

ENVIRONMENTAL MANAGEMENT PROGRAMME

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

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Prepared by:

1World Consultants (Pty) Ltd
P. O. Box 2311, Westville, 3630
Tel: 031 262 8327
Contact: Fatima Peer
Email: fatima@1wc.co.za



Commissioned by:

Eskom Holdings SOC Limited
Contact: Mhleli Vezi
Email: VeziMM@eskom.co.za



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Acronyms Used	
Acronym	Definition
DEA	National Department of Environmental Affairs (Pretoria)
BESS	Battery Energy Storage System
DW&S	Department of Water and Sanitation
ECO	Environmental Control Officer
EMPr	Environmental Management Programme
I&AP	Interested and Affected Party(ies)
PM	Project Manager
SCC	Species of Conservation Concern

Disclaimer:

This Environmental Management Programme (EMPr) has acknowledged the impacts such as health and waste that are associated with the development. This EMPr must not be considered a Waste Management Plan or assumed to be a health license. The EMPr has been prepared pre-construction and must be regarded as a working document that may be updated if and when necessary. Any amendments made to the proposed construction must be submitted to the Competent Authority as an amendment to the authorisation for approval before being implemented.

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	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 237m ²
New Development Footprint on the Ground Level	2 276m ²

1.1. Project Approach

The World Bank and co-financiers approved (i) 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 prohibited 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.

1.2. Location of the Activity

The proposed BESS facility is located within Ward 4 & 8 of the Msunduzi Local Municipality, 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 2.

Table 2: 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	NOFT00000000466900000
	Van Vuuren's Post	942	NOFT00000000094200000
	Calderwood	1946	NOFT00000000194600000
	Calderwood	1946	NOFT00000000194600000
	Zwaart Kop Native Location	4669	NOFT00000000466900000
	Van Vuuren's Post	942	NOFT00000000094200000
Property Size	19 237m ²		
Development Footprint	2 276m ²		
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 (Pointed out in Yellow), (Google Earth Imagery, 2018)



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

1.3. Project Description

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 by 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)

1.4. 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 3 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 3: 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

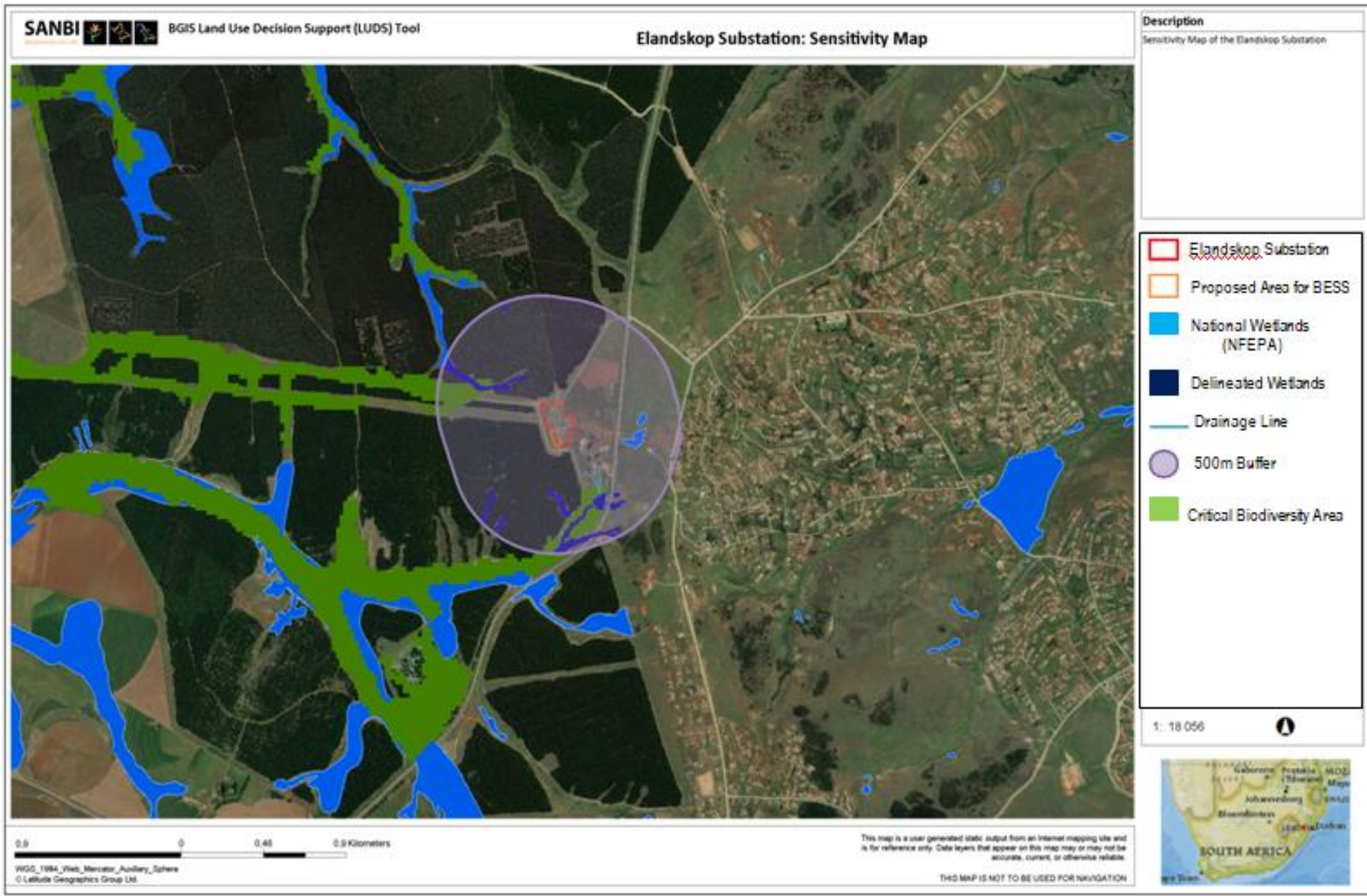


Figure 5: Sensitivity Map for the Elands kop Substation Site (SANBI GIS Tool, 2014)

1.5. 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.

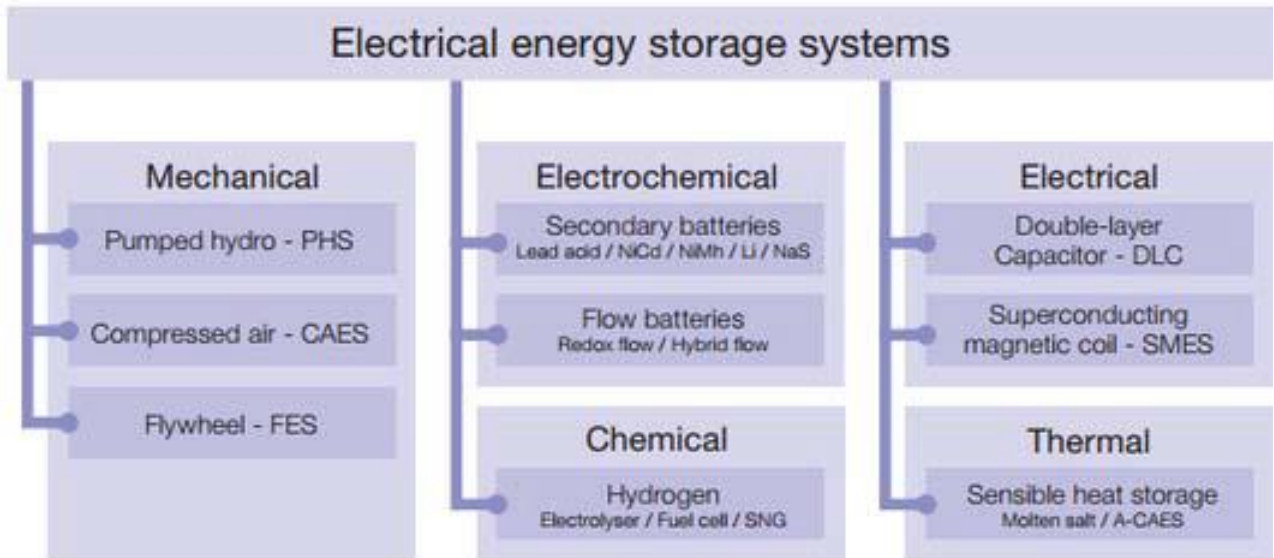


Figure 6: Electrical Energy Storage Systems (Eskom Technology, 2018)

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 of 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 500m³.

1.6. Associated Activities and Infrastructure

- Network integration equipment such as power cables, control cables, isolators, circuit breakers, transformers, etc. will be required to connect the new BESS to existing infrastructure at the substations. Each site may also require additional fencing, security equipment, lighting, masts and/or control room upgrades.
- Construction of platforms for BESS (compacted fill, earth protection layer and stone chip) to accommodate the BESS containers. Cable trenches to connect BESS to grid.
- Temporary laydown areas and site camp will be required at each of the sites during construction.
- Stormwater measures on site to divert stormwater away from the BESS containers.

1.7. Points to Consider

- 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
- Stormwater Management
- Surface runoff
- Noise and disturbance
- Visual quality

2. PROJECT RESPONSIBILITIES

The project team will consist of the Project Manager, the Project Engineer, the Environmental Control Officer (ECO) and the Contractor.

2.1. Project Engineer

The Project Engineer will provide the project specifications of the construction phase. The contractor is legally bound to follow these specifications unless agreed upon by the Engineer. The engineer has the following responsibilities:

- Monitor compliance of the project, following provision of inspection reports provided by the ECO.
- Assess the Contractors performance with regard to completion of the task and keep records on a monthly basis.
- Facilitate the site handover to the Contractor.

Company Name	Eskom Holdings SOC Limited
Contact Person	Eugene van Heerden
Address	25 Valley View Road, New Germany
Telephone	031 710 5044
Email	vHeerdE@eskom.co.za

2.2. Environmental Control Officer (ECO)

The ECO is responsible for monitoring and reporting that the contractor and applicant are implementing and following the EMPr during the construction and operational phases (for the timeframe specified in the conditions of the environmental authorisation) and to liaise and report to DEA. The following will fall within the ECO responsibilities:

- Have a working knowledge of the recommendations and mitigation measures as provided in this EMPr and of the permits, authorisations and licenses.
- Conduct monthly audits of the construction site according to the EMPr and according to the conditions of the environmental authorisation.
- Provide the contractor with environmental training and a copy of the EMPr and confirm in writing that it is understood.
- Liaise with the contractor and project manager.
- Recommend corrective steps for any non-compliance activity on site with respect to the EMPr.
- Compile a monthly audit report highlighting compliance and non-compliance with the EMPr and submit to DEA.
- All agreements between the contractor and the ECO with regard to the EMPr will be in writing and co-signed by the Project Manager.
- The ECO will not be on site on a daily basis and the Contractor is responsible for implementing the EMPr. The Contractor will be provided with a contact number for the ECO.

2.3. Contractor and Sub-contractors

The Contractor is responsible for implementing and adhering to the EMPr during the construction phase, in all respects as stipulated. Compliance with the EMPr by staff during the construction must be adhered to by the contractor and this must be recorded by the contractor for audit purposes. The following will be the responsibility of the Contractor:

- Be familiar with the EMPr and all conditions of authorisations, licenses and/or permits.
- Supply method statement for implementation of the EMPr.
- Attend training provided by the ECO, and relay training to all staff and sub-contractors. Proof of training must be kept on record.
- Maintain an environmental file that must contain the following documents:
 - Company environmental policy
 - Hazardous material handling and storage protocols
 - Spill Contingency Plan
 - Emergency Response Plan and Contact Numbers
 - Waste disposal certificates
 - Servicing of portable toilets
- Maintain an environmental complaint register that must have carbon copies and numbered pages, to record all incidents that occur on site during construction. Incidents include but may not be limited to:
 - Public involvement / complaints
 - Occupational health and safety incidents
 - Incidents / spills involving hazardous materials and/or equipment on site
 - Non-compliance incidents
 - Spills into or around watercourses
 - Encountering fauna of interest
 - Finding archaeological artefacts and/or human remains
- Bear any costs associated with non-compliance and/or damage to the environment as a result of not implementing the EMPr or due to negligence.

2.4. Developer

The Developer is legally ultimately responsible for the overall compliance with the conditions of the environmental authorisation, since any authorisation and/or license is in the name of the developer. The following fall within the responsibilities of Eskom Holdings SOC Limited:

- Be familiar with the recommendations and mitigation measures of the EMPr. The contractor and all staff must agree to adhere to it.
- Monitor site activities on an ongoing basis or contract the service out
- Conduct internal audits of the site
- The contractor must confine the activities to within the demarcated area
- Rectify transgressions via communication with the contractor and staff and the ECO
- An ECO must conduct monthly audits and audit reports must be submitted to the DEA.

3. THE ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)

The focus of the environmental management programme is to allow for the proposed battery energy storage system whilst still protecting the environment. Particular reference is given to the following key aims:

- The general protection of the receiving environment via compliance with all applicable laws, protocols and guidelines,
- Water courses and wetlands are protected,
- Prevent or minimise pollution of the receiving environment,
- Minimise disturbance of the environment and aim to protect flora and fauna,
- Prevent soil erosion and soil degradation
- Facilitate the rehabilitation of disturbed areas
- Restrict the nuisance and aesthetic factor

Damage to water courses, vegetation, animal life, surrounding roads (by construction vehicles), etc. may result from the proposed construction activities. Chemicals such as paints, sealants, coatings, adhesives and solvents may contaminate the soils, groundwater and watercourses if proper procedure is not followed.

3.1. Objectives of the EMPr

The objectives of the EMPr are to:

- Comply with local, provincial, national and/or international regulations, standards and guidelines, relating to the protection of the environment.
- Clarify roles and responsibilities of the team members
- Identify measures of mitigating any potential negative impacts thereby reducing or eliminating them
- Provide detail on specific actions required for minimising negative impacts and provide tools or methods for monitoring the effectiveness of mitigation measures
- Optimise positive impacts to maximise the benefit thereof
- Provide management of concerns/complaints from I&AP's
- Provide monitoring and auditing processes during all phases of the development.
- Provide methods of compliance monitoring and reporting of the monitoring
- Provide waste management, recycling and re-use strategies

3.2. Environmental Monitoring

A monitoring program for compliance with the EMPr will be implemented for the duration of the proposed construction. The program will include the following:

- Monthly site visits and audits (subject to the conditions of any environmental authorisation or license) which will be conducted by the Environmental Control Officer (ECO) to monitor compliance to the final EMPr.
- Provide corrective recommendations to rectify any non-compliance.
- Compilation and submission of audit reports to DEA providing rating of compliance with the EMPr. Any evidence of damage to areas outside the construction zone will be recorded via photographs as well as a record of the date and time of damage, type of damage and reason for damage. The contractor will be liable for damages if it has resulted from non-compliance to the EMPr.
- A register of complaints from I&AP's will be opened and maintained. Complaints and concerns must be responded to immediately.

3.3. Compliance with the EMPr

The EMPr specifies the requirements to be implemented by the developer in order to minimise and manage any potential environmental impacts. The provisions of this EMPr will be legally binding to the Authorisation Holder or any authority to whom responsibility has been delegated to, for the proposed development, for the duration of the construction phase.

The EMPr is legally binding to the contractors/sub-contractor(s) and must be included in the Contractual Clauses. A copy of the approved EMPr must be kept on site during construction and operation. In terms of the Environmental Conservation Act and the National Environmental Management Act, those parties responsible for damage to the environment must pay the costs to repair and compensate for environmental and/or human health as well as for preventative measures to avoid or reduce further damage. The Contractor must make provisions in the budget for implementation of the EMPr.

Non-compliances may result in the application of penalty(ies) following non-compliance after a written warning by the ECO. Failure to rectify non-compliances within one (1) week of the issue OR a repeat offense will result in a fine issued by the ECO.

The following rates will apply for issuing of fines:

Table 4: Fine Rates to be Applied

Offense	Fine Amount
Failure to demarcate working areas	R 1 000
Working or trespassing outside of the demarcated areas	R 3 000
Failure to strip topsoil with intact vegetation	R 5 000
Failure to stockpile topsoil correctly	R 3 000
Failure to stockpile materials in designated areas	R 1 000
Failure to implement dust suppression actions	R 1 000
Washing of vehicles on site	R 1 000
Pollution of surface or ground water	R 5 000
Failure to implement stormwater management plans	R 10 000
Failure to control stormwater runoff	R 10 000
Soil erosion	R 20 000
Failure to provide adequate sanitation	R 5 000
Failure to erect temporary fencing around trenches	R 5 000
Failure to provide adequate waste disposal facilities and services	R 5 000
Failure to re-instate disturbed areas within a specified time frame	R 5 000
Removal of protected flora without a permit to do so	Specified by DAFF
Any non-compliance of the project specifications	R 10 000

The fines will be paid by the Contractor to the Developer to be utilised in the landscaping and/or rehabilitation of the site.

3.4. Layout of the EMPr

The EMPr is presented in two phases namely, the construction phase and the operational phase of the project. Each phase has specific mitigation measures that address potential impacts which may be unique to that phase.

- Design and Construction Phase – This phase includes pre-construction activities including the site handover, site establishment, environmental training and access routing. The specifications of all mitigation measures, the responsibilities and the procedures for this phase must form part of the contract documentation. Hence, the relevant personnel will be required to comply with this phase of the EMPr.
- Rehabilitation Phase – This phase of the EMPr provides for the removal of the contractor's camp, rehabilitation of the site and any disturbed areas and handover to the Client.

3.5. Training

Contractors and workers must receive basic training in environmental awareness i.e. minimisation of impacts to sensitive elements, waste management, water pollution and the requirements of the EMPr.

3.6. Implementation of EMPr by Contractor

The contractor must implement and comply with the EMPr at all times. If clarity be required the contractor must contact the ECO for advice. The ECO must provide the contractor with their contact details.

3.7. Environmental File

The Environmental File comprises the following documents and must be kept on site in order to record compliance:

- Copy of any Environmental Authorisation, licenses, permits, Stormwater Management Plan, and the approved Final EMPr
- Method statement for complying to the EMPr,
- Record of complaints from I&AP's capturing the time, date, location and nature of complaint as well as the actions taken and by whom. The complaints register must have carbon copy pages and numbered pages.
- Emergency Response Plan and Record of emergencies and incidents
- Spill Contingency Plans
- Proof of Training
- Emergency contacts and numbers
- Material Safety Data Sheets for any hazardous substances
- Dust suppression records
- Written corrective action instructions provided by the ECO (including emails)
- Any Non-Conformance Reports (NCR) that have been issued to the contractor and/or sub-contractor(s). A Non-Conformance follows non-compliance to rectifying a problem area and must be reported to the Competent Authorities. A Non-Conformance Report typically contains the following information:
 - Details on the non-conformance,
 - Any plant or equipment involved,
 - Any chemicals or hazardous substances involved,
 - Details on the non-conforming action,
 - Nature of associated risk(s),
 - Corrective actions to rectify non-conformance, as agreed by all parties concerned,
 - Timeframes for corrective measures to be implemented,
 - Record of compliance by corrective actions, as verified by the ECO

3.8. Environmental Emergency Response plan

The Contractor is responsible for preparing an Environmental Emergency Response Plan. This is to exhibit the Contractors ability to respond effectively to incidents that may have detrimental impacts on the environment. Such incidents include the following among others:

- Accidental spillage of hazardous substances (oil, fuels, sewage, etc.) resulting in negative impacts such as; soil contamination, surface and groundwater pollution, habitat and biodiversity loss, etc.
- Accidental toxic air emissions resulting in negative impacts such as; air pollution, habitat and biodiversity loss, etc.
- Accidental discharges to watercourses and onto land resulting in negative impacts such as; contamination, pollution, habitat and biodiversity loss, etc.,
- Specific impacts from accidental incidents, e.g. mass death of fish, etc.

The emergency response plan must include for the following:

- Provide actions to be taken in the event of an emergency, in the most logical sequence of events,
- Emergency contact numbers,
- Roles of designated emergency response team members from the contractor's team,
- Incident recording,
- Remediation measures to be implemented,
- Information on hazardous substances, plant and equipment, including warnings and potential risks,
- Proof of emergency response training, including proof of emergency preparedness, as per legal requirements.

3.9. Method Statements

Beside the emergency response plan, the Contractor must provide the following method statements in the environmental file:

- Construction site establishment,
- Dust suppression,
- Cement mixing/concrete batching,
- Contaminated/used water,
- Erosion control and stormwater management,
- Storage and handling of hazardous substances,
- Bunding
- Project management including training,
- Personnel and public safety,
- Protection of fauna and flora,
- Rehabilitation of disturbed areas,
- Solid and liquid waste management,
- Topsoil management including storage and re-use,
- Sourcing and Storage of materials,
- Rest and Wash areas, including toilets
- Interaction with public and stakeholders

4. RELEVANT LEGISLATION

In terms of the Environmental Impact Assessment (EIA) Regulations (2014) and (2017), promulgated in terms of the National Environmental Management Act, 1998 (NEMA) a basic assessment has been conducted by an independent environmental assessment practitioner (EAP), 1World Consultants (Pty) Ltd. According to the BA requirements, an Environmental Management Programme (EMPr) was formulated to address the impacts identified. The EMPr endeavours to monitor, minimise and mitigate impacts identified and concerns raised by interested and affected parties and/or stakeholders.

The EMPr presented covers activities authorised by the competent authority (DEA) only. Activities not approved must be submitted for environmental authorisation, before commencement. If the impacts identified in the BAR be more significant than assessed, the environmental management plan must be reviewed; and updated if necessary. The EMPr is not independent of the BAR, therefore both must be read in conjunction with each other.

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 5: 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.	<p>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).</p> <p>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.</p>

The final environmental management programme is submitted and is subject to approval by the National Department of Environmental Affairs. The environmental management programme is formulated to include only those aspects pertaining to the environmental authorisation. It may not have taken all the necessary legislation and regulations, pertaining to the actual development activities. The appointed project manager and/or developer must adhere to the necessary legal requirements.

Examples of such legislation or regulations, amongst others, include:

- The Constitution (1996)
- Labour Relations Act (1995)
- National Building Regulations and Building Standards Act (1977)
- Health Act (1977)
- National Water Act (1998)
- Occupational Health and Safety Act (1994)
- National public health and food hygiene regulations
- National Water Act 1998 (Act 36 of 1998)
- Minimisation of Shadows on Beaches Policy for eThekweni: Shadow Impacts on Beach and Residential Amenities (2008)

The EMPr covers legislative requirements derived from the following:

- National Environmental Management Act (107 of 1998) as amended.
- National Water Act
- National Environment Management Act: Biodiversity Act

5. PRE-CONSTRUCTION PHASE

The pre-construction phases include all activities that are required to render the project ready to begin construction.

Authorisations, Permits and Licenses:		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
All legally required authorisations, permits and licenses must be obtained prior to commencement of construction.	Developer	Once
The Developer must appoint an independent EAP and/or ECO.	Developer	Once
All I&AP's and stakeholders must be notified prior to commencement of construction.	Developer/Contractor	Once
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.	Developer/Contractor	Once
An alien invasive management plan must be developed and applied to prevent spread and new invasions by alien invasive plant species.	Developer/Contractor	Once
A species relocation plan must be developed and submitted to the Msunduzi Municipality: Environmental Management Unit for approval prior to any construction activities.	Developer	Once
A horticultural specialist must be appointed to identify and relocate sensitive plant species prior to any site works.	Specialist	Once

Appointment of Contractor:		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
An experienced and suitably qualified contractor must be appointed.	Developer/Engineer	Once
The EMPr must form part of the contractual agreements with any Contractor which must include any Sub-Contractor(s). The Contractor must take cognisance of this when budgeting during the tender process.	Developer	Once
The Contractor must comply fully with the authorisations, permits and licenses pertaining to the construction phase of the project.	Developer/Contractor	Once

Tender documents must allow for the employment of local community members.	Developer/Contractor	Once
The Contractor must provide Method Statements pertaining to implementation of the EMPr, emergency response plans, stormwater management, hazardous substance handling and storage, spill contingency plans, environmental incidents records file and complaints register.	Developer/Contractor	Once
The Method Statements must be submitted to the ECO for record keeping.	Developer/Contractor/ECO	Once

Appointment of ECO		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
An independent ECO must be appointed to monitor the implementation of the EMPr	Developer	Once
The Appointed ECO must monitor the project from an environmental perspective, as per the conditions of any authorisations, permits and licenses and according to the EMPr. The findings of each inspection must be documented in a monthly report and submitted to the CA.	ECO	Monthly or as specified in the Authorisation

Environmental Education and Training		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
The Contractor must receive environmental training to effectively implement the EMPr.	Developer/ECO	Once
The Contractor must relay training received to all staff and sub-contractors, in a language easily understandable to them. All contractors' representatives, sub-contractors and staff must acknowledge receipt of training in writing.	Contractor/SHE Officer/ECO	Once
Toolbox sessions must be scheduled and must include refreshers on environmental responsibilities.	Contractor/SHE Officer	Once
All site personnel must have a basic level environmental awareness training session. Topics covered must include: <ul style="list-style-type: none"> • What is meant by "The Environment", • Why the environment needs to be protected and conserved, • How construction activities can impact on the environment, • What can be done to mitigate against such impacts, 	Contractor / ECO	Once

<ul style="list-style-type: none"> • Awareness of emergency and spill response provisions, • Social responsibility during construction of the BESS e.g. being considerate of the local community who share the roads 		
The ECO must provide training to the Contractor’s representatives. It is the Contractors responsibility to provide the site foremen with environmental training and to confirm that the foremen have sufficient understanding to pass this information onto the construction staff. Translators must be used for thorough training.	ECO	Once
Training by the contractor must be provided to the staff members for use of the firefighting equipment.	Contractor	Once
Environmental awareness posters on site must be used to further facilitate compliance to the EMPr.	Contractor	Once
The need for a clean site policy must be explained to the workers. This includes prohibiting sanitation activities outside of the ablution facilities and toilets provided by the Contractor.	Contractor	Weekly
Staff operating equipment (e.g. loaders, excavators, etc.) must be trained and sensitised to any potential hazards associated with their tasks.	Contractor	Weekly/ Monthly
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 must sign a register confirming their attendance at this training. This register must be included in the site Environmental file.	ECO	Once
The contractor must monitor the performance of the workers to verify that the training was properly understood and is being followed.	Contractor	
The ECO must monitor the construction phase periodically to ascertain if training was effective.	ECO	Monthly
Areas that are demarcated as ‘No-Go’ areas must not be accessed by workers.	Contractor/ ECO	Once
There must be no trapping of animals on site.	Contractor/ ECO	Weekly/ Monthly
<p>Prior to construction, a final walk through must be conducted in order to confirm no flora Species of Conservation Concern (SCC) are present. If these species are found, the following must be conducted:</p> <ul style="list-style-type: none"> ○ Application for permits for the removal of listed plant SCC; ○ Removal and replanting/ relocation to a nursery of existing SCC; and 	ECO	Once

○ Planting of additional individuals of specific SCC.		
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Environmental Planning and Design		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
The ECO must assess and examine the environment for sensitive elements of flora and fauna which must then be demarcated and relocated accordingly.	Developer/ ECO	Once
Any erosion control measures must be incorporated from inception, these include: <ul style="list-style-type: none"> Sandbags, Hessian sheets, Retention or replacement of vegetation. 	Engineer	Once
Records of relocated flora and fauna must be kept.	Ecologist/ECO	Once
A set of “before” photographs must be captured for record keeping purposes and to monitor any degradation of the environment.	Contractor	Once
Before any construction takes place the proposed area for the BESS construction must be pegged out. All construction activities will be limited to these areas in order to reduce the footprint of the proposed activity and impact on adjacent natural vegetation and animal life.	Contractor/ ECO	Once/ Monthly
Construction areas must be fenced off or demarcated prior to and during construction.	Contractor/ ECO	Once/ Monthly
Keep the footprint of the development (particularly during construction) as small as possible. Excavations must be kept to the minimum size and stockpiles of soil piled adjacent to the excavation must take up as little space for as short an amount of time as possible.	Contractor/ ECO	Once/ Monthly
Laydown areas must be located exclusively in areas of low sensitivity including in areas that have already been disturbed or contain primarily alien vegetation.	Contractor/ ECO	Once/ Monthly

Site Establishment		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
The ECO / Engineer must approve the site selected for the Construction Camp.	Contractor/ ECO	Monthly
The construction camp must be defined, secured and limited to authorised contractors only.	Contractor	Monthly
The construction camp must be comprised of: <ul style="list-style-type: none"> • site office • ablution facilities • designated first aid area • eating areas • staff lockers • storage areas • refuelling areas (if required) 	Contractor	Daily
The ECO / Contractor must demarcate the construction camp so that the minimal amount of space is occupied.	Contractor	Monthly
The EO / ECO must approve alien weeds and invader plants that must be removed. The ECO must monitor that no trees are removed.	Contractor	Monthly
No development must be undertaken outside the current boundary of Elandskop Substation.	Contractor	Monthly
The Developer must ensure that no vegetation is cleared or damaged outside the Elandskop Substation property boundary.	Contractor	Monthly

6. CONSTRUCTION PHASE

The construction phase includes all activities on the site that are required to render the project operational. Environmental training must be provided to the contractor before commencement of construction activities. The duration of the construction phase is approximately 12 months.

General construction activities		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
The contractor must ensure that all employees, including sub-contractors and their employees, attend on-site Environmental Awareness Training prior to commencing work on site.	Contractor	Once or as and when required
Follow-up Environmental Awareness Training must be conducted 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.	Contractor / ECO	Monthly
The contractor must maintain accurate records of any training undertaken.	Contractor	Monthly
Training must cover all aspects of the EMP, procedures to be followed, the sensitivity of the site and importance of adhering to “no-go” areas.	ECO	Monthly or as and when required
The ECO must monitor the contractor’s compliance with the requirement to provide sufficient environmental awareness training to all site staff.	ECO	Monthly
Environmental signage must be displayed on the site including – “no smoking”, “fire hazards”, etc.	ECO	Monthly
Emergency numbers must be clearly displayed.	ECO	Monthly
Access to fuel and other equipment stores must be strictly controlled.	ECO	Monthly

Clearance of site		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
The appointed contractor must do an initial alien plant clearance and three follow up clearances.	Contractor/ ECO	As and when required
Site clearing must be limited to only the area designated for the specified works.	Contractor/ ECO	Monthly
“No-go” areas prior to earthworks commencing must be demarcated with danger tape for protection for the duration of the construction phase.	Contractor/ ECO	Monthly
The contractor must draw up a plan for submission to the ECO indicating the locations of construction infrastructure including the site-camp, paint or cement cleaning pits, toilets, site office, and “no-go” areas.	Contractor	Once
No unauthorised entry, stockpiling, dumping or storage of equipment in “no-go” areas, or outside the site boundary is permitted.	Contractor/ ECO	Monthly
All construction activities, plant, labour and materials must be restricted within the site boundary.	Contractor/ ECO	Monthly
Demarcation must remain in place for the duration of the work on site.	Contractor/ ECO	Monthly
Rehabilitation of disturbed areas must be undertaken within a month after construction activities have concluded.	Contractor/ ECO	Monthly

Earthworks		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
All trenches must be clearly demarcated and barricaded on site at all times	ECO	Monthly
Trenches must have one sloped side to allow animals which fall in to get out.	ECO	Monthly
The earthworks operation must be carried out by a suitably qualified contractor.	ECO / Contractor	Monthly

Storage, mixing, and disposal of cement and concrete		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
No mixing of concrete or cement directly on the ground is permitted. The mixing of concrete must only be done on a mixing tray or on impermeable sheeting.	ECO / Contractor	Monthly

Both used and unused cement bags must be stored in weatherproof containers so as not to be affected by rain or runoff.	ECO / Contractor	Monthly
Contaminated soil resulting from concrete or cement spills must be removed immediately after the spillage has occurred and placed on the appropriate rubble stockpile.	ECO / Contractor	Monthly
Clean stormwater must be kept away from areas where it could be contaminated and must be directed to the stormwater drainage system.	ECO / Contractor	Monthly

Soil Erosion		
Actions and Mitigation Measures	Responsible Peron(s)	Monitoring Frequency
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.	ECO / Contractor	Monthly
Soil erosion measures must be placed on sensitive areas like banks, slopes and towards the property boundary.	ECO / Contractor	Monthly
All stockpiles must be covered with suitable material to prevent loss of sediment via wind/ water.	ECO / Contractor	Monthly
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.	ECO / Contractor	Monthly
Topsoil must not be used as fill material for backfilling of excavations on site.	ECO / Contractor	Monthly
Minimize the amount of area that needs to be disturbed and the amount of time spent on sensitive areas.	ECO / Contractor	Monthly
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.	ECO / Contractor	Monthly
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.	ECO / Contractor	Monthly
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.	ECO / Contractor	Monthly

Stockpiling of topsoil and cleared vegetation		
Actions and Mitigation Measures	Responsible Peron(s)	Monitoring Frequency
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.	ECO / Contractor	Monthly
Excavated topsoil must be stockpiled separately from subsoil.	ECO / Contractor	Monthly
Topsoil is to be stockpiled in discrete areas and retained for future landscaping efforts.	ECO / Contractor	Monthly
Topsoil stockpiles must not exceed 2m in height and must be protected from wind, erosion and runoff by covering with a suitable fabric approved by the ECO.	ECO / Contractor	Monthly
When backfilling of trenches, replacement of subsoil must precede the topsoil replacement.	ECO / Contractor	Monthly
Backfilled soil must be compacted to natural compaction levels.	ECO / Contractor	Monthly
Prior to commencing with earthworks, the topsoil must be stripped and stockpiled separately from subsoil.	ECO / Contractor	Monthly
Topsoil must be kept for use during rehabilitation of landscaped areas.	ECO / Contractor	Monthly
If at risk of being eroded, all stockpiles must be secured with sandbags around the base of the soil stockpile.	ECO / Contractor	Monthly
All stockpiles must be established outside the 30m buffer of all watercourses and on flat ground.	ECO / Contractor	Monthly

Risk of alien invasive encroachment into disturbed areas		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
Protect as much indigenous vegetation as possible.	ECO / Contractor	Monthly
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.	ECO / Contractor	Monthly
Monitor all sites disturbed by construction activities for colonisation by exotics or invasive plants and control these as they emerge.	ECO / Contractor	Monthly
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.	ECO / Contractor	Monthly

All invasive alien plants must be removed from the construction area. Mechanical methods such as digging, hoeing, pulling out of weeds and invasive plants must be implemented.	ECO / Contractor	Monthly
Use of chemical treatment methods must be kept to a minimum.	ECO / Contractor	Monthly
Where chemical treatment methods are used, the contractor must ensure that watercourse friendly herbicides are used.	ECO / Contractor	Monthly
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.	ECO / Contractor	Monthly
All alien vegetation, both existing and new must be controlled throughout the construction and operational phase of the development.	ECO / Contractor	Monthly

Flora		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
Identify sensitive flora on the site prior to construction and demarcate the area as a no-go area.	ECO / Specialist	Once
Prior to the clearing of the site, the ECO and the Biodiversity Specialist must ensure that all plants of conservation significance are relocated for possible reuse.	ECO / Specialist	Once
The site boundary that currently exists must be maintained to identify the limits of the construction site.	ECO / Contractor	Daily
Burning of removed vegetation is prohibited.	ECO / Contractor	Monthly
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.	ECO / Contractor	Monthly
The ECO must ensure that a list of any indigenous trees/ shrubs which are to be removed is provided. This list must include the tree/ shrub species and the number of each species.	ECO / Contractor	Daily/ Monthly
It is recommended that where possible, protected species must be selected and planted in any garden as part of the development.	ECO / Contractor	Monthly

Fauna		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
Identify sensitive fauna on the site prior to construction and relocate species.	Contractor/ ECO	Monthly
Trapping/snaring/killing of animals including snakes and reptiles is prohibited.	Contractor/ ECO	Monthly
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.	Contractor/ ECO	Daily/ Monthly
Stormwater Management		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
Stormwater infrastructure currently exists on site; however, the following measures must be implemented: <ul style="list-style-type: none"> ○ 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. 	Contractor/ ECO	Monthly
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.	Contractor/ ECO	Monthly

Ground water and Surface water pollution		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
Chemical substances must be mixed or handled on impervious surfaces or bunded areas. Concrete must be mixed on impervious surfaces. 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.	Contractor/ ECO	Daily or as and when required
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.	Contractor/ ECO	Monthly
Spills that result in the contamination of ground and/or surface water must be reported immediately to the ECO.	Contractor/ ECO	Daily or as and when

		required Monthly
Spills must be managed in the following manner: <ul style="list-style-type: none"> - 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 - Document the spill - Employees involved in spill control must be using PPE 	Contractor/ ECO	Daily or as and when required Monthly

Cleaning on-site		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
No washing of vehicles or equipment is permitted on site.	Contractor/ ECO	Monthly
Cleaning of equipment is to take place within designated areas.	Contractor/ ECO	Monthly
A dedicated cleaning area must be demarcated to facilitate washing of all cement and painting equipment.	Contractor/ ECO	Monthly
No wastewater must be disposed on site, onto the soil or into any water body.	Contractor/ ECO	Monthly
Any soil contaminated by hydrocarbons (fuel and oils) must be removed and the affected area rehabilitated immediately.	Contractor/ ECO	Monthly

Increased traffic frequency on road infrastructure		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
All construction vehicles must be roadworthy.	Contractor/ ECO	Monthly
All loads must be securely fastened when being transported.	Contractor/ ECO	Monthly
All speed limits and other traffic regulations on the public roadways must be adhered to.	Contractor/ ECO	Monthly

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.	Contractor/ ECO	Monthly
Construction vehicles must use the agreed route to and from site. The Elandskop Substation has one entry- exit point which must be adhered to.	Contractor/ ECO	Monthly
Pointsmen to guide traffic for entry and exit of construction vehicles must be used where required.	Contractor/ ECO	Monthly
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.	Contractor/ ECO	Monthly
Construction phase must be as short as possible. Reliable building contractors must be employed to avoid delays.	Contractor/ ECO	Monthly
Vehicles must park on demarcated site only.	Contractor/ ECO	Monthly

Storage, spillage and disposal of hazardous chemicals		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
The following action must immediately take place in the event of spills: <ul style="list-style-type: none"> ○ 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. 	Contractor/ ECO	Monthly
All fuels and flammable materials must be handled safely, stored safely and clearly labelled. 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.	Contractor	Monthly
Flammable materials must comply with standard fire safety regulations.	Contractor/ ECO	Monthly
Drip trays must be used to collect spillage from equipment, vehicles and plant. These must be emptied regularly into secondary containers.	Contractor/ ECO	Daily or as and when required
Fuels and flammable materials must be handled in a safety conscious manner.	Contractor/ ECO	Monthly
Safety signage including “No Smoking”, “No Naked Lights” and “Danger”, and product identification signs, must be clearly	Contractor/ ECO	Monthly

displayed on the Battery system.		
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.	Contractor/ ECO	Daily or as and when required

Generation of general and domestic waste		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
Refuse skips must be used and must be covered with shade cloth to ensure the containment of waste.	Contractor/ ECO	Monthly
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.	Contractor/ ECO	Monthly
Refuse bins must not overflow and must be emptied regularly. No littering is permitted on site.	Contractor/ ECO	Monthly
Building rubble must be kept separate from other construction waste.	Contractor/ ECO	Monthly
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.	Contractor/ ECO	Monthly
All waste must be disposed of at approved landfill sites, no burning or burying is permitted.	Contractor/ ECO	Monthly
Personnel must be trained in etiquette regarding littering and waste management.	Contractor/ ECO	Monthly
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).	Contractor/ ECO	Monthly
A hazardous waste disposal certificate must be obtained from the waste removal company as evidence of correct disposal.	Contractor/ ECO	Monthly
On-site chemical toilets must be provided for domestic purposes during construction phase.	Contractor/ ECO	Monthly
The contractors are responsible for the maintenance of the chemical toilets.	Contractor/ ECO	Monthly
Waste must be collected by an accredited waste company and disposed of at an appropriate and licensed waste disposal facility.	Contractor/ ECO	Monthly
Littering is prohibited and general housekeeping must be enforced.	Contractor/ ECO	Monthly
Solid waste must be picked up on a daily basis, particularly in the vicinity of sensitive areas such as the wetland, in order to	Contractor/ ECO	Daily

prevent any build-up of wastes on site.		
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Fire risk		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
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).	Contractor/ ECO	Monthly
Equipment must be maintained in good working order to the satisfaction of local fire authorities.	Contractor/ ECO	Monthly
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.	Contractor/ ECO	Monthly
Burning of removed vegetation is prohibited.	Contractor/ ECO	Monthly
Smoking is prohibited near places where any readily combustible or flammable materials are present. Notices must be prominently displayed prohibiting smoking in such areas.	Contractor/ ECO	Monthly
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).	Contractor/ ECO	Monthly
All flammable materials must be stored in a lockable storage area.	Contractor/ ECO	Monthly
Combustible materials must not accumulate on the construction site.	Contractor/ ECO	Monthly
Cooking must be restricted to bottled gas facilities in designated areas approved by the ECO. This facility must be supervised and strictly controlled.	Contractor/ ECO	Monthly

Noise disturbance		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
Construction activities must be limited to normal construction industry working hour – avoid nighttime hours.	Contractor/ ECO	Monthly
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.	Contractor/ ECO	Monthly

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.	Contractor/ ECO	Monthly
No loud music is allowed on site.	Contractor/ ECO	Monthly

Air Quality		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
Dust control measures/suppression of dust must be implemented timeously by the contractor.	Contractor/ ECO	Monthly
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.	Contractor/ ECO	Monthly
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.	Contractor/ ECO	Monthly
Dust and mud must be controlled at vehicle exit and entry points to prevent the dispersion of dust and mud beyond the site boundary.	Contractor/ ECO	Monthly
Speed limit sign boards must be erected during the construction phase to limit dust emissions.	Contractor/ ECO	Monthly

Installation and use of ablution facilities		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
Chemical toilets must be cleaned on a regular weekly basis.	Contractor/ ECO	Weekly or as and when required
Servicing receipts must be maintained and kept on site within the site environmental file.	Contractor/ ECO	Weekly or as and when required
Chemical toilets must be provided to workers during the construction phase. A single chemical toilet must be provided for every 10 employees.	Contractor/ ECO	Monthly
Toilets must have properly closing doors and supplied with toilet paper.	Contractor/ ECO	Monthly

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.	Contractor/ ECO	Weekly
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Visual Quality		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
The site must be well maintained and neat.	Contractor/ ECO	Monthly
The contractor must adhere to project schedule in order to minimise the length of the construction period.	Contractor/ ECO	Monthly
Inspections of the site by an Environmental Control Officer are required.	Contractor/ ECO	Monthly

Public safety and health		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
Skilled contractors must be utilised for specialised tasks.	Contractor/ ECO	Monthly
Unskilled labour must be trained relevantly including environmental training.	Contractor/ ECO	Monthly
Fire safety measures must be included in the design of the facility. Fire safety equipment must be provided on site during construction.	Contractor/ ECO	Monthly
First aid kits must be available on site as well as an incident records file.	Contractor/ ECO	Monthly
Safety gear including hard hats and safety shoes must be provided and worn at all times while on site.	Contractor/ ECO	Monthly
Emergency numbers must be clearly visible on site.	Contractor/ ECO	Monthly
Contractor staff are prohibited from trespassing over the site boundaries.	Contractor/ ECO	Monthly
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.	Contractor/ ECO	Monthly
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.	Contractor/ ECO	Monthly

Fabrication		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
Welding with propane torches are required and propane must be stored in gas tanks on site within a designated area.	Contractor/ ECO	Monthly

Disturbance / Damage to Heritage Finds		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
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.	Contractor/ ECO	Monthly
A heritage specialist must be called to site to assess the significance of the find.	Contractor/ ECO	Monthly
Permits must be obtained from the Institute if heritage resources are to be removed, destroyed or altered.	Contractor/ ECO	Monthly
Only once the heritage specialist gives the go-ahead can work in the area of the find re-commence.	Contractor/ ECO	Monthly
Under no circumstances heritage material be destroyed or removed from site unless under direction of a heritage specialist.	Contractor/ ECO	Monthly
If recent remains be found on site that could potentially be human remains, then the South African Police Service must be contacted. No SAPS official must remove remains until the correct permit/s have been obtained.	Contractor/ ECO	Monthly
In terms of chance fossil finds, the following must be adhered to: <ul style="list-style-type: none"> ○ When excavation takes place for the construction of the BESS facility, any rocks disturbed during this process must be inspected by the environmental officer or designated person. Any fossiliferous material (trace fossils, plants, insects, bone, and coal) must be put aside in a suitably protected place. ○ Photographs of possible fossils must 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 	Contractor/ ECO	Monthly

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.		
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Socio Economic Impacts		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
Local community members must be employed where possible.	Contractor/ ECO	Monthly
Strict penalties must be built into tenders to deal with issues such as petty crime, fence cutting, trespassing etc.	Contractor/ ECO	Monthly

Closure of Construction Camp Site

- Once construction has been completed and all excess material has been removed, the camp site must be rehabilitated.
- Any spilled concrete must be removed, and any soil compacted during the construction phase must be ripped, levelled and re-vegetated or surfaced.
- After all construction work is complete, the contractor is required to dismantle/detach/demolish and remove the temporary facility from site and make good to all damage, to the satisfaction of the engineer and ECO.
- All structures comprising the camp site must be removed from the site.
- The camp, storage and waste storage areas must be inspected for spills of substances such as paint, oil, etc and these must be cleaned up.
- All temporary worker facilities must be removed or decommissioned.
- Copies of all certificates from any waste disposals are to be provided to the ECO.
- Burying of any waste on site is prohibited. All waste must be disposed of at a licensed waste facility, proof of safe disposal must be kept on site for record keeping purposes.
- The contractor must repair any damage that the construction works have caused to neighbouring sites.
- The ECO must be notified of the complete decommissioning of the site camp after which the ECO will perform a final audit of the site.

7. REHABILITATION PHASE

The Rehabilitation Phase refers to the closing of the camp site and site handover to the Developer.

General		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
The Developer is responsible for compliance with the provisions for Duty of Care and Remediation of Damage in accordance with Section 28 of National Environmental Management Act (NEMA), Act No. 107 of 1998.	Developer/ Contractor	Monthly
A meeting must be held on site between the Engineer, Site Environmental Officer, ECO and the Contractor to approve all remediation activities and monitor that the site has been restored to a condition approved by the Engineer.	Developer/ Contractor/ ECO/ Engineer	Once
All areas where temporary services were installed must be rehabilitated to the satisfaction of the Engineer.	Contractor/ Engineer	Once
Once rehabilitation has been carried out, a post-construction audit must take place for final compliance. The contractor must rectify any non-compliance found by this audit, prior to vacating the site.	Contractor/ ECO	Once

Site Clean-up		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
All remaining maintenance materials, building rubble and waste must be removed from the site. Remove all construction material from the area where construction has been completed. Removal of material must be undertaken by hand where possible.	Developer/ Contractor	Monthly
Upon completion of the project or decommissioning of the construction camp, the sites must be rehabilitated to the pre-use or determined purpose for the areas. If required, the surface must be ripped and re-vegetated.	Contractor	Monthly
All structures comprising the construction camp must be removed from site. The area that previously housed the construction camp must be checked for spills of substances such as oil, paint etc. and these must be cleaned up.	Developer/ Contractor	Monthly
The Contractor must arrange the cancellation and removal of all temporary services.	Contractor	Monthly
All temporary chemical toilets must be removed from the construction camp and be disposed in a manner approved by the	Contractor/ ECO	Monthly

Contract/ ECO.		
Final rehabilitation must be completed within a period specified by the Engineer.	Developer/ Contractor/ Engineer	Monthly

Vegetation and Alien Invasive Control Measures		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
All disturbed surfaces compacted by maintenance activities including ablutions and storage areas must be deep ripped to a minimum depth of 30cm to allow organic contaminants to breakdown and promote vegetation establishment.	Developer/ Contractor	Monthly
Topsoil that has been stockpiled during construction must be applied to the area to undergo rehabilitation. The depth of the topsoil layer to be applied depends on the natural depth of topsoil in the area, and the amount of topsoil that have been lost during construction.	Contractor	Once
The naked ground must be seeded with a stabilising grass mix, suited to the conditions. The quantity of seed used will depend on the slope, with a steeper slope requiring a heavier application of seed. For slopes: • >15°: 25-50 kg/ha • <15°: 15-25 kg/ha	Developer/ Contractor	Once
Herbicides must only be used when absolutely necessary and under the supervision of a manager, with previous experience in using and mixing herbicides.	Contractor	Monthly
The correct Personal Protective Equipment (PPE) must be used at all times.	Contractor	Monthly
Herbicides must not be used in close proximity to any watercourse or dams, unless the herbicide is specifically designed for the application and will not harm an aquatic environment and is highly selective.	Contractor	Monthly
All residual stockpiles must be removed to spoil or spread on site as directed by the ECO and the Engineer.	Contractor/ ECO/ Engineer	Monthly
Rehabilitation must take place as soon as possible after construction is completed and must comprise the planting of region-specific water wise plants (or wetland species where applicable).	Contractor/ ECO/ Engineer	Monthly

Employees		
Actions and Mitigation Measures	Responsible Peron(s)	Monitoring Frequency
Staff must take cognisance of this EMPr as well as any local Municipality Standard EMPr for construction, maintenance and management.	Developer	Monthly
Staff must abide by the mitigation measures that apply to waste management, sanitation, surface water pollution, traffic, access, soil erosion, stormwater management, protection of flora and fauna, public safety & health and the noise and disturbance factor.	Developer	Monthly
Employees must receive training with regard to environmental management.	Developer	Monthly
Employees must wear uniforms, supplied by the employer.	Developer	Monthly

Management and Monitoring		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
Immediate repair operation for any damaged portion of the new infrastructure must be taken.	Developer	As and when required
Buffer zones, gabion walls, ripraps etc., must be implemented to prevent stormwater from pooling and to direct stormwater to existing stormwater infrastructure on the surrounding roads and residential area.	Engineer	As and when required

8. OPERATIONAL PHASE

The Operational Phase is addressed in terms of the environment. Although it refers to the Management and Maintenance of the BESS, it is not to be used as an operational guideline for this task. The measures below are purely to ensure protection of the environment during the operational phase of the facility.

Vegetation loss		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
Indigenous landscaping must form part of the development. Areas that have been rehabilitated must be monitored to ensure the success of this component.	ECO / Developer	Monthly
Appropriate fire-fighting equipment must be kept on site at all time and must be easily accessible.	ECO / Developer	Monthly
No smoking must be allowed near batteries especially during maintenance and management of batteries.	ECO / Developer	Monthly

Fauna		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
Any fauna encountered on site must be safely located off the site towards the identified CBA.	ECO / Developer	Monthly
There must be no trapping/ killing or hunting of animals on site.	ECO / Developer	Monthly

Stormwater Management		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
Surface water off paved surfaces must be directed towards the stormwater inlets.	ECO / Developer	Monthly
All rainwater must be directed into the infiltration chambers.	ECO / Developer	Monthly
Clean storm water must be directed away from areas where it could be contaminated and must be directed to a storm water drainage system.	ECO / Developer	Monthly
The storm water drainage system must be maintained and not contaminated by other waste sources.	ECO / Developer	Monthly

Ground water and Surface water runoff		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
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.	ECO / Developer	Monthly
Proper management and disposal of waste must occur during the lifespan of the project, including during the 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.	Developer	Monthly or as and when required

Generation of waste material		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
The Service Manager must ensure that waste containers are provided for the collection of general waste at various points on the premises.	Service Manager	Monthly or as and when required
All containers must be kept in a clean and hygienic manner that prevents harboring of pests.	ECO / Developer	Monthly

Spillage of hazardous chemicals		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
Proper storage of chemicals must be within a lockable, well ventilated building.	ECO / Developer	Monthly
Storage areas for hazardous chemicals must comply with standard fire safety regulations.	ECO / Developer	Monthly
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.	ECO / Developer	Monthly
Adequate fire-fighting equipment must be available close at hand and no smoking is permitted within the vicinity of storage areas.	ECO / Developer	Monthly
Chemicals must be properly labeled and handled in a safety conscious manner.	ECO / Developer	Monthly
Bunded walls to retain possible spillages. To contain leaks, a primary container (tank) is within the battery technology itself, the	ECO / Developer	Monthly

secondary containment is the battery container, the tertiary containment is the concrete surface and / or bund.		
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Fire risk in batteries		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
Gas fire suppression must be used as acid is a part of the battery composition.	Contractor/ ECO	Monthly
Equipment must be maintained in good working order to the satisfaction of local fire authorities.	Contractor/ ECO	Monthly

Noise and disturbance		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
All noise generating plant such as air conditioning, fans, etc. are to comply with noise standards.	Developer	Monthly

Air emissions		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
The Service Manager must ensure that any emissions must be kept to a minimal.	Developer	Monthly
Regular maintenance and monitoring of the batteries must be undertaken to prevent leaks and abnormal emissions.	Developer	Monthly
Regular site inspections must be conducted by supervisors.	Developer	Monthly

Visual Quality		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
All flood lighting must comply with relevant municipal standards.	Developer	Monthly
No unauthorized or un-approved structures must be erected.	Developer	Monthly

Safety of employees		
Actions and Mitigation Measures	Responsible Person(s)	Monitoring Frequency
No unauthorized access is permitted.	Developer	Monthly
Service managers and supervisors inspecting the site must be PPE.	Developer	Monthly

9. PROPOSED MONITORING AND AUDITING

9.1. Site Audits

- The construction and operational activities must be inspected, according to the conditions of the environmental authorisation, which is generally once a month during construction.
- The date and time of the inspection may not be available to the contractor and/or developer in advance.
- The audit must be executed by an independent environmental control officer (ECO).

9.2. Audit Methodology

- The inspection will cover all aspects stipulated in the proposed management plan.
- Each action will be assigned according to “Adequately done”, “Inadequately done” and “Not done”.
- The ECO may adjust actions if they are not effective in protecting sensitive elements or mitigating threats. This may require an amendment to the EMPr and DEA must be consulted prior to any changes.
- Audits will be well documented in Monthly Audit Reports and submitted to the Competent Authority and the Project Manager as per the agreed frequency contained in the authorisation.

9.3. Responsibility

- Ultimately, the applicant is responsible for the **implementation** of the environmental management programme.
- If a concern be raised by an interested and affected party and/or stakeholder, DEA will refer to the monthly audit reports from the ECO.
- The ECO is not responsible for the implementation of the EMPr but is responsible for auditing the developer’s and contractor’s compliance to the EMPr.
- Following the rehabilitation of the affected site and the final ECO inspection and report, a site handover to the developer must be scheduled.

CLOSING COMMENTS

- This EMPr will be submitted to DEA for approval.
- The Client’s/Contractor’s Environmental Code of Conduct and specialist study reports must be provided as Appendices to this EMPr in the Environmental File during construction

Appendix 1

Battery Energy Storage System

Elandskop – Sat Overview



Elandskop – Conceptual Design

