Determine the nature, significance, consequence, extent, duration and probability of impacts; and
- The degree to which these impacts:
  - Can be reversed,
  - May cause irreplaceable loss of resources, and
  - Can be avoided, managed or mitigated

The impacts of any development including the construction and operational phases are identified, using the following definitions:

Term	Description
Significant Impact	*an impact that may have a notable effect on one or more of the aspects of the environment or may result in non-compliance with accepted environmental quality standards, thresholds or targets and is determined through rating the positive and negative effects of an impact on the environment based on criteria such as duration, magnitude, intensity and probability of occurrence.*
Cumulative impact	*In relation to an activity, means the past, present and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities.*

The potential impacts are listed and assessed for significance. Significance is assessed by scoring each impact based on four variables viz. probability, severity, duration and spatial impact. The four variables, with their score criteria are detailed below:

Table 17: Impact Risk Assessment Scoring Matrix

Score	**Frequency/ Probability (FR)** (Frequency or likelihood of activities impacting on the environment)	**Severity (SV)** (Degree of change to the baseline environment in terms of reversibility of impact; Sensitivity of receptor, duration of impact and threat to environment and health standards)	**Duration (DR)** (Length of time over which activities will cause change to the environment)	**Spatial Scope (SS)** (Geographic overage)
1	Almost Never / impossible	Insignificant / not harmful / totally reversible	One day to a month	Activity Specific
2	Very seldom / highly unlikely	Small / potentially harmful / reversible within 05 years	One month to a year	Site specific
3	Infrequent / seldom	Significant / slightly harmful / needs specific mitigation to reverse in a time span of between 05 and 15 years	One year to ten years	Area
4	Often / regular	Great / harmful / irreversible	Life of project	Regional
5	Daily / Highly regular	Disastrous / extremely harmful / totally irreversible and damaging	Post closure	National

The impacts are also scored taking any mitigation into consideration. The impacts are scored and scaled for significance as follows:

Impact Rating	Score Range	Description
Negligible	3 or less	The impact is unimportant / indiscernible and hence insignificant – little or no mitigation adequately addresses the impact.
Low	4 to 9	The impact is of little importance since it is easily and adequately mitigated.
Medium	10 to 15	The impact is considerable and requires adequate mitigation to reduce potential damage to the environment.
High	16 or more	the impact is adverse and may never be adequately mitigated. The impact has a high probability of causing cumulative effects of other less significant impacts. It may be considered to be a fatal flaw of the project and requires intense consideration.

12.3. Impacts Identified

The impacts of the construction and operational phases for the proposed BESS project are summarised in the tables below. The duration of the construction phase is ±12 months while the duration of the rehabilitation phase is ±3 months.

Table 17.1: General Construction Activities Impacts

Phase	Potential Impact	Impact Type	Mitigation	Frequency	Severity	Duration	Spatial Scope	Impact Score	Significance
Construction	General Construction Activities - Potential harm to the environment due to workers or contractors being unaware of how their activities may impact the environment or due to unauthorised access to the site.	Direct	**Without**	5	5	2	3	15	**Medium**
			With	3	3	2	2	10	**Medium**
			Mitigation measures: • The contractor must ensure that all employees, including sub-contractors and their employees, are required to attend on-site Environmental Awareness Training prior to commencing work on site. • Follow-up Environmental Awareness Training are required for new subcontractors or crews prior to commencing work or for specific activities that may potentially impact the environment, or if work is being undertaken in sensitive environments. • The contractor must maintain accurate records of any training undertaken. • Training must cover all aspects of the EMPr, procedures to be followed, the sensitivity of the site and importance of adhering to "no-go" areas. • The ECO must monitor the contractor's compliance with the requirement to provide sufficient environmental awareness training to all site staff. • Environmental signage must be displayed on the site including – "no smoking", "fire hazards", etc. • Emergency numbers must be clearly displayed. • Access to fuel and other equipment stores must be strictly controlled. In terms of frequency, these mitigation measures ensure that the impacts change from a possible daily occurrence to a seldom event. In terms of severity, these mitigation measures change from being harmful to be slightly. However, the mitigation measures including ongoing environmental awareness training are predicted to be sufficient.						
Construction	Earthworks –	Direct	**Without**	4	4	3	2	13	**Medium**
			With	3	2	2	2	9	**Low**

<table>
<tr><td></td><td>Excavation, trenching and site establishment for implementation of BESS.</td><td></td><td colspan="7">Mitigation measures:

• All trenches must be clearly demarcated and barricaded on site at all times
• Trenches must have one sloped side to allow animals which fall in to get out.
• The earthworks operation must be carried out by a suitably qualified contractor.

These impacts, without mitigation, have the potential to damage the environment on a regular basis but with mitigation are expected to drop significantly both in frequency and severity.</td></tr>
<tr><td rowspan="3">Construction</td><td rowspan="3">Storage, mixing, and disposal of cement and concrete -

Potential water and/or soil pollution due to incorrect management of concrete and cement.</td><td rowspan="3">Direct</td><td>Without</td><td>3</td><td>2</td><td>2</td><td>2</td><td>9</td><td>Low</td></tr>
<tr><td>With</td><td>3</td><td>2</td><td>1</td><td>2</td><td>8</td><td>Low</td></tr>
<tr><td colspan="7">Mitigation measures:

• No mixing of concrete or cement directly on the ground is permitted. The mixing of concrete will only be done on a mixing tray or on impermeable sheeting.
• Ready-mix trucks are not permitted to clean chutes on site. Cleaning into foundations or a dedicated cleaning pit is permitted.
• Both used and unused cement bags are to be stored in weatherproof containers so as not to be affected by rain or runoff.
• Contaminated soil resulting from concrete or cement spills is to be removed immediately after the spillage has occurred and placed on the appropriate rubble stockpile.
• Clean stormwater must be kept away from areas where it could be contaminated and must be directed to the stormwater drainage system.

These impacts, without mitigation, have a low impact to the environment and with mitigation is expected to be reduced further.</td></tr>
</table>

Table 17.2: Soil Erosion

Phase	Potential Impact	Impact Type	Mitigation	Frequency	Severity	Duration	Spatial Scope	Impact Score	Significance
Construction	Soil erosion - Heavy rains result to high levels of erosion. Loss of stockpiles, instability of soils and associated loss of vegetation may also result. Ecological disturbances from high levels of erosion are also possible.	Cumulative	**Without**	4	3	3	3	13	**Medium**
			With	2	2	2	2	8	**Low**
			Mitigation measures: • Project management of construction activities must be done to ensure that only small and/or necessary portions will be disturbed at any given time. Vegetation must not be removed until necessary. • Soil erosion measures must be placed on sensitive areas like banks, slopes and towards the property boundary. • All stockpiles must be covered with suitable material to prevent loss of sediment via wind/ water. • Topsoil (top 300mm layer minimum) must be removed prior to the construction by earthmoving equipment. Topsoil must be stored in heaps of not higher than 2m in a way that prevents damming. Stored topsoil must not be compacted. • Topsoil must not be used as fill material for backfilling of excavations on site. • Minimize the amount of area that needs to be disturbed and the amount of time spent on sensitive areas. • Offsite runoff around disturbed areas must be diverted to reduce the amount of stormwater which comes into contact with exposed soils, as a result there will be less erosion. In terms of frequency, these mitigation measures ensure that the impacts change from a regular occurrence to a highly unlikely event. In terms of severity, these mitigation measures change from being slightly harmful to be being potentially harmful. However, the mitigation measures including ongoing environmental awareness training which are predicted to be sufficient.						
Construction	Stockpiling of topsoil and cleared vegetation: Potential loss of valuable topsoil due to inadequate stockpiling practices; potential loss of indigenous vegetation; potential erosion of cleared	Cumulative	**Without**	4	3	2	2	11	**Medium**
			With	3	2	1	1	7	**Low**
			Mitigation measures: • Topsoil must be stockpiled for eventual return during topsoil back-filling and rehabilitation. These must be weed free and must not stand for a prolonged period of time. • Sub-soil and topsoil must be stored separately onsite. • Topsoil is to be stockpiled in discrete areas and retained for future landscaping efforts. • Topsoil stockpiles must not exceed 2m in height and must be protected from wind, erosion and runoff by covering with						

	areas.		a suitable fabric approved by the ECO. In terms of frequency, these mitigation measures ensure that the impacts change from a regular occurrence to a seldom event. In terms of severity, these mitigation measures change from being slightly harmful to be being potentially harmful. However, the mitigation measures including ongoing environmental awareness training which are predicted to be sufficient.

Table 17.3: Biodiversity Impacts

Phase	Potential Impact	Impact Type	Mitigation	Frequency	Severity	Duration	Spatial Scope	Impact Score	Significance
Construction	Risk of alien invasive encroachment into disturbed areas - Alien species are able to easily invade a wide range of ecological niches thereby altering natural systems.	Cumulative	**Without**	4	4	3	3	14	**Medium**
			With	2	2	2	2	8	**Low**
			Mitigation measures: • Protect as much indigenous vegetation as possible. • Ongoing alien plant control must be undertaken particularly in the disturbed areas. Areas which have been disturbed will be quickly colonised by invasive alien species. Ongoing management must be undertaken for the clearing/eradication of alien species. • Monitor all sites disturbed by construction activities for colonisation by exotics or invasive plants and control these as they emerge. These impacts, without mitigation, have the potential to damage the environment on a regular basis but with mitigation are expected to drop significantly both in frequency and severity.						
Construction	Flora - Damage and removal of existing indigenous vegetation.	Direct	**Without**	5	3	2	2	12	**Medium**
			With	2	2	1	1	6	**Low**
			Mitigation measures: • Sensitive flora must be identified prior to construction and must be marked. • Comments from Ezemvelo and Environmental protection bodies must be kept in consideration in order to protect the flora on the site and surrounds. • Prior to the clearing of the site, the ECO and if necessary, the Biodiversity Specialist must ensure that all plants of conservation significance are relocated for possible reuse. • A site boundary that currently exists must be maintained to identify the limits of the construction site.						

<table>
<tr><td></td><td></td><td></td><td colspan="7">• Burning of removed vegetation is prohibited.
• Sealant, coatings, adhesives and glazing's, can be toxic to flora, if released into the environment. Therefore, the products used must be stored and used carefully, to save resources as well as protect the environment.
• The ECO must ensure that a list of any indigenous trees/ shrubs which must be removed is provided. This list must include the tree/ shrub species and the number of each species.
With correct implementation of these mitigation measure, the frequency can be reduced from a daily occurrence to a highly unlikely event. While severity will be reduced from significant to small.</td></tr>
<tr><td rowspan="3">Construction</td><td rowspan="3">Fauna -

Hunting/ Fishing/ Poaching by construction workers.</td><td rowspan="3">Indirect</td><td>Without</td><td>5</td><td>4</td><td>3</td><td>2</td><td>14</td><td>Medium</td></tr>
<tr><td>With</td><td>3</td><td>3</td><td>2</td><td>2</td><td>10</td><td>Medium</td></tr>
<tr><td colspan="7">Mitigation measures:

• Identify sensitive fauna on the site prior to construction.
• Trapping/snaring/killing of animals including snakes and reptiles is prohibited.
• Sealant, coatings, adhesives and glazing's, can be toxic to fauna, if released into the environment. Therefore, the products used must be stored and used carefully, to save resources as well as protect the environment.

In terms of frequency, these mitigation measures ensure that the impacts change from a daily occurrence to a seldom occurrence. In terms of severity, these mitigation measures change from being great to slightly harmful.</td></tr>
<tr><td rowspan="3">Operational</td><td rowspan="3">Vegetation Loss due to Fire Outbreak</td><td rowspan="3">Indirect</td><td>Without</td><td>3</td><td>3</td><td>3</td><td>2</td><td>11</td><td>Medium</td></tr>
<tr><td>With</td><td>2</td><td>2</td><td>2</td><td>1</td><td>7</td><td>Low</td></tr>
<tr><td colspan="7">Mitigation measures:

• Appropriate fire-fighting equipment must be kept on site at all time and must be easily accessible.
• No smoking must be allowed near batteries especially during maintenance and management of batteries.
• Relevant signage must be placed near flammable substances.

With correct implementation of these mitigation measure, the frequency can be reduced from a regular occurrence to a highly unlikely event. While severity will be reduced from slightly harmful to potentially harmful.</td></tr>
</table>

Operational	Impact to Fauna on site	Indirect	**Without**	2	2	2	1	7	**Low**
			With	2	2	2	1	7	**Low**
			Mitigation measures: • Any fauna encountered on site must be safely located off the site towards the identified CBA. • There must be no trapping/ killing or hunting of animals on site. With correct implementation of these mitigation measure, the frequency can be reduced from a regular occurrence to a highly unlikely event. While severity will be reduced from slightly harmful to potentially harmful.						

Table 17.4: Stormwater Impacts

Phase	Potential Impact	Impact Type	Mitigation	Frequency	Severity	Duration	Spatial Scope	Impact Score	Significance
Construction	Stormwater management – Increase run-off as a result of construction activities and bare, exposed ground. This may potentially result to increased siltation and erosion.	Direct	**Without**	4	4	3	3	14	**Medium**
			With	3	3	2	2	10	**Medium**

			Mitigation measures:
			
			• Stormwater infrastructure currently exists on site; however, the following measures must be implemented:
			  ○ The earthworks operation must be carried out by a suitably qualified contractor.
			  ○ Temporary v-drains must be used where necessary;
			  ○ The use of shade clothes strategically positioned along the environmental sensitive areas so that no contamination with respect to dust and litter enter.
			• Clean storm water must be directed away from ablution facilities where it could be contaminated and must be directed to the storm water drainage system.
			
			In terms of frequency, these mitigation measures ensure that the impacts change from a regular occurrence to a seldom event. In terms of severity, these mitigation measures change from being harmful and great to being slightly harmful. Mitigation measures including ongoing environmental awareness training are predicted to be sufficient.						

Operational	Stormwater Management and	Indirect	**Without**	3	3	3	2	11	**Medium**
			With	2	1	2	2	7	**Low**

	Maintenance of Structures - Proper management maintenance must be conducted throughout the lifespan of the operational phase.		**Mitigation measures:** • Surface water off paved surfaces must be directed towards the stormwater inlets. • All rainwater must be directed into the infiltration chambers. • Clean storm water must be directed away from areas where it could be contaminated and must be directed to a storm water drainage system. • The storm water drainage system must be maintained and not contaminated by other waste sources. These impacts, without mitigation, will have an infrequent occurrence but can be reduced to a highly unlikely event with severity being small upon implementation of the mitigation measures.

Table 17.5: Impacts on Groundwater and Surface-water

Phase	Potential Impact	Impact Type	Mitigation	Frequency	Severity	Duration	Spatial Scope	Impact Score	Significance
Construction	Ground water and surface water pollution Pollution of ground and surface and water may result from hazardous chemical substance spills.	Direct	**Without**	5	5	4	3	17	**High**
			With	3	2	3	3	11	**Medium**
			Mitigation measures: • Chemical substances must be mixed or handled on impervious surfaces or bunded areas. Concrete must be mixed on impervious surfaces when necessary. There must be a contained/ designated area for washing out and cleaning of concrete mixing equipment, to further prevent pollution. In addition, wash waters from site must be collected and disposed of off-site. • An adequate number of chemical toilets for the staff must be provided and serviced regularly. The positioning of the toilets must be authorized by the ECO. • Spills that result in the contamination of ground water must be reported immediately to the ECO • Spills must be managed in the following manner: - Stop the spill - Contain the spill - Report significant spills to DWS and the Local Municipality Water and Sanitation Department. - Remove spilled material for treatment/disposal. - Determine any possible impact to soils, groundwater, storm water, etc. - Undertake any necessary remedial actions						

<table>
<tr><td></td><td></td><td></td><td colspan="7">- Document the spill
- Employees involved in spill control must be using PPE

In terms of frequency, these mitigation measures ensure that the impacts change from a daily occurrence to a seldom event. In terms of severity, these mitigation measures change from being disastrous to potentially harmful.</td></tr>
<tr><td rowspan="4">Construction</td><td rowspan="4">The cleaning of vehicles, equipment and construction areas.</td><td rowspan="4">Direct</td><td>Without</td><td>4</td><td>3</td><td>2</td><td>2</td><td>11</td><td>Medium</td></tr>
<tr><td>With</td><td>2</td><td>2</td><td>1</td><td>2</td><td>7</td><td>Low</td></tr>
<tr><td colspan="7">Mitigation measures:

• No washing of vehicles or equipment is permitted on site.
• Cleaning of equipment is to take place within designated areas.
• A dedicated cleaning area is to be demarcated to facilitate washing of all cement and painting equipment.
• No wastewater must be disposed on site, onto the soil or into any water body.
• Soil contaminated with hazardous substances, fuel or oil must be treated as hazardous waste and removed from site.

In terms of frequency, these mitigation measures ensure that the impacts change from a regular occurrence to a highly unlikely event. In terms of severity, these mitigation measures change from being slightly harmful to small.</td></tr>
<tr><td></td></tr>
<tr><td rowspan="4">Operational</td><td rowspan="4">Ground and Surface Water runoff -

Proper management and disposal of waste must occur during the lifespan of the project, including during the operational phase of BESS.</td><td rowspan="4">Cumulative</td><td>Without</td><td>3</td><td>2</td><td>2</td><td>2</td><td>9</td><td>Low</td></tr>
<tr><td>With</td><td>2</td><td>1</td><td>1</td><td>1</td><td>5</td><td>Low</td></tr>
<tr><td colspan="7">Mitigation measures:

• The fire protection system must be implemented on site.
• It is ideal for a leak detection system to be installed for the BESS facility.
• Secondary containments must be put in place for BESS.
• Spill kits must be kept on site for small spills and must be easily accessible.
• If the event of spills and leaks, the contaminated area must be cleaning and collected in a container or leak proof bag for easy disposal at a registered landfill site.
• Regular visual inspections must be conducted by the developer to monitor the wear and tear of the battery.
• The applicant must ensure regular maintenance of all drainage systems within the project area as they help in improving site drainage, and reduce pollutants entering surface waters and groundwater.
• Proper management and disposal of waste must occur during the lifespan of the project, including during the</td></tr>
<tr><td></td></tr>
</table>

			operational phase. The applicant must ensure regular maintenance of all drainage systems within the road upgrade as they help in improving site drainage, and reduce pollutants entering surface waters and groundwater. With correct implementation of these mitigation measure, the frequency can be reduced from a seldom occurrence to a highly unlikely event. While severity will be reduced from potentially harmful to insignificant.

Table 17.6: Traffic

Phase	Potential Impact	Impact Type	Mitigation	Frequency	Severity	Duration	Spatial Scope	Impact Score	Significance
Construction	Increased Traffic Frequency on Road Infrastructure – Potential wear of access roads, potential unpermitted transport of materials and potential loss of materials being transported. Presence of construction vehicles and personnel leading to traffic congestion.	Direct	**Without**	5	4	3	3	15	**Medium**
			With	4	3	2	3	12	**Medium**
			Mitigation measures: • All construction vehicles must be roadworthy. • All loads must be securely fastened when being transported. • All speed limits and other traffic regulations on the public roadways must be adhered to. • Construction vehicles and personnel must adhere to business hours. This may be relaxed to accommodate abnormal vehicles so they may not hinder daily life and/or regular traffic. • Construction vehicles must use the agreed route to and from site. The Elandskop Substation has one entry- exit point which must be adhered to. • Pointsmen to guide traffic for entry and exit of construction vehicles must be used where required. • Safety measures such as appropriate pavements, speed humps, signage boards for construction site and vehicles and for workmen must be implemented to slow down traffic within the development. • Construction phase must be as short as possible. Reliable building contractors must be employed to avoid delays. • Vehicles must park on demarcated site only. With correct implementation of these mitigation measure, the frequency can be reduced from a daily occurrence to a seldom occurrence. While severity will be reduced from slightly harmful to potentially harmful.						

Table 17.7: Waste Management Impacts

Phase	Potential Impact	Impact Type	Mitigation	Frequency	Severity	Duration	Spatial Scope	Impact Score	Significance
Construction	Storage, spillage and disposal of hazardous chemicals: Potential hazardous chemical spills, resulting from incorrect management of resources, can cause soil, surface water and groundwater pollution.	Direct	**Without**	5	4	4	3	16	**High**
			With	3	2	2	2	9	**Low**

			Mitigation measures:
			
			• The following action must immediately take place in the event of spills:
			  ○ Immediately set up a barrier to alert unauthorised personnel to keep out;
			  ○ Eliminate all possible sources of leakages;
			  ○ Immediately begin containment by placing absorbent material on the spill;
			  ○ Setup decontamination zone to ensure proper decontamination procedures.
			• Proper handling, storage and disposal of hazardous chemicals. All fuels and flammable materials must be handled safely, stored safely and clearly labelled.
			• Flammable materials must comply with standard fire safety regulations.
			• Drip trays must be used to collect spillage from equipment, vehicles and plant. These must be emptied regularly into secondary containers.
			• Fuels and flammable materials must be handled in a safety conscious manner.
			• Safety signage including “No Smoking”, “No Naked Lights” and “Danger”, and product identification signs, must be clearly displayed on the Battery system.
			
			In terms of frequency, these mitigation measures ensure that the impacts change from a possible daily occurrence to a seldom event. In terms of severity, these mitigation measures change from great to potentially harmful in the event that the mitigation measures were not sufficient. However, the mitigation measures including ongoing environmental awareness training are predicted to be sufficient.						

Construction	Waste and littering around the site - Improper storage/ disposal of waste and litter may contaminate/ pollute	Cumulative	**Without**	5	3	2	2	12	**Medium**
			With	2	2	1	1	6	**Low**
			Mitigation measures: • Refuse skips must be used and must be covered with shade cloth to ensure the containment of waste. • Refuse bins must be provided for domestic waste (lunch litter) and placed in designated eating areas and any other areas where deemed necessary to control littering.						

	identified sensitive areas and the surrounding area.		• Refuse bins must not overflow and must be emptied regularly. No littering is permitted on site. • Building rubble must be kept separate from other construction waste. • Accumulation of large stockpiles of rubble and waste is not permitted. Waste must be removed at regular intervals at a minimum frequency of once a week. • All waste must be disposed of at approved landfill sites, no burning or burying is permitted. • Personnel must be trained in etiquette regarding littering and waste management. • Hazardous waste bins must be clearly marked, stored in a contained bunded area (or have a drip tray) and covered (either stored under a roof or the top of the container must be covered with a lid). • A hazardous waste disposal certificate must be obtained from the waste removal company as evidence of correct disposal. • On-site chemical toilets must be provided for domestic purposes during construction phase. • The contractors are responsible for the maintenance of the chemical toilets. • Waste must be collected by an accredited waste company and disposed of at an appropriate and licensed waste disposal facility. • Littering is prohibited and general housekeeping must be enforced. These impacts, without mitigation, have a daily occurrence that can be reduced to a highly unlikely event. The severity with mitigation is reduced from slightly harmful to small.

Operational	Generation of waste material- The potential generation of general waste from battery usage.	Indirect	**Without**	4	3	3	2	12	**Medium**
			With	2	2	2	1	7	**Low**
			Mitigation measures: • The Service Manager must ensure that waste containers are provided for the collection of general waste at various points on the premises. • All containers must be kept in a clean and hygienic manner that prevents harboring of pests. With correct implementation of these mitigation measure, the frequency can be reduced from a regular occurrence to a highly unlikely event. While severity will be reduced from slightly harmful to potentially harmful.						

Operational	Accidental spillage of hazardous chemicals or materials, such as Lithium, zinc and vanadium	Direct	**Without**	4	4	2	2	12	**Medium**
			With	2	2	1	1	6	**Low**
			Mitigation measures: • Proper storage of chemicals must be within a lockable, well ventilated building. • Storage areas for hazardous chemicals must comply with standard fire safety regulations. • Safety signage including "No Smoking", "No Naked Lights" and "Danger", and product identification signs, must be clearly displayed in areas housing chemicals such as the battery. • Adequate fire-fighting equipment must be available close at hand and no smoking is permitted within the vicinity of storage areas. • Chemicals must be properly labeled and handled in a safety conscious manner. • Bunded walls to retain possible spillages. To contain leaks, a primary container (tank) is within the battery technology itself, the secondary containment is the battery container, the tertiary containment is the concrete surface and / or bund. These impacts, without mitigation, have the potential to damage the environment on a regular basis but with mitigation are expected to drop significantly both in frequency and severity.						

Table 17.8: Fire Suppression

Phase	Potential Impact	Impact Type	Mitigation	Frequency	Severity	Duration	Spatial Scope	Impact Score	Significance
Construction	Fire risks during construction	Direct	**Without**	3	3	3	3	12	**Medium**
			With	2	2	2	2	8	**Low**
			Mitigation measures: • Basic fire-fighting equipment, fire extinguishers, must be placed at strategic locations on site (e.g. at the site office, flammable material store and watchman's container). • Equipment must be maintained in good working order to the satisfaction of local fire authorities. • No open fires are permitted. A dedicated braai facility must be approved by the ECO, if the campsite is in close proximity to firefighting equipment. At no time must a braai fire be left unattended. • Burning of removed vegetation is prohibited. • Smoking is prohibited near places where any readily combustible or flammable materials are present. Notices must be						

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<tr><td></td><td></td><td></td><td colspan="7">prominently displayed prohibiting smoking in such areas.
• Welding, flame cutting, and other hot work must be undertaken in places where safety precautions are in place (i.e. not near potential sources of combustion and with a fire extinguisher immediately accessible).
• All flammable materials must be stored in a lockable storage area.
• Combustible materials must not accumulate on the construction site.
• Cooking must be restricted to bottled gas facilities in designated areas approved by the ECO. This facility must be supervised and strictly controlled.

These impacts, without mitigation, have a daily occurrence that can be reduced to a highly unlikely event. The severity with mitigation is reduced from slightly harmful to small.</td></tr>
<tr><td rowspan="4">Operational</td><td rowspan="4">The batteries comprise of various chemical compositions and run the risk of outbreaks of fire.</td><td rowspan="4">Direct</td><td>Without</td><td>3</td><td>3</td><td>3</td><td>3</td><td>12</td><td>Medium</td></tr>
<tr><td>With</td><td>2</td><td>2</td><td>2</td><td>2</td><td>8</td><td>Low</td></tr>
<tr><td colspan="7">Mitigation measures:

• Eskom must implement a Fire Management and Protection Plan for the BESS facility for each technology alternative.
• Appropriate fire-fighting equipment must always be available on site and serviced at regular intervals.
• Gas fire suppression must be used as acid is a part of the battery composition.
• Equipment must be maintained in good working order to the satisfaction of local fire authorities.
• No open fires are permitted on site.

In terms of frequency, these mitigation measures ensure that the impacts change from a possible daily occurrence to a seldom event. In terms of severity, these mitigation measures change from great to potentially harmful in the event that the mitigation measures were not sufficient. However, the mitigation measures including ongoing environmental awareness training are predicted to be sufficient.</td></tr>
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Table 17.9: Noise Impact

Phase	Potential Impact	Impact Type	Mitigation	Frequency	Severity	Duration	Spatial Scope	Impact Score	Significance
Construction	Noise disturbance - The presence of personnel and machinery will present a nuisance to the area.	Direct	**Without**	4	3	2	2	11	**Medium**
			With	2	2	2	1	7	**Low**
			Mitigation measures: • Construction activities must be limited to normal construction industry working hour – avoid nighttime hours. • A registered contractor providing a project schedule must be employed. Penalties for extending the timeline must be enforced to try and minimise the period of impact. • In addition, construction vehicles and machinery must be fitted with the appropriate noise muffling devices and must be appropriately maintained to ensure that the machines and vehicles do not produce excessive noise disturbance. • No loud music is allowed on site. With correct implementation of these mitigation measure, the frequency can be reduced from a daily occurrence to a very seldom occurrence. While severity will be reduced from slightly harmful to potentially harmful.						
Operational	Noise and disturbance from the battery unit.	Indirect	**Without**	2	2	3	2	9	**Low**
			With	1	1	2	1	5	**Low**
			Mitigation measures: • All noise generating plant such as air conditioning, fans, etc. are to comply with noise standards. In terms of frequency, these mitigation measures ensure that the impacts change from a seldom event to highly unlikely. In terms of severity, these mitigation measures change from being potentially harmful to not harmful.						

Table 17.10: Air Quality Impacts

Phase	Potential Impact	Impact Type	Mitigation	Frequency	Severity	Duration	Spatial Scope	Impact Score	Significance
Construction	Air Quality - Dust generated from construction vehicles and on-site activities.	Direct	**Without**	4	4	2	3	13	**Medium**
			With	3	2	1	3	9	**Low**
			Mitigation measures: • Dust control measures/suppression of dust must be implemented timeously by the contractor. • Water trucks must be utilized to wet exposed road surfaces or stockpiled areas. The dust levels must be kept as minimal as possible to ensure minimal impact to the environment. • Vehicles must be kept in good condition to minimise vehicular fumes. If excessive emissions are observed, the Contractor must remove the vehicle from the site. • Dust and mud must be controlled at vehicle exit and entry points to prevent the dispersion of dust and mud beyond the site boundary. • Speed limit sign boards must be erected during the construction phase to limit dust emissions. These impacts, without mitigation, have the potential to damage the environment on a regular basis but with mitigation are expected to drop significantly both in frequency and severity.						
Construction	Installation and use of ablution facilities- Release of odours as a result of the chemical toilets on-site.	Direct	**Without**	4	4	2	3	13	**Medium**
			With	3	3	1	2	9	**Low**
			Mitigation measures: • Chemical toilets must be cleaned on a regular weekly basis. • Servicing receipts must be maintained and kept on site within the site environmental file. • Sufficient ablution facilities must be provided – minimum of 1 toilet per 20 workers. • Toilets must have properly closing doors and supplied with toilet paper. • Chemical toilets must be serviced weekly. The contractor is to ensure that no spillage occurs and that the contents are removed from site according to approved methods. These impacts, without mitigation, have the potential to damage the environment on a regular basis but with mitigation are expected to drop significantly both in frequency and severity.						

Operational	Release of emissions from battery.	Indirect	**Without**	2	2	3	2	9	**Low**
			With	2	2	2	1	7	**Low**
			Mitigation measures: • The Service Manager must ensure that any emissions must be kept to a minimal. • Regular maintenance and monitoring of the batteries must be undertaken to prevent leaks and abnormal emissions. • Regular site inspections must be conducted by supervisors. With correct implementation of these mitigation measure, the frequency can be reduced from a regular occurrence to a highly unlikely event. While severity will be reduced from slightly harmful to potentially harmful.						

Table 17.11: Visual Impacts

Phase	Potential Impact	Impact Type	Mitigation	Frequency	Severity	Duration	Spatial Scope	Impact Score	Significance
Construction	Visual Quality - The substation is located on the outskirts of the Howick town; however, motorists may not appreciate the presence of a construction site in the vicinity.	Direct	**Without**	3	3	3	3	12	**Medium**
			With	2	2	2	2	8	**Low**
			Mitigation measures: • The site must be well maintained and neat. • The contractor must adhere to project schedule in order to minimise the length of the construction period. • Inspections of the site by an Environmental Control Officer are required. With correct implementation of these mitigation measure, the frequency can be reduced from a seldom occurrence to highly unlikely. While severity will be reduced from slightly harmful to potentially harmful.						
Operational	Visual Quality – The battery storage is placed in an organized manner that is aesthetically pleasing.	Indirect	**Without**	3	3	2	2	10	**Medium**
			With	2	2	1	2	7	**Low**
			Mitigation measures: • All flood lighting must comply with relevant municipal standards. • No unauthorized or un-approved structures must be erected. • Regular inspections must be conducted by the Client to monitor the wear and tear of the batteries.						

			In terms of frequency, these mitigation measures ensure that the impacts change from a seldom event to highly unlikely. In terms of severity, these mitigation measures change from being slightly harmful to potentially harmful.

Table 17.12: Health and Safety Impacts

Phase	Potential Impact	Impact Type	Mitigation	Frequency	Severity	Duration	Spatial Scope	Impact Score	Significance
Construction	Public safety and health – Occupational safety, security and health of staff and public in general.	Direct	**Without**	4	3	3	2	12	**Medium**
			With	2	2	2	2	8	**Low**
			Mitigation measures: • Skilled contractors must be utilised for specialised tasks. • Unskilled labour must be trained relevantly including environmental training. • Fire safety measures must be included in the design of the facility. Fire safety equipment must be provided on site during construction. • First aid kits must be available on site as well as an incident records file. • Safety gear including hard hats and safety shoes must be provided and worn at all times while on site. • Emergency numbers must be clearly visible on site. • Contractor staff are prohibited from trespassing over the site boundaries. • Interaction with objecting parties at the site must be well documented. A complaints register must be readily available on site. Interaction with external parties must be courteous. • Although the Contractor is responsible for ensuring that the environmental awareness training of staff members is put in place, it must be the direct responsibility of the appointed ECO to carry out the training. Each staff member is to sign a register confirming their attendance at this training. This register must be included in the site Environmental file. These mitigation measures are predicted to reduce impacts from occurring regularly to occurring very seldomly. The severity will also reduce to being potentially harmful.						
Construction	Fabrication for the construction of metal	Direct	**Without**	2	2	2	2	8	**Low**
			With	2	1	1	1	5	**Low**

	frames for the batteries to sit on.		**Mitigation measures:** • Welding with propane torches is required and propane must be stored in gas tanks on site within a designated area. In terms of frequency and severity, these mitigation measures ensure that the impacts remain as low as possible.

Operational	Safety of Employees	Indirect	**Without**	2	2	2	1	7	**Low**
			With	2	2	2	1	7	**Low**
			Mitigation measures: • No unauthorized access is permitted. • Service managers and supervisors inspecting the site must be PPE. With correct implementation of these mitigation measure, the frequency can be reduced from a regular occurrence to a highly unlikely event. While severity will be reduced from slightly harmful to potentially harmful.						

Table 17.13: Impacts to Heritage Resources

Phase	Potential Impact	Impact Type	Mitigation	Frequency	Severity	Duration	Spatial Scope	Impact Score	Significance
Construction	Impact to items of Heritage Significance - During construction, items of historical significance may be stumbled upon.	Direct	**Without**	2	3	2	2	9	**Low**
			With	2	1	1	1	5	**Low**
			Mitigation measures: • The KwaZulu-Natal Amafa and Research Institute must be contacted if any heritage objects are identified during earth-moving activities and all development must cease until further notice. • No structures older than sixty years or parts thereof are allowed to be demolished altered or extended without a permit from the KwaZulu-Natal and Amafa Research Institute. • Under no circumstances must any heritage material be destroyed or removed from site unless under direction of the KwaZulu-Natal and Amafa Research Institute and a heritage specialist. • If any remains be found on site that is potentially human remains, the South African Police Service (SAPS) must also be contacted. No SAPS official must disturb or exhume such remains, without the necessary permission from the						

			KwaZulu-Natal and Amafa Research Institute. • No activities are allowed within 50m of a site, which contains rock art. • Sources of all natural materials (including topsoil, sands, natural gravels, crushed stone, asphalt, etc.) must be obtained in a sustainable manner and in compliance with the heritage legislation. In terms of frequency and severity, these mitigation measures ensure that the impacts remain as low as possible especially due to the fact that the site is already disturbed.

Table 17.14: Socio Economic Impacts

Phase	Potential Impact	Impact Type	Mitigation	Frequency	Severity	Duration	Spatial Scope	Impact Score	Significance
Construction	Socio Economic Impacts – Job creation and possible economic benefit to construction material suppliers in the area.	Direct	**Without**	2	2	2	2	8	**Low**
			With	2	1	1	1	5	**Low**
			Mitigation measures: • Local community members must be employed where possible • Strict penalties must be built into tenders to deal with issues such as petty crime, fence cutting, trespassing etc. In terms of frequency and severity, these mitigation measures ensure that the impacts remain as low as possible.						

Table 17.15: Decommissioning Impacts

Phase	Potential Impact	Impact Type	Mitigation	Frequency	Severity	Duration	Spatial Scope	Impact Score	Significance
Operational	Impact of waste from the decommissioning of the battery once the life span of the battery has been reached.	Direct	**Without**	2	2	2	2	8	**Low**
			With	2	1	1	1	5	**Low**
			Mitigation measures: • The supplier will be responsible to recycle any hazardous waste emanating from the technology operation, maintenance and finally replacement of the battery. • If the batteries cannot be recycled, the batteries must be disposed of at a registered waste disposal facility. In terms of frequency and severity, these mitigation measures ensure that the impacts remain as low as possible.						

12.4. Significance of Impacts

Construction Phase:

The duration of the construction phase is approximately 12 months. The proposed construction phase for the entire development is anticipated to be a year (approximately 12 months), given the scope of the project the construction phase is relatively short. A shorter construction phase will act as a mitigation measure in itself as it will reduce exposure of the environment to direct and indirect construction activities. Based on the outcome of the impact assessment matrix noted in Section 12 above, the overall significance of the impacts with mitigation measures for the construction phase, is noted to be **LOW/MEDIUM** i.e. the impact is reasonable but requires mitigation to reduce potential impacts to the environment.

Operational Phase:

Based on the outcome of the impact assessment matrix noted in Section 12 above, the overall significance of the impacts with mitigation measures for the operational phase, is noted to be **LOW/MEDIUM** i.e. the impact is reasonable but requires mitigation to reduce potential impacts to the environment.

12.5. Wetland Habitat Impact Assessment

Summarised results of the impact significance assessed are provided in Table 17.16. below.

Table 17.16: Summarised Impact Significance Results (Wetland Habitat Impact Assessment, 2019)

Impact	Construction Phase		Operational Phase	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Loss of freshwater habitat and biota	N/A	N/A	N/A	N/A
Degradation of freshwater habitat	Medium (24)	Negligible (8)	Low (18)	Negligible (4)
Soil and water pollution	Low (18)	Negligible (8)	Low (12)	Negligible (4)

The assessment results indicate that without mitigation, the construction phase will have a “medium impact significance” on the “degradation freshwater habitat” impact and a “low impact significance” on the “soil and water pollution” impact whilst the operational phase will have a “low impact significance” on both impacts. With implementation of good mitigation measures, the significance of all impacts can be reduced to a “negligible” level for both the construction and operational phases of the project. Note that the impact of the proposed development to the “loss of freshwater habitat and biota” impacts was not assessed because the project will unlikely result in loss of freshwater habitat and biota.

12.6. Ecological Impact Assessment

It must be noted that the Impact Assessment conducted is based on desktop information. The impacts assessed are categorized into three broad categories:

1. Loss of vegetation communities
2. Loss of species of conservation concern and biodiversity
3. Loss of ecosystem function and process

Table 17.17: Loss of Vegetation (Ecological Impact Assessment, 2019)

Impact	Effect						Probability		Total Score	Significance
	Extent		Duration		Magnitude					
Without mitigation	Minor	1	Short term	2	Minor	2	Probable	3	15	Low -
With mitigation	Minor	1	Very short term	1	Negligible	0	Very improbable	1	2	Negligible

Due to the level of transformation of the site, this impact is rated as low sensitivity for the purposes of this assessment. These areas will be affected by the construction phase of the development. The impact will be minor and of minor magnitude over the medium term with a significance of low negative. Mitigation measures will reduce the impact to negligible.

Table 17.18: Loss of Flora Species of Conservation Concern (Ecological Impact Assessment, 2019)

Impact	Effect						Probability		Total Score	Significance
	Extent		Duration		Magnitude					
Without mitigation	Minor	1	Short term	2	Minor	2	Probable	3	15	Low -
With mitigation	Minor	1	Very short term	1	Negligible	0	Very improbable	1	2	Negligible

No flora Species of Conservation Concern are likely to be recorded. Impacts will be minor over the short term and restricted to the site with an overall significance of low negative. Application of the recommended mitigation measures will reduce this impact to negligible.

Table 17.19: Loss of Fauna Species of Conservation Concern (Ecological Impact Assessment, 2019)

Impact	Effect						Probability		Total Score	Significance
	Extent		Duration		Magnitude					
Without mitigation	Minor	1	Permanent	5	Minor	1	Improbable	2	14	Low -
With mitigation	Minor	1	Very short term	1	Negligible	0	Very improbable	1	2	Negligible -

No fauna Species of Conservation Concern were recorded and the likelihood of them occurring is considered to be low. As such, impacts are expected to be correspondingly low.

Table 17.20: Fragmentation and Edge Effects (Ecological Impact Assessment, 2019)

Impact	Effect						Probability		Total Score	Significance
	Extent		Duration		Magnitude					
Without mitigation	Minor	1	Short term	2	Minor	2	Probable	3	15	Low -
With mitigation	Minor	1	Very short term	1	Negligible	0	Very improbable	1	2	Negligible

Due to the high level of fragmentation of the existing and post-construction landscape, impacts will be low. This impact, without mitigation is estimated to be minor in extent and magnitude over the short term and is probable. Overall significance is a low negative and can be reduced to negligible with mitigation.

Table 17.21: Invasive of Alien Species (Ecological Impact Assessment, 2019)

Impact	Effect						Probability		Total Score	Significance
	Extent		Duration		Magnitude					
Without mitigation	Local	2	Permanent	5	Moderate	6	Definite	5	65	High -
With mitigation	Minor	1	Short term	2	Minor	2	Probable	3	15	Low -

There are already alien invasive species on site (and the site is within a plantation). There is a high risk of these invasive species spreading in the construction phase in addition to new species being introduced through seed dispersal, and on vehicles and personnel. This impact will be local in extent, permanent and moderate in magnitude. The impact is definite with an overall significance of high negative. With the application of mitigation measures, this impact can be reduced to low negative.

Table 17.22: Direct Results of Pollution

Impact	Effect						Probability		Total Score	Significance
	Extent		Duration		Magnitude					
Without mitigation	Local	2	Long term	4	Moderate	6	Probably	3	36	Medium -
With mitigation	Minor	1	Short term	2	Minor	2	Improbable	2	10	Low -

As batteries contain chemicals, it is possible that these chemicals may leak and affect surrounding vegetation. As the site is comprised a transformed area, and surrounded by plantations, little, if any, indigenous vegetation will be lost. However, such chemicals will remain in the soil and damage any future attempts to rehabilitate and necessitate a complicated remediation process that will affect the soil, losing structure and possible future rehabilitation efforts. The impact is thus likely to be a medium negative, which can be reduced to low with mitigation measures.

13. ENVIRONMENTAL IMPACT STATEMENT

According to the wetland habitat impact assessment, the construction and operation of the Battery Energy Storage System (BESS) at the Elandskop Substation was assessed as likely to have a negligible impact to the four delineated watercourses found to be within the impact zone of the proposed development. The negligible impact rating is attributed to the BESS not generating any pollution or significant stormwater onto the closest watercourse being 135m downslope. Given the low environmental risk associated with the proposed development and the 135m distance between the watercourse and the development footprint, a formal buffer determination tool was not applied as the 135m distance is more than sufficient to manage surface impacts such as sedimentation, erosion etc. The specialist recommends that the proposed development go ahead.

According to the ecological impact assessment, sensitivity of the site is low as it is located within a disturbed landscape (peri-urban sprawl) and plantations. The site itself is also fully transformed and the proposed BESS is planned to be built on an existing cement platform. Although this report is based on desktop information and some photographs, it is considered highly unlikely that any conservation important vegetation or habitats are present on site, and the likelihood of species of conservation concern occurring (both flora and fauna) is considered low. It is recommended that the development go-ahead provided that the conditions of the EA are adhered to.

According to the heritage specialist, an exemption application is applicable. The proposed development of the BESS will take place within an existing substation site which indicates that the area is already disturbed by the constructed and operational substation. The specialist recommends that the exemption application be accepted and granted.

Through this Basic Assessment, it had been concluded that the proposed development is not expected to have any significant, adverse or lasting impacts on the environment. During the construction phase, the project can be expected to have low negative impacts on various environmental attributes with proper mitigation measures implemented. Similarly, the project can be expected to have a positive impact on the regional and local socio-economy during the construction phase. This will be as a result of the creation of jobs as well as procurement opportunities from local suppliers in the area. Benefits of the project outweigh the potential negative environmental and social impacts, which can be mitigated to within acceptable levels. Based on the outcomes of the risk assessments conducted as part of the BAR, coupled with the recommendations made by the specialists, the overall negative impact of the project is of Low - Medium significance, which can be reduced to Low significance through the implementation of simple, effective mitigation measures.

The EMPr must be adhered to and will ensure that any negative impacts however minimal are not magnified. During the post construction phase of the project, the contractors must ensure that all hazardous materials are removed from the site and that rehabilitation of land is undertaken according to the requirements of the EMPr.

14. IMPACT MANAGEMENT MEASURES FROM SPECIALIST STUDIES

14.2. Geotechnical Investigation

14.1.1. Excavation Requirements

Red sandy soils that have lower CBR values, the requirement would be cut to spoil and import good materials or use soil type three foundations. It is anticipated that soft excavation will be required to a depth of 1m.

14.1.2. General Terrace Layer Works

DCP in tests were done on a hot day and single digit blows were recorded to 1000mm depth in all readings as an indication of existing poor soils. Soil type 3 foundations are recommended.

14.1.3. Access Road

Single digit blows were recorded to 700mm depth, however double digits were recorded in the first 300mm depth. Therefore, results are acceptable on the base of the access road with much higher DCP blows. No work is necessary on the access road.

14.1.4. Storm Water Management

Existing headwall outlet situated on the proposed BESS site will require repositioning. Proposed site is at the lowest point of the Eskom yard where storm water will naturally flow. Storm water to be directed away from the proposed site.

14.3. Wetland Habitat Impact Assessment

14.2.1. Construction Footprint Limit

- The water user must ensure no development is undertaken outside the current boundary of Elandskop Substation.
- The water user must ensure that no vegetation is cleared or damaged outside the Elandskop Substation property boundary.

14.2.2. Soil Management

- Excavated topsoil must be stockpiled separately from subsoil.
- When backfilling of trenches, replacement of subsoil must precede the topsoil replacement.
- Backfilled soil must be compacted to natural compaction levels.
- Prior to commencing with earthworks, the topsoil must be stripped and stockpiled separately from subsoil.
- Topsoil must be kept for use during rehabilitation of landscaped areas.
- Topsoil must be stockpiled in stockpiles not exceeding 2m in height.
- All stockpiles must be kept free of weeds and invasive alien plants.
- If at risk of being eroded, all stockpiles must be secured with sandbags around the base of the soil stockpile.
- All stockpiles must be established outside the 30m buffer of all watercourses and on flat ground.

14.2.3. Soil Erosion Control Measures

- Sediment barriers must be installed in areas sensitive to erosion such as slopes and erodible soils. These measures include but are not limited to the use of sandbags, hessian sheets, silt fences etc.
- All sediment barriers must be installed within the Elandskop Substation.
- Disturbed sites must be rehabilitated as soon as construction in an area is complete and not left until the end of the project to be rehabilitated.

14.2.4. Pollution Prevention Measures

- Any soil contaminated by hydrocarbons (fuel and oils) must be removed and the affected area rehabilitated immediately.
- Chemical toilets must be provided to workers during the construction phase. A single chemical toilet must be provided for every 10 employees.
- Chemical toilets must be serviced regularly by a registered service provider and waybills must be retained as proof of servicing.
- Fuel must be stored in a bunded structure with a roof. The bund must be able to contain at least 110% of the volumes of fuel.
- Mixing and/or decanting of all chemicals and hazardous substances must take place on a tray, shutter boards or on an impermeable surface.
- Drip trays should be utilised at all dispensing areas.
- A chemical spill kit must be present onsite at all times and once used it must be disposed of at a registered hazardous landfill site.
- All solid waste must be collected and placed in bins.

14.2.5. Invasive Alien Plant Control

- The control and eradication of a listed invasive species must be carried out by means of methods that are appropriate for the species concerned and the environment in which it occurs in.
- All invasive alien plants must be removed from the construction area.
- Mechanical control methods such as digging, hoeing, pulling out of weeds and invasive plants are recommended.
- Use of chemical treatment methods must be kept to a minimum.
- Where chemical treatment methods are used, the contractor must ensure that he uses watercourse friendly herbicides.
- The methods employed to control and eradicate a listed invasive species must also be directed at the new growth, propagating material and re-growth of such invasive species in order to prevent such species from producing offspring, forming seed, regenerating or re-establishing itself in any manner.

14.4. Ecological Impact Assessment

14.4.1. Loss of Vegetation Communities

Vegetation will be lost as a direct result of the construction phase of the project. Vegetation lost includes degraded vegetation present within the footprint of the proposed substation and is already transformed. Recommended mitigation measures to reduce impacts to vegetation include:

- Keep the footprint of the development (particularly during construction) as small as possible. Ensure that excavations are kept to the minimum size and that stockpiles of soil piled adjacent to the excavation takes up as little space for as short an amount of time as possible.
- Laydown areas should be located exclusively in areas of low sensitivity including in areas that have already been disturbed or contain primarily alien vegetation.
- All alien vegetation, both existing and new must be controlled throughout the construction and operational phase of the development.
- Permits must be obtained for the damaging, cutting or removal of protected trees and other protected species (TOPs or KZN listed.), following a walk-through of the full site in the wet season prior to construction commencing.

14.4.2. Loss of Species of Conversation Concern and Biodiversity

As the site is transformed, impacts to flora SCC are unlikely to occur. As the footprint of the development is relatively narrow, it is highly likely that any fauna SCC occurring on site will be able to move away and will not be affected. It is highly likely that faunal SSC do not occur within the site due to its transformed nature. The following mitigation measures are recommended:

- Prior to construction, a final walk through must be conducted in order to confirm no flora SCC are present; should these be found the following must be conducted:
    - Application for permits for the removal of listed plant SCC;
    - Removal and replanting/ relocation to a nursery of existing SCC; and
    - Planting of additional individuals of specific SCC.
- It is recommended that where possible, protected species should be selected and planted in any garden as part of the development.

14.4.3. Loss of Ecosystem Function and Process

Ecosystem function and process are important for terrestrial biodiversity. Invasion by alien flora species can result in the change of vegetation and the loss of function, especially when a grassland is converted to woodland, resulting in the reduction of available water and the drying up of wetlands and streams. As the site is small, and already part of a fragmented and impacted ecosystem comprising peri-urban sprawl and plantations, loss of function will be low to negligible. Recommended mitigation measures include:

- Development and application of an alien invasive management plan to prevent spread and new invasions by alien invasive plant species.
- Keeping the disturbance footprint as small as possible.
- Rehabilitation should take place as soon as possible after construction is completed and should comprise the planting of region-specific water wise plants (or wetland species where applicable).

14.5. Heritage Impact Assessment

If exemption from undertaking a Phase 1 HIA is granted, then the following conditions must be met by the Applicant:

- For any chance heritage finds, all work must cease in the area affected and the Contractor must immediately inform the Project Manager. The provincial heritage agency, the KwaZulu-Natal Amafa and Research Institute (hereafter referred to as the Institute) must also be informed.
- A heritage specialist must be called to site to assess the significance of the find.
- Permits must be obtained from the Institute if heritage resources are to be removed, destroyed or altered.
- Only once the heritage specialist gives the go-ahead can work in the area of the find re-commence.

- Under no circumstances may heritage material be destroyed or removed from site unless under direction of a heritage specialist.
- Should recent remains be found on site that could potentially be human remains, then the South African Police Service should also be contacted. No SAPS official may remove remains until the correct permit/s have been obtained.
- In terms of chance fossil finds, the following must be adhered to:
    - When excavation takes place for the construction of the BESS facility, any rocks disturbed during this process should be inspected by the environmental officer or designated person. Any fossiliferous material (trace fossils, plants, insects, bone, and coal) should be put aside in a suitably protected place.
    - Photographs of possible fossils should be sent to a palaeontologist for preliminary assessment.
    - If there are concerns regarding any fossil finds, then a palaeontologist must visit the site to inspect the selected material and check dumps where necessary.
    - Fossil plants or vertebrates that are deemed to be of good quality scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a permit must be obtained from the Institute. Annual reports must be submitted to the Institute as required by the relevant permits.

15. CONDITIONS OF AUTHORISATION

In terms of Monitoring and Auditing, the following are recommended to ensure protection of the environment during construction:

- The Battery Energy Storage System (BESS) is a new and developing technology especially in the context of South Africa, therefore there are some areas that still have limitations and uncertainties.
- A Basic Assessment process has been undertaken with the assurance from the Applicant will not exceed 500m^3 of dangerous goods.
- An ECO must monitor the construction site and activities on a monthly basis for the duration of the construction phases,
- An ECO must document the findings and submit a monthly report to the Competent Authority (CA);
- The Project Manager and Contractor are responsible for the implementation of the EMPr and protection of the environment for the duration of the construction period.
- An ECO must monitor the facility on a monthly basis for the operational phase, for a period of 12 months following completion of construction to ensure that rehabilitation has been successful.
- An ongoing Alien Invasive Management Plan must be compiled and implemented prior to construction activities.
- A Landscape Plan is must be submitted to the Msunduzi Municipality: Environmental Management Unit for comment and approval prior to site works commencing.
- A species relocation plan must be compiled and submitted to the Msunduzi Municipality: Environmental Management Unit for comment and approval prior to site works commencing.
- The Storm Water Management Plan must address the impacts associated with the increase in hardened surface area and must address quantity and quality of the storm water discharged from the site and incorporate on-site storm water attenuation measures to ensure the proposed development is flood neutral. Post development storm water discharge volumes must not exceed pre-development volumes. The storm water management plan must be submitted to Msunduzi Municipality: Environmental Management Unit as well as the Msunduzi Roads and Drainage Management Unit for comment and approval prior to any site works commencing.
- A horticultural specialist must be appointed to identify and relocate sensitive plant species prior to any site works.
- A Rehabilitation Plan must be compiled as per the Ezemvelo KZN Wildlife Biodiversity Guideline.
- Once the final technology alternative is selected, a detailed fire management and protection plan must be compiled and submitted to DEA for consideration prior to undertaking any construction activities.

16. ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

The proposed plans and designs of the BESS project have been completed and are included in this BAR as Appendix C. However, these still require approval and Environmental Authorisation from the Competent Authority; the Department of Environmental Affairs.

16.2. Wetland Habitat Impact Assessment

The following assumptions and limitation are applicable to this study:

- Desktop delineation was undertaken using 5m contours, latest aerial imagery and the latest Google Earth Imagery. Any vegetation changes may have influenced the accuracy of the delineation.
- The slope gradient was calculated using 5m contour lines which might not be very accurate.
- The handheld GPS device used has an accuracy of 3m.
- All literature and datasets used were accurate at the time of compiling this report.
- Vegetation descriptions provided for each wetland unit are not comprehensive but serve to provide a general description of the wetland habitat.
- There may be important species that were missed due to:
    a. the assessment being undertaken late in winter to early spring when most plants dieback or are beginning to sprout; and
    b. burning of the wetland vegetation.

16.3. Ecological Impact Assessment

This report is desktop only and thus does not take into account any vegetation, flora and fauna actually occurring on site.

17. RECOMMENDATIONS OF THE EAP

The information contained in this report and the documentation attached hereto, in the view of the EAP, was sufficient for the Public Participation Process (PPP). Should the Competent Authority request additional studies to be conducted, this shall be conducted and obtained to assist the Competent Authority in making an informed decision. The EMPr, which includes recommended conditions and mitigation measures that should be considered for inclusion in any authorisation that may be granted by the competent authority in respect of the application, is provided.

It is noted that the proposed technology would not pose significant negative environmental or social impacts. Potential adverse environmental impacts were identified and are accompanied with corresponding mitigation measures. Implementing renewable technology would directly contribute to the reduction in strain on the grid especially during peak hours as well as reduction of fossil fuels. Keeping the above-mentioned points in mind, it is the opinion of the EAP that DEA grant an EA that covers all possible scenarios.

Refer to Appendix F for a full Environmental Management Program. The EMPr must be read in conjunction with the BAR.

18. TIMEFRAMES

An environmental authorisation valid for five (05) years is requested. Construction may commence at any time within this 5-year period.

19. UNDERTAKING UNDER OATH OR AFFIRMATION BY THE EAP

(i) 1World Consultants (Pty) Ltd hereby confirms that the information provided in this Basic Assessment Report is correct at the time of the compilation and distribution for review. Input from specialists was utilised in the compilation of the Report.

(ii) 1World Consultants (Pty) Ltd confirms that all comments received from Stakeholder and I&APs have been included in this report. It is to be noted that in terms of the EIA Regulations (2017), GNR 326 43(2), all State Departments that administer a law relating to a matter affecting the environment, specific to the Application, must submit comments within 30 days to the EAP. Should no comment be received within the 30-day comment period, it will be assumed that the relevant State Department has no comment to provide.

(iii) All information from the specialist studies have been included in this Basic Assessment Report. Recommendations from the specialists have been included in the EMPr.

(iv) All information and comments received in response to this Basic Assessment Report will be summarised and responded to in a final version of the Report, which will be submitted to DEA for consideration in terms of issuing Environmental Authorisation.

For 1World Consultants (Pty) Ltd:

Fatima Peer B.Sc. (Hons) Pr. Sci. Nat.
SENIOR ENVIRONMEN TAL ASSESSMENT PRACTITIONER

N.B. An original signed EAP Declaration has been downloaded from the Departmental website and can be reviewed under Appendix B.

APPENDICES

The following appendices must be attached as appropriate:

Appendix	Description of Contents
A	Minutes of the pre-application meeting DEA Environmental Screening Report Desktop Screening Report
B	1World Consultants - Company Profile 1World Consultants - Company Experience EAP Team – Declaration and CV's Specialist Team – Declaration and CV's
C	Acknowledgement of Receipt of Environmental Authorisation Conceptual Design of BESS Correspondence Regarding Listed Activities
D	I&AP distribution list Background Information Document Newspaper Advertisements Site Notice Boards Comments and Responses Report on BID Comments and Responses Report on DBAR Proof of Distribution of DBAR and Comment Requested
E	Geotechnical Report Wetland Habitat Impact Assessment Ecological Impact Assessment Heritage Exemption Application
F	Environmental Management Programme

Appendix A

Environmental & Engineering Consultants
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Minutes of the Pre-Application Meeting

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Environmental Screening Reports

Appendix B

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1World Consultants Company Profile

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1World Consultants Company Experience

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EAP Team – Declaration and CV's

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Specialist Team – Declaration and CV's

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Appendix C

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Acknowledgement Receipt of Environmental Authorisation

Conceptual Design of BESS

Correspondence Regarding Listed Activities

Appendix D

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I&AP Distribution List

Environmental & Engineering Consultants
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Background Information Document

Environmental & Engineering Consultants
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Newspaper Advertisements

Environmental & Engineering Consultants
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Site Notice Boards

Environmental & Engineering Consultants
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Comments and Responses Report on BID

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Comments and Responses Report on DBAR

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Proof of Circulation of DBAR

Appendix E

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Geotechnical Report

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Wetland Habitat Impact Assessment

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Ecological Impact Assessment

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Heritage Exemption Application

Appendix F

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Environmental Management Programme